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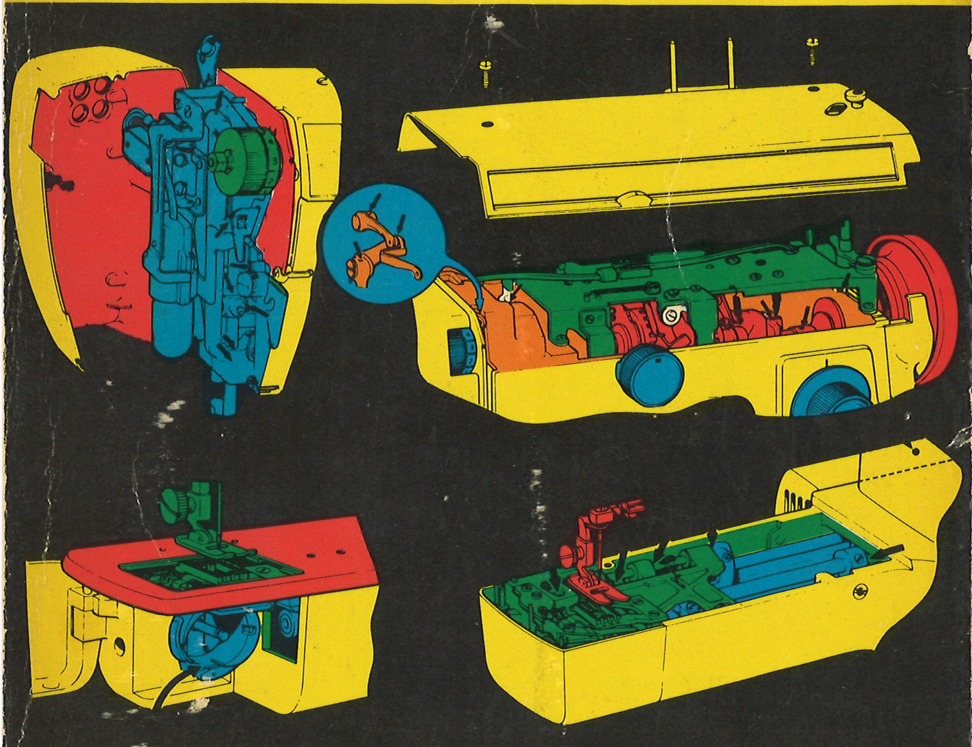
THE COMPLETE HANDBOOK OF SEWING MACHINE REPAIR

How to service, adjust, and repair ALL kinds of sewing machines!



BY HOWARD HUTCHISON

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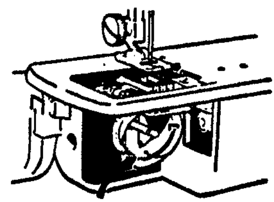

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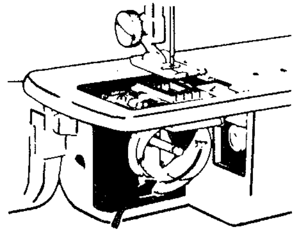
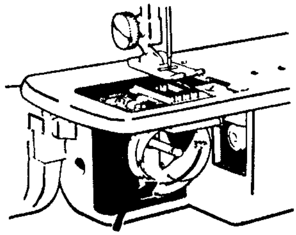


Preface



One of the most durable and useful consumer items that has been made available to the general-buying public in the past two or three generations is the sewing machine. Rudimentary sewing machines date back as far as the early 1800s, and models that were prototypes of today's modern sewing machines appeared, although were not widely available on a consumer basis, around the mid-1800s.

Unlike many consumer items, sewing machines appear not to have built-in obsolesence factors, nor have they been traditionally designed to self destruct when the last payment is made. Each and every sewing machine manufacturer whose cooperation was solicited in compiling this manual expressed a tremendous pride in the quality of the material and workmanship that goes into the machine that he manufactures. All moving parts are milled with high precision. All mechanisms are engineered and designed to operate efficiently at high speeds. A sewing machine designed and built in 1800 could sew 250 to 300 stitches per minute but today's consumer machines are capable of producing between 800 and 1,200 stitches per minute, depending upon the model. Today's machines produce intricate stitching of consistently uniform quality through a wide range of stitch lengths, designs, etc. Adjustments and regulations are incorporated into these mechanisms, allowing the operator to make adjustments within an extremely fine tolerance, virtually while the machine is running. Also, because any consumer item must have eye-appeal, the sewing machine will have other features which conceal the built-in qualities.

Apart from the creative satisfaction that many women (and a few men) obtain from creating sewn products, the rule-of-thumb is that home-sewn clothing will cost about one-half that of manufactured clothing, excluding the cost (principal cost and interest) of owning a sewing machine. Further, most devotees of home sewing will claim that home-sewn clothing is of superior quality to manufactured clothing; however, in fairness to the manufacturers of clothing, I would say that this is true only to the extent that the price of manufactured clothing is a major factor. Nevertheless, the experienced and careful home seamstress can make clothing that is comparable in value to the *best* of manufactured clothing, achieve a variety of styling that may not be available in store-bought clothing, do this for approximately one-half the cost of store-bought clothing and fulfill a creative urge while doing it. Also, while we dislike to believe that there are any poor people left in the United States, the sewing machine offers a distinct financial advantage to people of limited means, particularly those with large families of growing children. In regard to status, however, most people who sew extensively can well afford to buy ready-made clothing.

Another facet of home-sewing, which may be of diminishing importance with the widespread availability of welfare assistance, is that home-sewing is one of the few remaining cottage industries—industries which can be operated from a home base with a moderate amount of success. The experienced and industrious home seamstress can establish a reliable part-time or full-time income by sewing *creations*, or specially fitted apparel, for clients with exotic or exclusive tastes. This can be done with a minimal investment in both equipment and materials. Sewing machine prices remain moderate, with new zig-zag machines starting at slightly over $100.00 (circa 1978). Excellent used models that would have cost the equivalent of 600 1978 dollars when new can often be found now for as little as $50.00. Threads, materials, patterns and sewing machine accessories are usually available locally, so that there is seldom the need for special ordering.

Still another intriguing facet of home-sewing is that if it is done as a hobby, there is not the need to buy the seemingly unlimited gadgetry associated with many other hobbies. Ample space to work would be luxury, but not a necessity, since home-sewing is not by nature a space hog. A professional cutting table would also be a luxury, but fold-away cutting tables are readily solving the cutting table problem. The basic hand-tools, such as scissors, seam-rippers, etc., are relatively inexpensive and long-lasting. Sewing machine accessories for a variety of sewing applications, such as special purpose feet, are available for even the older machines. They are also inexpensive and virtually indestructible.

If the sewing machine is durable and long lasting, you might well ask, what is the need of a manual on sewing machine maintenance and repair? The need is rooted in the unremitting battle that man must wage against *any* machine, no matter how durable and reliable, and finds its application in a most general way in caring for machines that have been used, or misused, for considerable lengths of time. A majority of the people who operate machines of any kind tend to believe that the best of all possible maintenance virtues is to leave a machine alone as long as it is functioning. Prevalent is the belief that over oiling gums a machine up. Many people simply refuse to make any external adjustments on a sewing machine as long as it makes any semblance of a stitch. At the other extreme are the few persons who continually adjust everything on a machine, whether or not adjustments are needed, and when the machine finally appears to malfunction, it is usually relegated to the attic. Generally, however, these poor maintenance practices don't stem from negligence, but from misinformation. Diverse as the differing concepts seem, all these people have one thing in common: They all want optimum performance out of a machine, and they go about getting it in their own personal way.

However, optimum performance from a normally operating sewing machine is only possible under four conditions:

- The operator must come to terms with the machine.
- Someone (preferably the operator) should perform routine maintenance on the machine.
- The operator should know where the external adjustments are located, and how and in what circumstances they are used.
- The operator should know how the various threads and materials affect sewing machine operation, and should apply this knowledge routinely.

When these four conditions are fulfilled, a sewing machine will not appear to malfunction unless there is something truly wrong with it.

Finally, even a well used and cared for sewing machine may experience cumulative wear to a point at which internal adjustments or new parts are needed. When this occurs, you may trade the machine in a new one, or on a new used one, or call a repairman or analyze and correct the problem yourself. Which of these choices you decide upon depends upon many factors, not all of which are within the scope of this book. If you consider the machine worth repairing, the choice to be made is essentially the same one you make when deciding whether to call a plumber to repair a leaking faucet, or repair it yourself. Do you repair your own leaky plumbing? Do you tune up your own car? Do you do the maintenance and minor repairs on your lawnmower? Do you replace broken windows yourself? If you do all of these things, the premise of this book is that you can make the internal adjustments on your own machine, and in 95% of cases you can make repairs.

We can make the above statement because, apart from electronic controls that have replaced manual controls, there has been no radical departure in sewing machine mechanisms in over 30 years. Even the advent of the zig-zag machines made only slight changes in basic sewing mechanisms. When compared to the mechanisms of many other machines (electric typewriters, for example), the sewing machine mechanisms are straightforward and simple, with most of them being easily accessible and highly visible. In this book we provide adjustment, repair and technical data on a variety of models of four name-brand machines, preluded in the first three chapters by general adjustment and repair information which could be applied in a common sense way to most of the sewing machines that you might encounter. In Chapter 3 we will discuss maintenance, repair and adjustment from the viewpoint of the repairman, as it would apply to a representative cross-section of machines currently in use. In the chapters that follow Chapter 3, we will outline specific maintenance, repair and adjustment procedures for a limited number of model of machines manufactured by and bearing the various brand names of the following companies:

- Chapter 4: *Pfaff*
- Chapter 5: *White*
- Chapter 6: *New Home*
- Chapter 7: *Brother*

To aid in compiling this information, all of these companies have provided us with technical manuals, and in some cases, parts lists, which are duplicates of those used by professional servicemen. So that the professionally-oriented data from the manuals might be clarified for layman-readers, substantial portions of it have been rewritten, and then submitted to the technical departments of the various companies to be read for accuracy.

The best way to read the book is to read the first three chapters in detail, then use the later chapters on specific models as a sort of reference book. If you can't find your particular brand or model in the later chapters, it's a good bet that if you apply the general principles found in the first three chapters, together with the information on a model that is somewhat similar to yours, you will arrive at a viable repair procedure. In so doing, you will achieve the satisfaction reserved for the most intrepid breed of all—the great American do-it-yourselfer.

I wish to thank the following companies for material and illustrations:

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The NewHome Sewing Machine Company
White Sewing Machine Company

Howard Hutchison

Basic Sewing Machine Mechanisms

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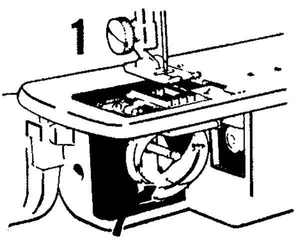


Sewing machines for home use can be broadly classified into two types:

- Those that sew only a straight stitch.
- Those that sew a zig-zag as well as a straight stitch.

Insofar as internal mechanisms are concerned, these two basic types can be further classified in accordance with the type of *loop-catching* mechanism that is employed. Loop catching is a general term used to describe the interaction between the thread loop that is formed when the sewing machine needle carries the top thread through the material to be sewn, and the thread that is carried in the sewing machine bobbin. The two basic types can also be classified by the variations of stitching that can be produced by the machine.

STRAIGHT-STITCH SEWING MACHINE

The basic home-sewing machine, as it was generally (but not exclusively) known and used throughout the early part of this century and into the post World War II years, is the one that produces only a straight stitch. The top and bottom stitches are visible on the sewn material. Apart from an unwavering straightness, this stitch has one characteristic in common with its zig-zag counterpart, inasmuch as in both types of stitching, the top and bottom stitches are interlocked between the two fabrics being sewn. The stitches are invisible, provided the machine is properly adjusted. Even when only one thickness of material is sewn (as in darning), the interlocking of the top and bottom stitches will virtually disappear into the fabric if the machine is properly adjusted. This interlocking feature, which is of primary importance to successful sewing, will be discussed in detail as we go along.

The early straight-stitch machine was at once a marvel of ingenuity and simplicity for its time. Although it had only to sew a straight stitch, if the stitch was to be both durable and neat, the machine had to accomplish this with the top and bottom stitches firmly and invisibly interlocked. For the sake of appearance, the individual stitches had to be of uniform length and unwavering from the line along which they were sewn. Finally, to fulfill what was expected of mechanization, these machines were designed to operate at what would even today be considered reasonably high speeds. An early treadle-operated machine could be made to sew about 800 stitches per minute, and when this same machine was powered by a fractional horsepower electric motor, it would sew between 800 and 1,200 stitches per minute, depending upon the model.

BASIC STRAIGHT-STITCH MECHANISMS

It is by this time only of academic interest that the older sewing machines were powered by foot treadles, connected to an external driving mechanism by a series of linkages and pulleys which ultimately applied a rotating motion to the drive pulley of the machine as the foot treadle was pumped up and down. What is more important to understand is that, if the treadle mechanism was disconnected and replaced with an electric motor of the appropriate rating, RPM and pulley size (as was often done with the old treadle *Singers*), the rotating motion of the electric motor could be imparted directly to the drive pulley, via a reduction pulley and drive belt. The speed of the motor can be made variable by connecting a variable rheostat ahead of it in the electrical circuit. The rheostat can be made to operate as either a knee or foot control, thereby allowing the operator the freedom of her hands as she runs the machine through a range of speeds that is continuous between the lower and upper limits. The motors are typically rated on the order of around 1/20 horsepower, to be used universally on either alternating current, within a wide range of alternating current frequencies, or on direct current. However, the *voltage rating* of consumer machines manufactured for use in the U.S. is never in excess of the house-current voltage of 110-120 volts. The RPM of these small motors is generally around 4,000 to 5,000, which when imparted to the drive pulley at a reduction of about 7:1, will cause the machine to operate throughout an optimum range of speeds when activated through the rheostat control. Depending upon the manufacturer, some motors are equipped with oiling points through which the bearings can be oiled. Others require no oiling throughout their lives. Motor maintenance, which consists primarily of replacing brushes, will be discussed in more detail in Chapter 3. If a motor is allowed to run free, that is, disconnected from the belt that couples it to the drive pulley of the machine, it may be damaged.

The rotating motion of the drive pulley is transmitted to the various internal mechanisims, and thence to the external sewing mechanisms, through a series of shafts, cranks, connecting rods, linkages, gears, pulley, belts and eccentrics. Moreover, since the motions of the mechanisms in the upper arm of the machine (the reciprocating motions of the needle bar and take-up lever) must synchronize with the motions of the mechanism in the lower bed of the machine (the feed dog and the loop-catching mechanism), these upper and lower internal mechanisms must be connected together.

As a general statement, we can say that if the sewing machine is of an older vintage, with the old-style, *vibrating* loop-catching mechanism, or a more recent but less expensive model with the *oscillating* loop-catching mechanism, the upper and lower internal mechanisms will be connected together by a connecting rod, forked to fit a crank bend in the main (upper) shaft and thence to a pivot point on the shuttle driving (bottom) shaft. This arrangement transmits a vibrating or oscillating motion to the loop-catching mechanism. If, on the other hand, the machine is the new, or more expensive, model with a *fully rotating* loop-catching mechanism, the upper and lower mechanisms will be connected together with either a timing belt or a shaft geared to the main shaft, thereby creating a more positive, full rotation of the loop-catching mechanism. In either arrangement, however, the back-and-forth motion of the feed dog will usually be accomplished through a forked feed drive connection that is fitted to a cam in the main shaft in the upper mechanism and to a pivot point on the feed drive shaft in the lower mechanism. To better understand the basic mechanism, refer to Fig. 1-1.

As the main shaft (S) rotates, cam (c) rotates, imparting a rocking motion to the forked feed drive connection (F) which is transmitted through the feed drive shaft (Sf) to the feed dog (D).

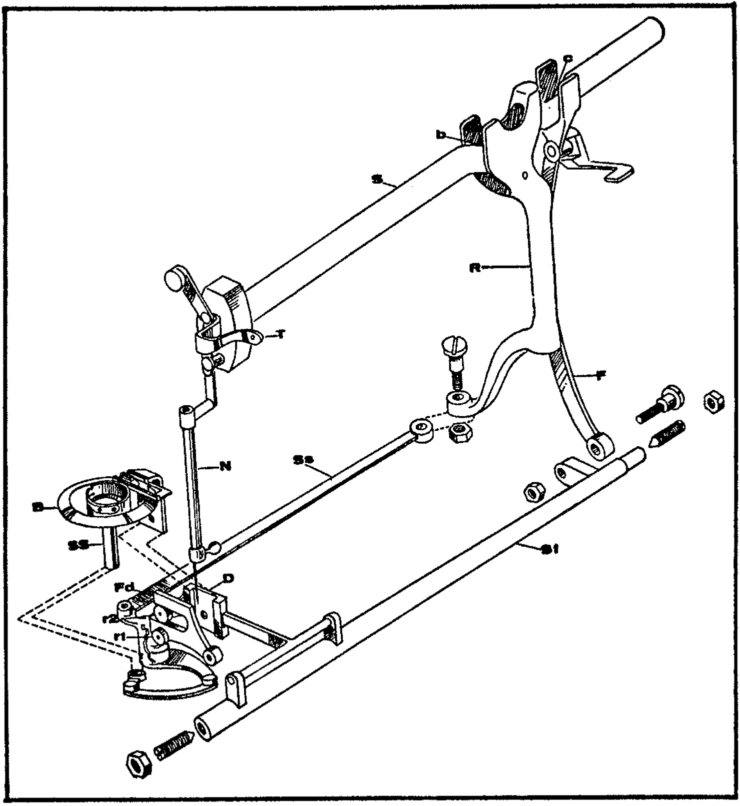


Fig. 1-1. The basic sewing machine mechanism is simplicity in itself. The adjustment screws and locking nuts in line with the center of shaft s1, provide a means of aligning the feed dog.

Simultaneously, the crank bend (b) imparts an oscillating motion to the connecting rod (R), which transmits that motion laterally through the shuttle connecting shaft (Ss) to the bobbin shuttle (B).

Each time the main shaft makes one complete revolution, the bobbin shuttle makes one oscillating motion that places the shuttle hook in position to pick up a thread loop, and a second oscillating motion that moves the hook about 180° from the loop pick-up position, where the looped thread will slip off the hook and pull the bobbin thread up into the material. Further, with each complete revolution of the main shaft, the needle bar (N) goes through one complete cycle, and the take-up lever (T) also goes through one complete cycle. The functions of the needle bar, take-up lever and shuttle will be explained more fully under the heading *Loop Catching*

Mechanisms. It is also necessary that as the feed dog is made to go back and forth by the feed drive mechanism, it must also be made to move up and down. This will be explained more fully under the heading *Feed Drive Mechanism*. This up and down motion can be accomplished in a variety of ways, and in this particular mechanism, as the oscillating shuttle spindle (SS) oscillates, the roller (rl) rides up and down on a spiraling shoulder that is incorporated into the shuttle spindle, imparting a similar up-and-down motion to the fork (Fd), which is transmitted through roller (r2) to the feed dog.

Moreover, since accurate synchronization, or *timing*, of the upper and lower mechanisms is essential, the relative positions of these upper and lower mechanisms are established through the design and installation of the parts. If the upper and lower mechanisms are connected through rods (as in Fig. 1-1), this timing is established by simply installing the main shaft, connecting rods

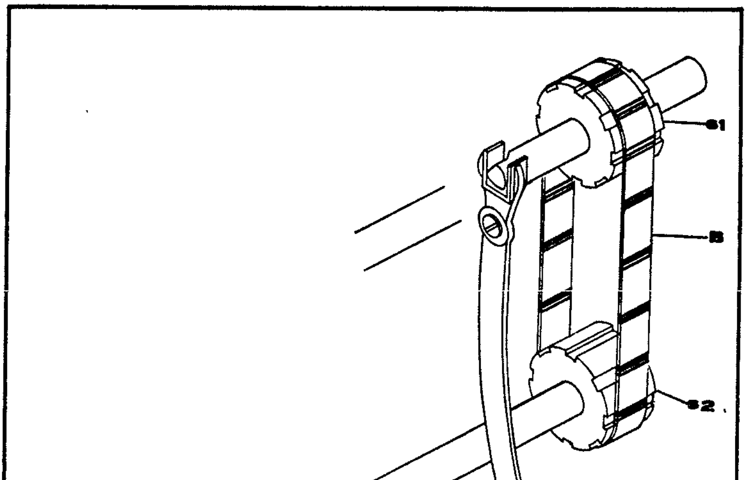


Fig. 1-2. This drawing shows how full rotation of the shuttle is accomplished. In some machines, full rotation of the shuttle is accomplished through gears, or the timing belt may be found located horizontally under the bed of the machine.

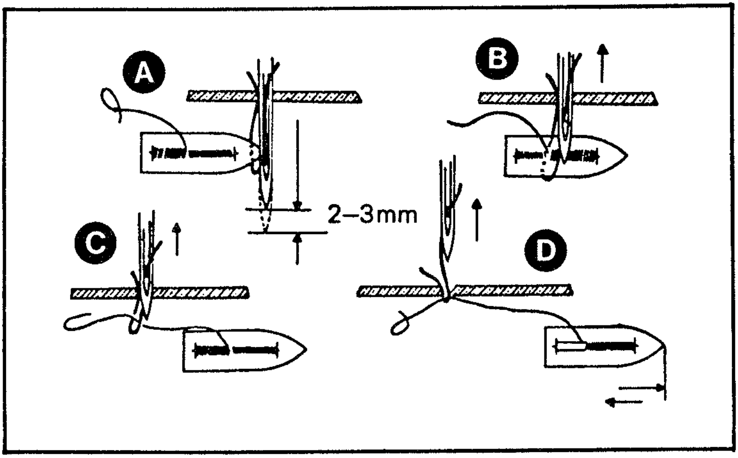


Fig. 1-3. Steps A, B, C, and D show the movement of the vibrating shuttle as it goes through its cycle of catching the thread loop. Only relatively old machines have the vibrating shuttle.

and lower shafts so that when the crank bends of the main shaft are imparting maximum thrust to the forked rods, the lower shafts are at their maximum throw.

If the upper and lower mechanisms are connected through a combination of connecting rod and timing belt (Fig. 1-2) the timing of the upper mechanism to the feed dog is accomplished as described above and the timing of the upper mechanism and the rotating shuttle is accomplished through the relative positions of the sprockets (s1) and (s2). They are maintained by the cleated timing belt (B). In this latter arrangement, the repairman is aided in the installation of major parts by *timing marks*, the locations of which will be described in the Chapters relating to specific brands and models.

Once the basic timing of the mechanisms is established through the correct installation of the major parts, precision timing of the shuttle, feed dogs, needle bar, etc., is accomplished through adjustments at these points, which will be described in detail in Chapters 3 and 7.

Loop-Catching Mechanism

As indicated earlier, loop catching is a general term to describe the interaction that takes place between the thread loop that is formed when the sewing machine needle carries the top thread through the material, and the bottom thread that is supplied by the sewing machine bobbin.

The sewing machine needle has a long groove on one side and a short groove on the other side, the purpose of which is to provide a space for the thread, thereby minimizing resistance as the downward cycle of the needle pushes the thread through the material. When the needle has reached its lowest point, the thread on both sides of the needle is pushed firmly into the grooves. Simultaneously, the take-up lever is moving downward in its cycle, supplying thread. When the needle rises just slightly (2mm to 3mm in most machines), the thread on the short grooved side of the needle jams against the body of the needle, causing a loop to be formed. The take-up lever continues to move downward, supplying thread so that the loop can be enlarged. It is then that the timed action of the shuttle causes the bobbin and bobbin thread to be passed through the loop, in the case of the *vibrating shuttle* (Fig. 1-3), or the loop to be carried around the bobbin, and thus around the bobbin thread, in the case of the *oscillating shuttle* or the *rotating shuttle* (Figs. 1-4 and 1-5).

Regardless of which shuttle is used, the end result is that the top and bottom threads are now interlocked. The take-up lever continues to move downward until the needle is about halfway up and out of the material. It then starts its upward motion to tighten and firmly interlock the stitch by pulling against the tension created between the upper tension regulator and the bobbin tensioner. The needle is raised to its highest point and starts downward. At about

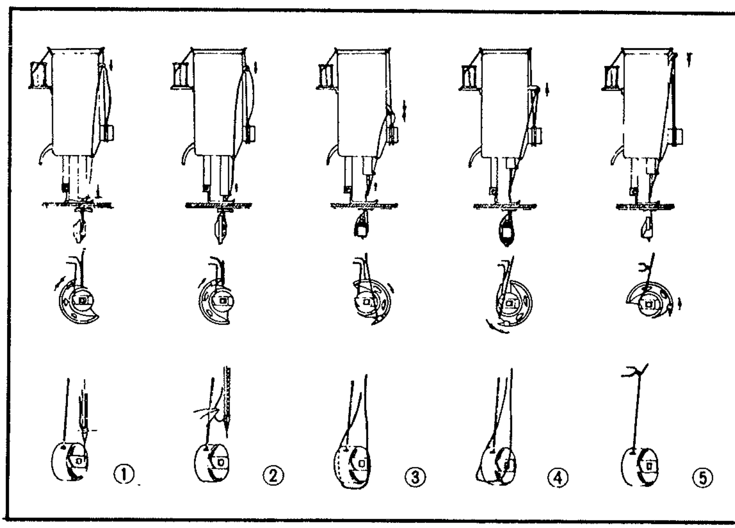


Fig. 1-4. Steps 1 through 5 illustrate how the oscillating shuttle picks up a thread loop.

the same instant, the take-up lever begins its downward motion, and the cycle is repeated.

In case there is no material for the needle to penetrate, a slack loop will nevertheless be formed when the needle is passed into the shuttle area on a downward cycle. This loop will fulfill effectively the same purpose as the loop just described, allowing the operator to pick up the bobbin thread in preparation for sewing.

As suggested in the above paragraph, there are three kinds of shuttles in general usage today:

- the vibrating shuttle
- the oscillating shuttle
- the rotating shuttle

When shopping for a used sewing machine, you should ask the dealer to tell you which kind of shuttle is used in the particular machine that interests you. If it is a vibrating shuttle you can assume that in age, this machine pre-dates one that has either the oscillating or rotating shuttle. If it has an oscillating shuttle, you have to determine the age of the machine from other factors, since oscillating shuttle machines are still being manufactured. In judging the value of machines of comparable age, you can assume that if all other factors seem equal, the rotating shuttle machine is considered superior to the oscillating shuttle machine. Accordingly, if you are comparing the costs of new machines, you will find that in a given brand of machine, top line machines have the rotating shuttle, while the less expensive models have the oscillating shuttles. The exception to this general rule is that as the trend in new machines is more and more toward the more efficient rotating shuttle, sacrifices in convenience features are made in the less expensive models.

Descriptions and working methods of the three shuttle systems are as follows:

The Vibrating Shuttle. The vibrating shuttle (Fig. 1-3) may also be called the *boat shuttle*. It is a torpedo-shaped shuttle which holds a long, cylindrical bobbin. The vibrating action of this shuttle, which is along its axis, is timed so that the shuttle will pass through the top thread loop, thus passing the bobbin thread through the loop. Note that it does not begin its return motion until after the needle has passed through the material on its upward stroke.

The Oscillating Shuttle. The oscillating shuttle (Fig. 1-4), which is semicircular in shape, partially encircles the bobbin holder. It is designed with a pointed portion, called the *hook*, which passes through the loop as shown in Fig. 1-4.

- Step 1 shows the needle at its lowest point, with the take-up lever having passed its highest point and moving downward.
- Step 2 shows the clockwise oscillation of the shuttle to where the hook enters the loop
- Step 3 shows the hook carrying the loop around the bobbin thread as the shuttle continues its clockwise motion, with the take-up lever at its lowest position and ready to be raised.
- Step 4 shows the hook about 180° from where it picked up the loop. The upward motion of the take-up lever pulls the loop off the hook.
- Step 5 shows the top and bottom threads interlocked, the take-up lever at its highest point and the shuttle moving counterclockwise to return to its starting position and repeat the cycle.

The Rotary Shuttle. The rotary, or fully rotating shuttle (Fig. 1-5) is also equipped with a hook that passes through the loop.

- Step 1 shows the needle at its lowest point with the take-up lever moving downward and the shuttle moving clockwise.
- Step 2 shows the take-up lever continuing to move downward and the hook entering the loop.

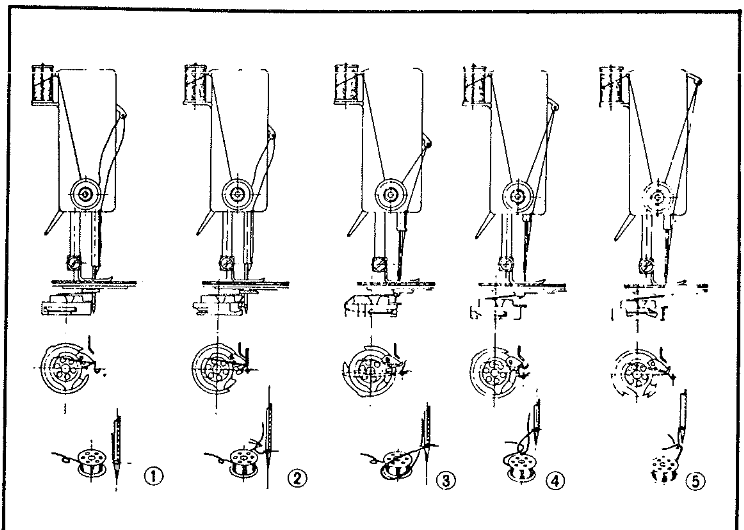


Fig. 1-5. Steps 1 through 5 illustrate how the fully rotating shuttle picks up a thread loop.

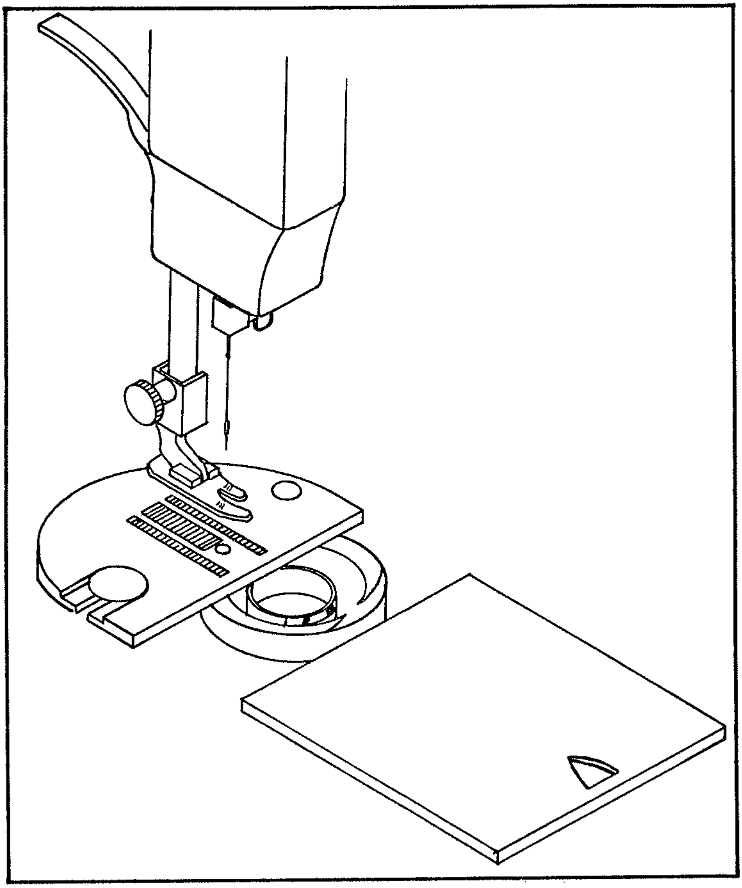


Fig. 1-6. If a portion of the divided throat plate slides outward, the shuttle will be located as shown.

- Step 3 shows the take-up lever at its lowest point, the needle being raised above the material and the loop being carried around the bobbin thread.
- Step 4 shows the take-up lever being raised and the thread loosely interlocked. The hook has returned to its original position, where it will not pick up a loop this time because the needle is above the material.
- Step 5 shows the take-up lever in its highest position and the threads firmly interlocked. The needle is descending and the timed action of the shuttle is carrying the hook clockwise to where it will pick up a loop and and the cycle will be repeated.

Identifying the Shuttle

To identify the shuttle used on a particular machine, you may gain access to the shuttle by one of a variety of methods, depending upon the machine:

- By rotating the balance wheel slightly toward you, make sure the needle is at its highest position.
- If the throat plate is the divided type that can slide toward you or to the left (Figs. 1-6 and 1-7), slide it and the shuttle

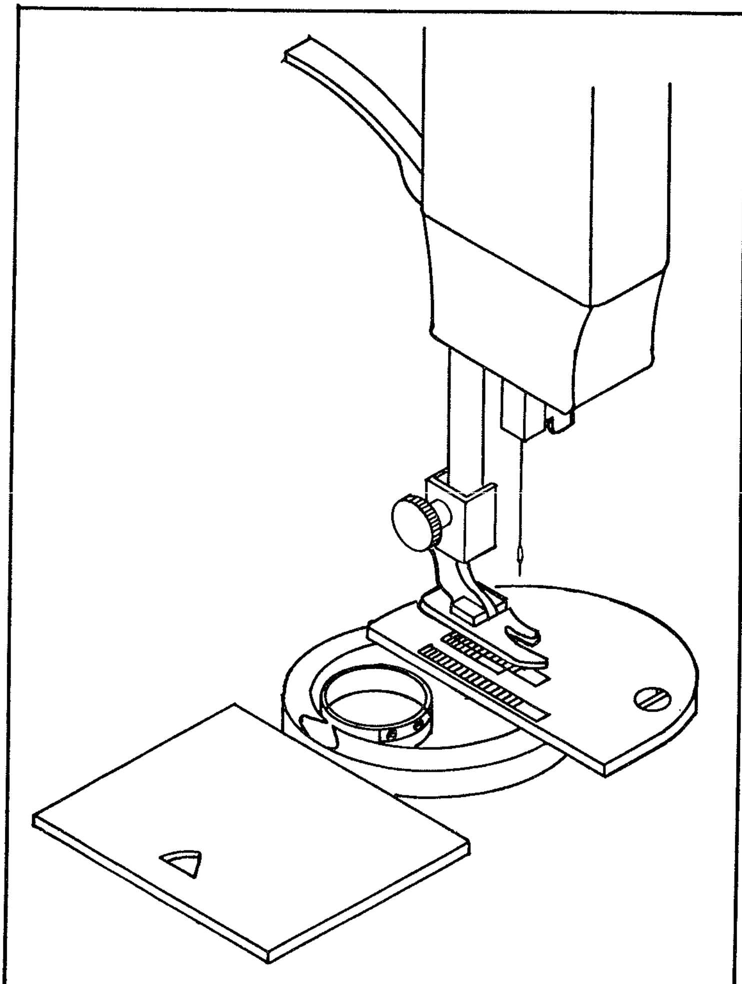


Fig. 1-7. A section of a divided throat plate may also be moved to the left.

mechanism and the bobbin will be exposed. Remove the top thread and with the presser foot in the up position, rotate the balance wheel toward you.

1. If a torpedo-shaped shuttle moves laterally across the area of the bobbin, the machine is of the vibrating shuttle type.

2. If a circular shuttle oscillates back and forth around the bobbin, the machine is of the oscillating shuttle type.

3. If a circular shuttle rotates completely around the bobbin, the machine is of the rotating shuttle type.

- If the throat plate is of solid construction, or does not slide, you can assume that access to the bobbin and shuttle must be gained underneath the bed of the machine. This is done either by swinging the head of the machine up and back or as done primarily on portables, by opening access doors at either the front, or the left end, of the machine. Since the bobbins in this type of mechanism are installed vertically, with their rotating axises parallel to the bed of the machine, they must first be installed in the bobbin case and then in the machine, with the hole of the bobbin over a centrally-located stud. The bobbin holder will be equipped with a latch, which serves the purpose of retaining the bobbin case and bobbin in the shuttle (Fig. 1-8). To remove the bobbin case and bobbin, spring the latch outward and pull the bobbin case out of the mechanism. To determine whether this machine has the oscillating or rotating shuttle (it will not have the vibrating shuttle), go through the procedures 2 and 3 just described, being sure to remove the top thread and raise the presser foot before rotating the balance wheel. To re-install the bobbin case and bobbin, be sure the needle is again at its highest point. Then with the bobbin in the case, and the thread threaded through the bobbin tensioner, place the entire assembly over the central stud and rotate it slightly to left or right while pushing. It will snap into place with an audible click. When the bobbin case is firmly in place, you should not be able to remove it without springing the latch outward.

If the machine is of the oscillating or rotating shuttle type, it is called a *central-bobbin machine* (because the bobbin is centrally located in the shuttle mechanism). If access is gained to the bobbin through the top of the machine, it is called a ***drop-in*** or ***top-loading***

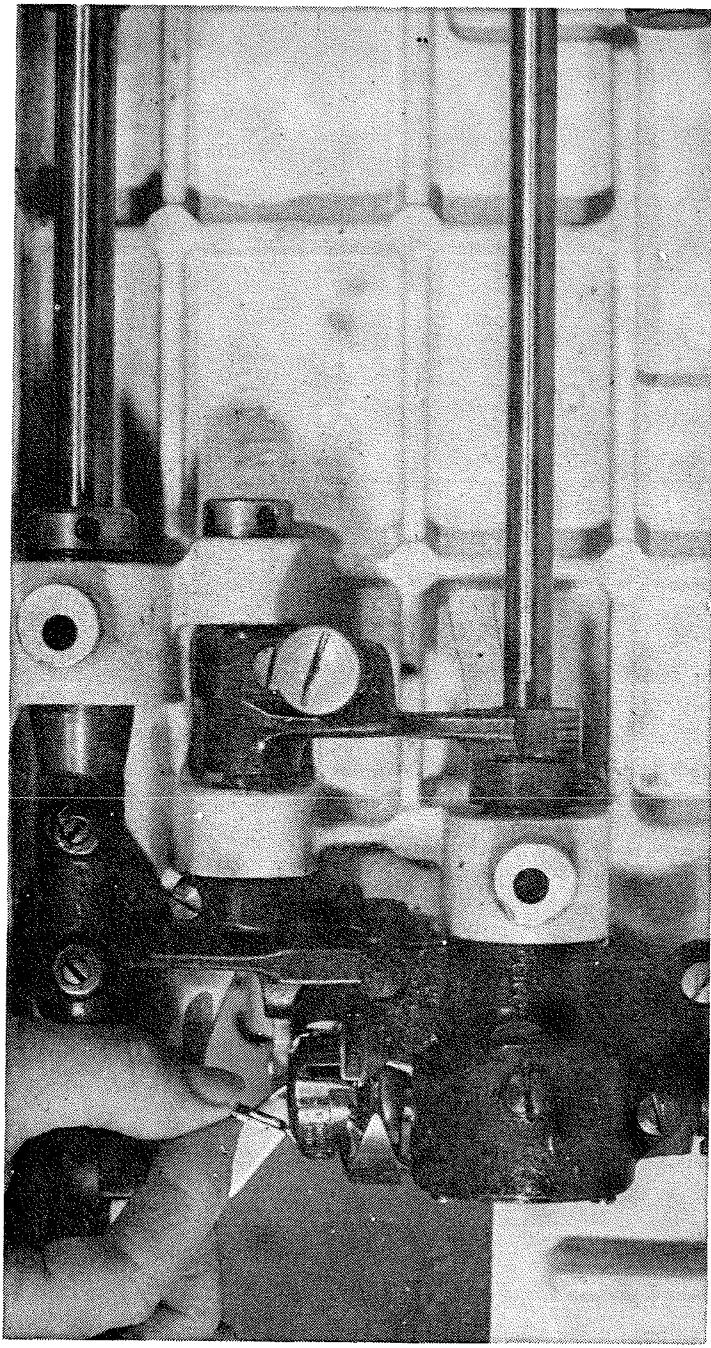


Fig. 1-8. The bobbin case and bobbin is being removed from the Singer 319W.

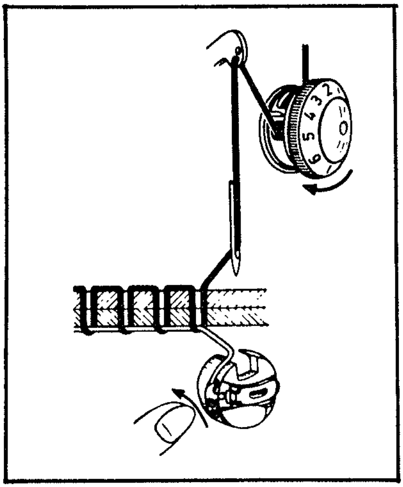


Fig. 1-9. Tension regulator of the tensioning circuit.

machine. If access is gained under the bed of the machine, it is called a *front-load* machine (in which case the side of the bobbin faces the operator), or a *side-load* machine (in which case the side of the bobbin faces the left end of the machine). In the drop-in machine, the bobbin case is an integral but removable part of the machine, and the thread-loaded bobbin is simply dropped into the bobbin case. In the side-load or front-load machine, the thread-loaded bobbin must first be placed in the bobbin case, and then into the machine as just described. In either type of machine, the bobbin case itself must be threaded with the bobbin thread before the machine will sew. More details on threading the bobbin case will be given in Chapter 2.

The Tensioning Mechanism

Earlier in this chapter, we said that the interlocking of the top thread the bobbin thread in such a manner that the interlocked portion of this stitch was drawn up into the material was of primary importance if the finished stitch was to be both durable and neat. The correct interlocking of the stitch is accomplished through the tensioning mechanism, which consists of

- a tension regulator for the top thread
- the take-up lever
- the bobbin tension spring (Figs. 1-9 through 1-11).

Table 1-1 determines the causes, reasons and remedies of various occurrences of interlocking stitches for these three illustrations.

The Tension Regulator. The tension regulator (Fig. 1-9) is mounted on the front of the machine head and easily accessible to

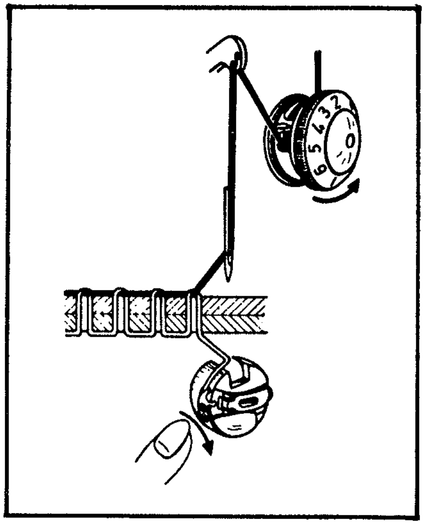


Fig. 1-10. Take-up lever of the tensioning circuit.

the operator since changing of the top thread tension is necessary if correct stitching is to be maintained throughout a variety of threads and materials. The top thread from the spool is invariably threaded into the tension regulator before it is threaded through the take-up lever, thus creating a point of tension between the take-up lever and thread source. To eliminate the guess work from upper thread tensioning, the tension regulator is equipped with a calibrated dial. Higher numbers (or + divisions) represent higher tensions than lower numbers (or – divisions). Regardless of the tension of the top

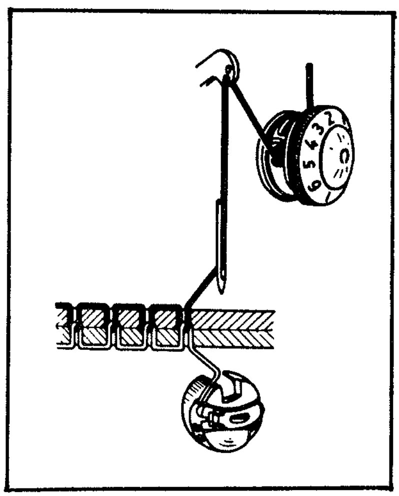


Fig. 1-11. The bobbin tensioner of the tensioning circuit.

thread, it will be released when the presser foot is up. There are no parts in the upper tension regulator that move in conjunction with the machine mechanisms.

Take-up Lever. As the take-up lever (Fig. 1-10) moves up and down through its cycles, it performs two basic functions:

- On its downward stroke, it releases the thread tension between itself and the needle in order that a loop might be formed and enlarged.
- On its upward stroke, it tightens the interlocked stitch by pulling simultaneously against the upper tension regulator and bobbin tensioner. Without this tension the upper thread would be unable to pull the bobbin thread into the material.

The Bobbin Tensioner. The bobbin case is equipped with a spring and regulator screw so that the bobbin thread can also be fed under tension (Fig. 1-11). Without this tension, the pull of the upper thread as the take-up lever rises would pull the thread completely through the material, and thereby form loosely interlocked loops with the interlocking appearing on the top surface of the material. The bobbin case has no parts that move in conjunction with the running machine.

In troubleshooting the causes of faulty interlocking stitches, it is important to understand the interplay between the upper tension regulator and the bobbin case. You should also understand that with no moving parts in either the upper tension regulator or bobbin case, there is little likelihood that mechanical problems will arise in the tensioning system. Accordingly, most tensioning problems are corrected through operator adjustments. However, there are times—such as in the disassembling, cleaning and reassembling of the upper tension regulator—when a knowledge of repair techniques is necessary to keep this system in working order. More details on adjusting and maintaining the tensioning system will be given in Chapters 2 and 3.

The Feed Mechanism

In sewing, material is automatically fed through the machine at a uniform rate, with no more than minor manipulation by the operator to guide the material. This is accomplished with a set of feed dogs, activated by the rocker arm that is connected to the feed-driving connection (refer back to Fig. 1-1).

In normal sewing, the cycle of the feed dog is as follows: At the instant that the needle is just rising out of the material on its upward

Table 1-1. Interlocking Stitches Occurrences.

Figure	Occurrence	Cause	Remedy	Reason
1-9	While the stitch is being formed the needle thread is pulled too far through the material by the bobbin thread.	The needle thread tension is too loose or the bobbin thread tension is too tight.	Set the needle thread tension tighter or the bobbin thread tension looser.	
1-10	During stitch formation the bobbin thread is pulled up to the surface of the material by the needle thread.	The needle thread tension is too tight or the bobbin thread tension is too loose.	Set the needle thread tension looser or the bobbin thread tension tighter.	
1-11	The stitch is neat and strong.	The two threads are interlocked in the center of the material.		The needle thread and bobbin thread tensions are correctly balanced.

stroke, the top surface of the feed dog is below the needle plate. As the needle rises clear of the material, a vertical lift is applied to the feed dog in order that the top surface of the feed dog will come in contact with the material, and simultaneously, a horizontal motion will be imparted to the feed dog in order that the material will be moved either forward or backward while the *needle is out of the material*. As the needle goes through its cycle and again enters the material, the feed dog is lowered below the surface of the needle plate, and simultaneously, no horizontal motion is imparted to the feed dog. The sum total of this motion is that the feed dog rises, contacts the lower surface of the material and moves horizontally while the needle is out of the material and lowers while the needle is in the material. For extraordinary sewing applications, such as darning, sewing on buttons or embroidering, when it is not desirable to have the feed dog come in contact with the material, most machines have a provision for lowering the feed dog and disengaging the feed mechanism. This is called a *drop feed*.

The Needle Reciprocating Mechanism

The needle reciprocating mechanism consists of a needle bar and the linkage that connects it to the cam on the end of the main drive shaft (again refer to Fig. 1-1). The lower end of the needle bar is equipped to insert a needle (or optionally a double needle in certain models), and since the needle dimensions and characteristics are of crucial importance to successful sewing, the needle can rightfully be considered a part of the needle reciprocating mechanism. The proper selection and use of needle will be discussed in detail in Chapter 2.

Referring again to Fig. 1-1, you can see that the needle will go through one complete cycle with every revolution of the balance wheel-and-main shaft. The needle bar connecting linkages and the characteristics of the mechanisms that transmit motions to the oscillating or rotating shuttle causes the needle bar to go through one complete cycle while the oscillating shuttle goes through *one* oscillation cycle, or the rotating shuttle goes through *two* complete revolutions. In either type of shuttle, the area of the needle between the point and the eye (where the loop is formed) must be opposite the shuttle hook, yet close enough that the hook can pick up a loop, each time the needle has reached its lowest position and risen about 2mm (on most models). In fact, the correct juxtaposition of the needle and the shuttle hook is so important at this instant of the sewing cycle that a needle of incorrect length, or one that is incorrectly installed, can create sewing problems. Apart from the needle considerations, timing problems between the shuttle hook and needle are usually corrected by adjusting the needle bar height or by adjusting the shuttle hook. These adjustments, which are internal adjustments normally made by a repairman, will be discussed in detail in Chapter 3.

The Bobbin Winding Mechanism

Virtually all sewing machines have a provision for winding thread on the bobbins by using some part of the basic sewing mechanism. Except on a few recent models, this is accomplished by installing the empty bobbin on a bobbin winding mechanism that can be engaged with the main drive pulley, then inserting the end of the thread that is led from the thread source to the spool and running the machine. Referring to Fig. 1-12, bobbin winding is accomplished by placing the empty bobbin on the bobbin winder spindle, threading the thread through the small hole of the empty bobbin, and depressing, the lever (L) downward into the empty bobbin. This places

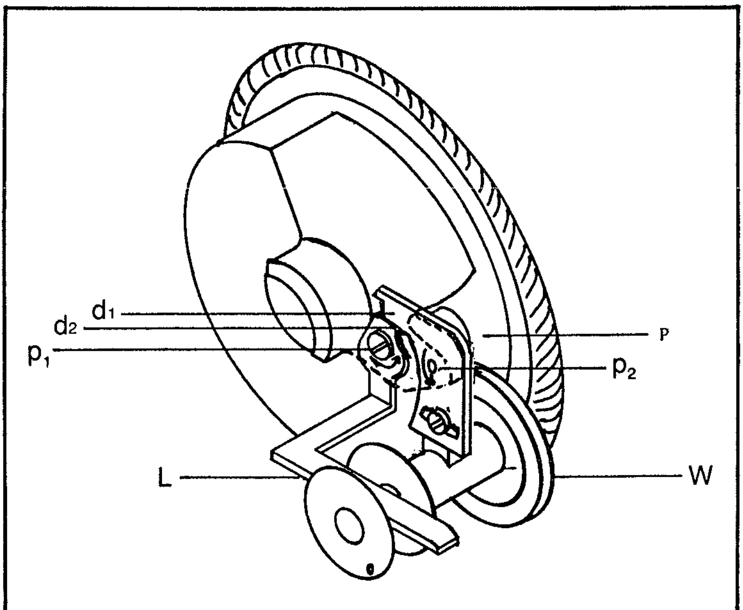


Fig. 1-12. This sketch of a rather old Bel Air (Japanese manufactured) bobbin-winding arrangement is fairly typical of many machines in use today. Lightly lubricate the pivot points with sewing machine oil to make the mechanism operate efficiently.

dogs (d1) and (d2) in the positions shown, with a spring tension at pivots points (p1 and p2), and the bobbin winding drive wheel (W) against the outer circumference of the main driving pulley (P). When the bobbin is fully wound the thread forces the lever upward, causing (d1) to pivot and allowing dog (d2) to be released. The tension at pivot point (p2) then kicks the bobbin winding wheel away from the main pulley.

Main Drive Pulley Disengaging Mechanism

So that the internal mechanisms of the machine will not move while the main drive pulley is turning against the bobbin winding wheel, a provision is made to disengage the main drive pulley from the main shaft. Referring to Fig. 1-13, when the parts are fully assembled for normal operation, the clutch (C) is pinned to the main shaft (S). When the central hub (H) of the main drive pulley slides over the clutch in assembly, the notched end of the clutch extends slightly past the end of the central hub. The clutch washer (W) is installed so that its body presses flush against the central hub and the flanges of the washer fit into the notches of the clutch. When the knurled hand-knob (K) is screwed snugly into the clutch, the washer is pressed snugly against the central hub, thus engaging the main drive pulley with the main shaft. Conversely, when the knob is loosened, the pressure on the washer is reduced, allowing the main drive pulley to turn freely around the clutch. The small screw in the knob simply extends past the knob far enough that when the knob is turned counterclockwise (to loosen), the screw strikes one of the ears on the washer. This prevents the operator from inadvertently backing the knob out so far as to let the washer flanges slip out of their notches.

STITCH VARIATION OF THE STRAIGHT-STITCH MACHINE

The only stitch variation on extremely old straight-stitch machines is a variation in stitch length. On models developed within the past 30 or 40 years, it is possible to vary the length of the stitches, and also to reverse the direction of stitching. Since most normal sewing jobs do not call for extensive reverse sewing, this latter feature is simple a convenience feature that keeps the operator from having to turn the material when sewing in reverse to lock the end of a stitch or reinforce stitch stress points. The stitch length regulating mechanism allows the operator to vary the length of the individual stitches when sewing forward from zero stitches per inch to about six or seven stitches per inch. Stitch lengths are

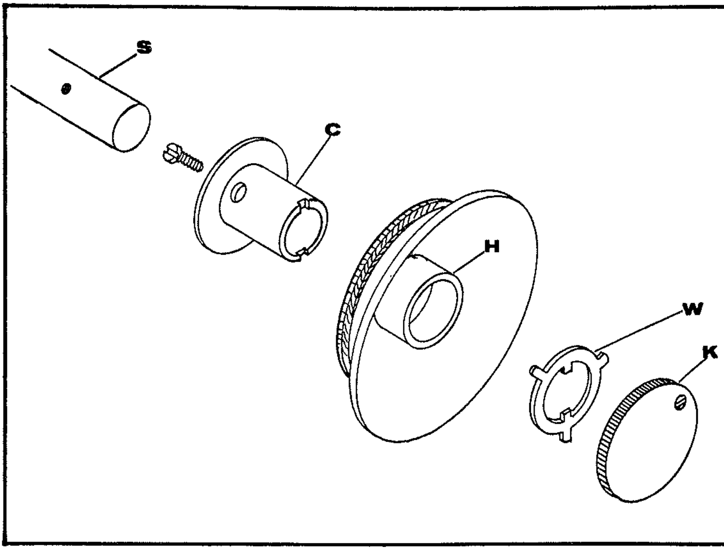


Fig. 1-13. Since it is never desirable to run the machine mechanisms while winding a bobbin, some way will be provided to disengage these mechanisms. This sketch is developed from a rather old machine, but even your recent model may have an arrangement similar to it for disengaging the main drive shaft from the drive pulley.

calibrated in millimeters on recent models, with 1mm approximating 25 stitches per inch.

Stitch length regulation when sewing in reverse is also variable, but not as accurately as when sewing forward. All the stitch length variations are continuous within the given range. The following is how the basic stitch regulation mechanism works (Fig. 1-14).

A three-pointed cam, which is incorporated into the main drive shaft, imparts a rocking motion to the forked connection. A roller on the side of the forked connection is fitted to ride in a groove of the stitch regulator lever, which can be moved up or down at the operator's will. Assuming the three positions (F, O and R) in Fig. 1-14 represent one position of the three-point cam (the machine not in motion):

- Illustration F shows the groove tipped so as to cause the forked connection to rock the feed mechanism rocker shaft clockwise (viewing the mechanisms from the right end), thereby pushing the feed dog to an extreme forward position. If the machine is started with the mechanisms in the position shown, the synchronization of the various mechanisms will cause the feed dog to be *lowered* as it is *reversed*, and *raised* on the next forward thrust. This causes the material to be moved forward in the sewing operation.

- Illustration R shows that if the stitch regulator lever is moved upward, the feed mechanism rocker shaft will be rocked counterclockwise, thereby moving the feed dog to its extreme back position. This effectively reverses the cycle of the feed mechanism as it works in synchronization with the lowering and raising of the feed dog. If the machine is started with the mechanisms in the positions shown, the synchronization of the various mechanisms will cause the feed dog to be *lowered* (just as in the first case) while the feed dog moves *forward*; and *raised* as it moves *backward*, thereby causing the material to be moved backward in the sewing operation.
- In Illustration O, which shows the groove to be on a minimal incline, the roller can ride along the groove without imparting any rocking motion to the feed mechanism rocker shaft. In this position, the forked connection simply pivots in its rocker shaft pivotal point, and the stitch length is minimal, or zero inches.

Stitch length variation and reversal may be accomplished somewhat differently in different machine brands and models, but as a general statement, it can be said that these variations usually originate from a feed driving eccentric imparting a rocking motion, which can be variable, to the feed mechanism rocker shaft. This works in synchronization with the raising and lowering of the feed dog. In most machines, the accuracy of the stitch regulation is maximum when the lever is set at a normal stitch length, and may diminish slightly as the stitch length approaches zero and goes into reverse.

ZIG-ZAG STITCH SEWING MACHINE

The zig-zag sewing machine, which became widely available and quite popular in the 1950's, has by now almost preempted the straight stitch machine (a few straight stitch machines are still being manufactured, however) because of the variety of decorative and functional stitching it can produce. In addition to zig-zag stitching, it will perform every function of the straight stitch machine.

The zig-zag stitching of the earlier zigzag machines was more functional than decorative, but as a larger variety of zig-zag patterns has been provided through a larger variety of cams, decorative stitching is a large part of the appeal of zig-zag machines. At the

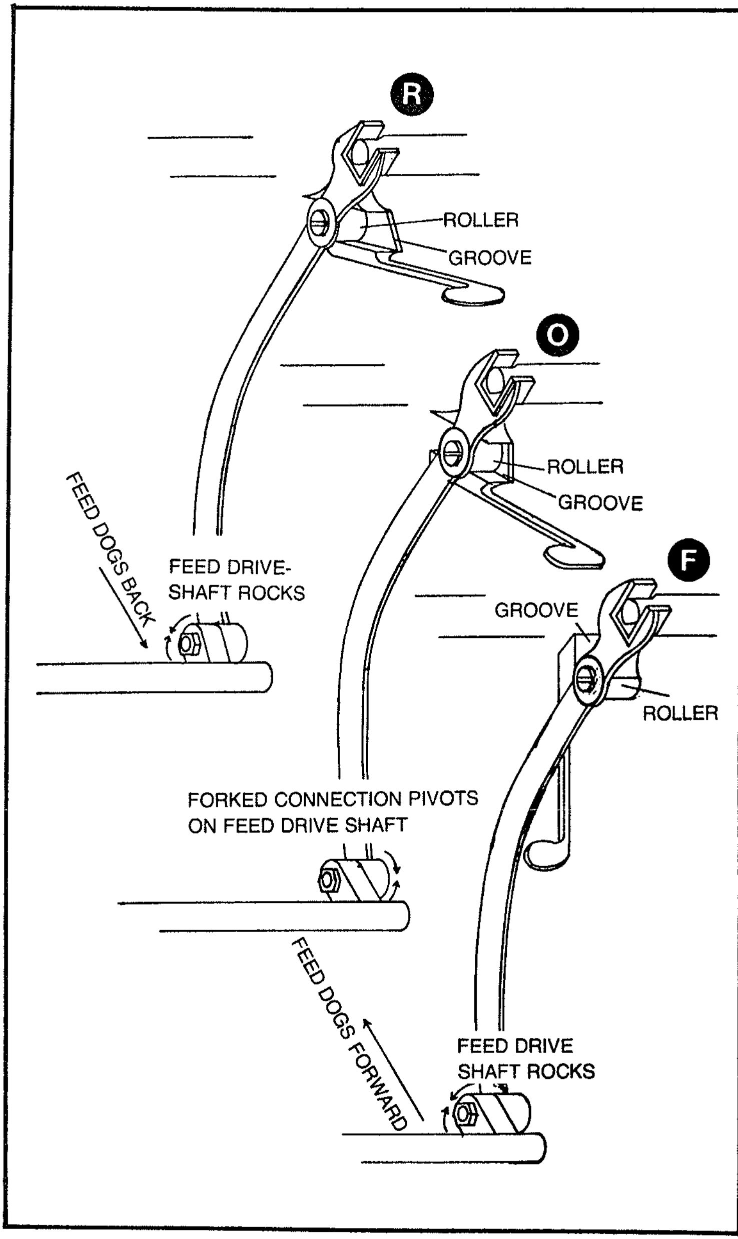


Fig. 1-14. This sketch shows how stitch length changing and reversing is accomplished. To orient yourself to this mechanism, consider the forked connecting rod to be the same part as F in Fig. 1-1, connected at its bottom pivot point to shaft Sf with the rocking motion being applied to D.

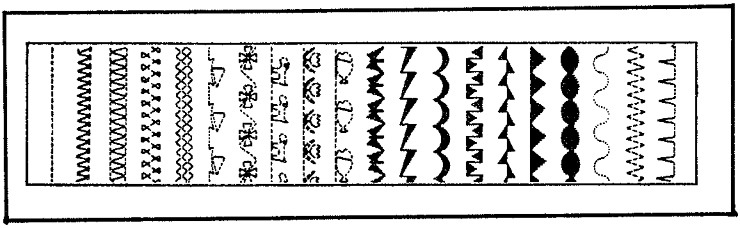


Fig. 1-15. These are the various stitch patterns possible on a certain Brother Model.

same time, the functional importance of zig-zag stitching has increased with the advent of stretch materials and polyester threads.

Functionally, the zig-zag stitch adds strength to stitched seams by providing an accordian-like effect to stitching that keeps the stitch from breaking when stress points (or certain fabrics) are stretched; provides a relatively simple means of darning or inserting patches in which the patch and original material are butted together; and provides a relatively simple means of sewing on buttons or sewing buttonholes without special attachments. Decoratively, variations of the zig-zag stitch can produce many styles of decorative stitching (Fig. 1-15) as well as a variety of embroidery patterns. Experienced operators can embroider names and pictures on fabrics quite quickly by using certain techniques with the built-in or supplemental zig-zag cams.

BASIC ZIG-ZAG STITCH MECHANISM

A zig-zag sewing machine employs all of the mechanisms of comparable straight-stitch machines including the feed driving mechanism, bobbin shuttle mechanism, etc., since the sequence of forming a thread loop and catching it with the shuttle hook remains essentially the same in the zig-zag as in the straight-stitch machine. The primary difference between the two mechanisms is that the needle bar of the zig-zag machine can be made to swing from side to side for a controlled distance while the feed dog is feeding the fabric. The stitch length regulator can be set any place on the calibrated dial to produce a longitudinal distance between the apex points of the zig-zag stitches that is the equivalent of a stitch length. Thus, instead of a line of stitching in which the individual stitches are lined up like the links of a stretched chain, the *basic* zig-zag stitch will zig-zag from side to side while it proceeds along the line of sewing.

To understand the zig-zag mechanism, refer to Fig. 1-16. A worm gear on the main shaft is geared to the cam drive shaft (Gc) so that as the main shaft makes one revolution, the cam driving shaft will make about 15 revolutions. If a cam (c1) is installed on this shaft, each time a high spot on the cam contacts the point of the lever (L1, for example), the lever will rock. This rocking motion will be transmitted through connecting linkage (1c) to the needle bar as a similar rocking motion with the frequency of the motion—and thus the pattern of the stitch—depending upon the contour of the cam. Levers (L1 and L2) pivot independently so that the supplemental cam (C2) can be made to replace the permanent cam (C1) by simply disengaging and engaging the appropriate levers.

On a theoretical or basic zig-zag mechanism, a cam to produce a zig-zag stitch of optimum design is installed as a permanent part of the mechanism, with the needle bar throw lever extended to an external control lever through which the operator can place the lever in contact with the cam at will. In such a case the machine

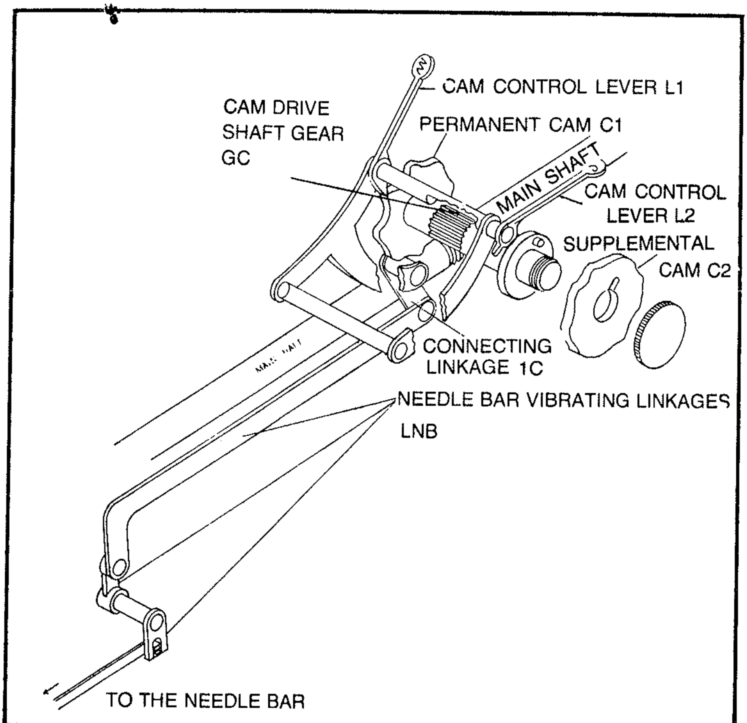


Fig. 1-16. This sketch, developed from a Singer 319W, will give you a basic idea of how and why the needle bar swings from side to side when the machine is set for zig-zag stitching. On some machines (notably certain Pfaff Models), the zig-zag mechanism can be removed from the machine as a unit.

could be made to sew a straight stitch by moving the point of the lever *away from* the contour of the cam or to sew a zig-zag stitch by moving the point of the lever *into contact with* the contour of the cam. To give such a system more variety, a variety of cams to produce a variety of styles of zig-zag stitches could be installed on this shaft, with a separate, independently pivoting lever for each cam. In this system the operator would have the options of sewing a straight stitch by leaving all the levers away from the contours of their respective cams, or sewing the zig-zag stitch with a design of choice by placing the appropriate lever in contact with its cam contour. This system can be made even more flexible and comprehensive by extending the cam shaft to some convenient, external part of the sewing machine, as in Fig. 1-16 where the operator can install supplemental cams that are supplied by the machine manufacturer.

One of the above methods of changing zig-zag stitch designs, or some variation of it, is used in all the zig-zag machines in use today. For example, if the cam shaft is brought to some external location, the internal cams may be entirely eliminated (as they might in an econony model), or they may be included to provide a few basic zig-zag designs with the variety extended by externally installed supplemental cams. In most economy models, all the cams are operator-installed, externally. In older top-line models the cams may be internal, contacted through external levers—or a combination of internal cams and the option of using supplemental cams on an external shaft. On the more recent top-line models, all the cams are internal, and the control levers have given way to control panels, through which the operator can contact the cam design of her choice by activating electric relays.

Zig-Zag Stitch Width Regulation

The width of the zig-zag stitch is adjustable, from about O (straight stitch) to about 5mm, through an external dial or lever (Fig. 1-17). The mechanism for making this change may be one that places the cam lever where it will not ride into the lowest contour of the cam, thereby limiting the distance of travel of the lever, or by any one of several different other methods, depending upon the brand and model of the machine. It is usually quite easy to gain a visual access to this mechanism by removing the top cover of the upper arm of the machine. On some models, further visual access can be gained by removing a plate on either the front or rear of the upper arm of the machine.

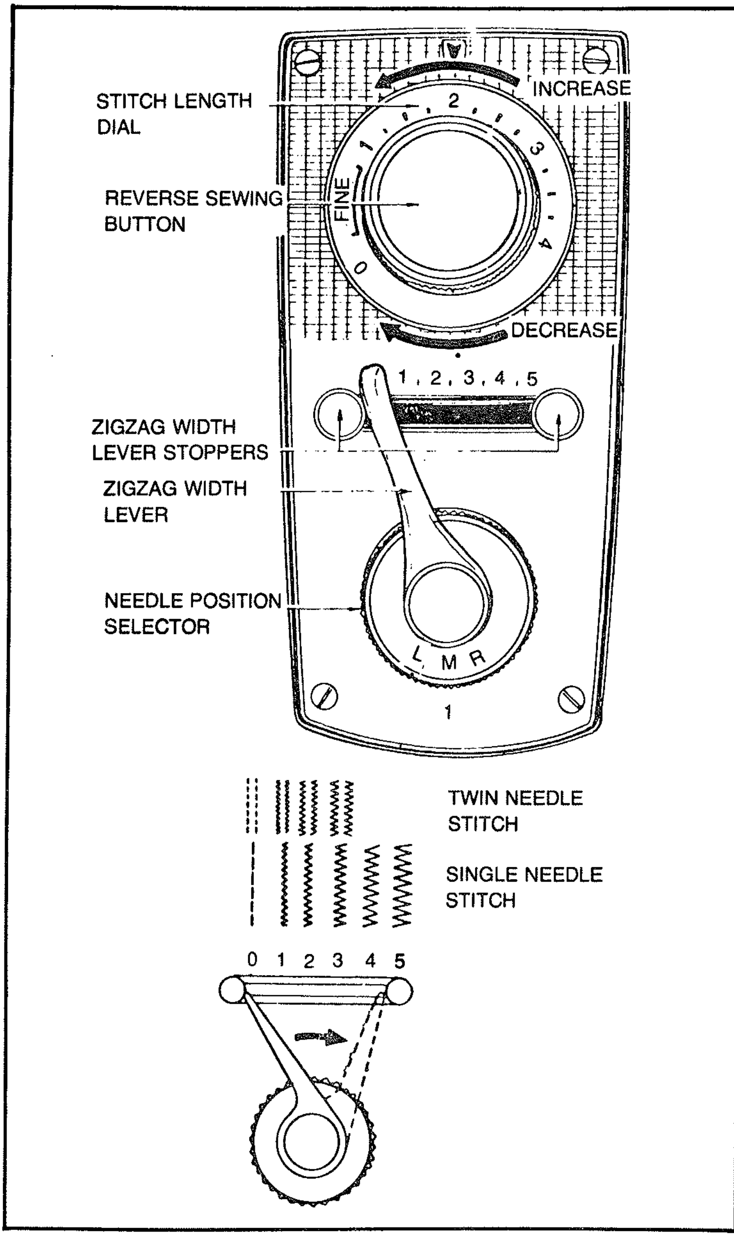


Fig. 1-17. This reproduction, taken from a Brother B875-B609 operator's manual, shows the format of certain operator controls. The controls on your machine may be quite different, but on most machines the functions of the controls are almost self-explanatory, even in the absence of an operator's manual.

Needle Position

Zig-zag machines have a provision by which the operator can change the needle position (Fig. 1-17) from the extreme left of the central position of the needle arm swing, to the central position, to the extreme right position. When straight stitching, the machine will sew at the extreme left when the needle is set at the left, along the center when the needle is set at the center, etc. Further, this regulation can be used when zig-zag stitching, to sew a zig-zag pattern to the left, center or right of the center line, provided the stitch width is no more than about 2½ mm or one-half the widest setting of the stitch width dial. This needle position regulating mechanism is connected to the needle bar through linkages, and it is also easily accessible for a visual examination on most machines.

STITCH VARIATIONS OF THE ZIG-ZAG MACHINE

The number and style of stitch variations possible on the zig-zag machine is a corollary of the cams that are built into the particular machine. If a provision is made for external cams, it also depends upon the number and style of supplemental cams that are available from the manufacturer. As explained earlier, as the point of the lever follows the contour of the lever follows the contour of the cam, the information that is programmed into the cam will be transmitted from the lever-point to a connecting linkage and thus to the needle bar, where it will be interpreted as a right-left needle bar swing. From the viewpoint of troubleshooting a zig-zag system, it is helpful to understand that the contour of the cams regulate the *frequency* of the needle bar swing, but the *amplitude* of the swing is determined by the cam contour working in conjunction with the stitch width regulator. Therefore, if correctly adjusted stitch width regulator is set at 0, there will be no needle bar swing even though a lever point contacts a cam. Further, if *optimum* results are to be obtained from a zig-zag system, it is essential that the setting of the stitch width (0 to 5mm); needle position (left, center or right); stitch length; and cam selection *be made in accordance with instructions provided with the machine*.

SUMMARY

The information in this chapter has been presented to give you a grounding in basic sewing machine mechanisms. Although the explanations and illustrations were developed from actual sewing machines, we have made no attempt to relate them to specific manufacturers' brands or models. The fortunate fact is that through the years most of the changes in sewing machines have come through the addition of convenience features, but there have been extremely few radical departures in basic mechanisms. Therefore, the following general rules will apply, regardless of the brand or model of the sewing machine:

☐ When the main drive shaft makes one revolution corresponding to one revolution of the balance wheel:
— The take-up lever will go through one complete cycle.
— The needle bar, and thus the needle, will go through one complete cycle.
— An oscillating shuttle will go through one complete cycle, causing the shuttle hook to be in position to pick up a thread loop the instant one is formed.
— A rotating shuttle will make two complete revolutions (this is determined by the relationship between the gears of the shuttle shaft and the shuttle driving shaft), with the shuttle hook picking up a thread loop every second revolution.
— The feed dog will go through one complete cycle, provided that the stitch length regulator is set on a number other than 0.

☐ Regardless of whether the feed dog is programmed to feed fabric forward or backward, the top surface of the feed dog teeth will be below the throat plate when the needle is below the throat plate, and above the throat plate when the needle is above the material, except when:
— The feed dog has been purposely dropped for such sewing applications as darning, embroidering, etc., or:
— A special needle plate, the surface of which is above the top edge of the feed dog at its highest point, is installed on the machine. In this case the feed dog will remain below the surface of the needle plate at all times during the sewing cycle.

☐ On a zig-zag machine, a special zig-zag needle plate must be used for all zig-zag sewing applications. If not, the needle will strike the needle plate on its downward stroke if a zig-zag cam is engaged, and the stitch width indicator is on a setting other than 0—or straight stitch.

☐ The same general principles apply to presser feet. Special presser feet must be used for all zig-zag sewing applications.

☐ Every sewing machine will have some provision for winding the bobbin by running the machine. Further, unless it is a self-winding bobbin—in which the bobbin remains in the bobbin case when being wound—there will be some provision for disengaging the drive pulley from the main shaft while winding the bobbin.

☐ Every straight-stitch sewing machine will have provisions for the operator to make the following adjustments:

—**Top Thread Tension.** To regulate the tension of the top thread there will be a tension regulator located on the front of the machine, just below the take-up lever. It will be equipped with a calibrated dial.

—**Presser Foot Pressure.** A presser foot pressure regulator will be located on top of the machine, directly above and in line with the presser bar (this may be eliminated on some very recent models, however). It may be a dial, a thumb screw or a screwdriver adjustment with or without a calibrated dial, depending upon the brand and model of the machine.

—**Stitch Length.** A stitch length regulator is usually located at the lower right end of the machine, roughly below the spool spindle. It may be a lever or a dial. Generally speaking, if it is calibrated in numbers from 0 to between 25 and 6, the numbers indicate the stitches-per-inch. If it is calibrated from 0 to 4, the numbers indicate the stitch length in millimeters. A means of reversing the stitching will usually be incorporated into the stitch length dial or lever.

—**Main Drive Belt Tension.** The tension of the main drive belt is adjusted by loosening a motor-mounting bolt, which allows the slotted mounting bracket to be moved so that the distance of the motor pulley from the main pulley can be varied, thereby adjusting the tension of the drive belt.

—**Bobbin Thread Tension.** On most machines there will be a regulating screw on the bobbin case, by which you can regulate the tension of the bobbin thread.

☐ Every zig-zag machine will have provisions for making adjustments from external locations, and in addition will have provisions to make the following adjustments from external locations:

—**Stitch Width.** A stitch width regulator is located on the front of the machine. It may be either a dial or lever, and may be calibrated in either numbers or some pictorial representation of the stitch width. This dial or lever should not be moved from its minimum setting under the following conditions:

1. when a straight stitch needle plate is on the machine
2. when a straight stitch presser foot is on the machine
3. when the needle is in the material

—**Needle Position.** Located near the stitch width regulator dial or lever will be a needle position indicator. This may be either a dial or lever, and in either case, an extreme left setting of the dial or lever moves the needle to the extreme left position, etc.

—**Zig-Zag Patterns.** A dial, or levers on a control panel with a chart of some other pictorial representation of the available zig-zag patterns will be found on any zig-zag machine that is equipped with internal cams.

☐ On some zig-zag machines, the cam drive shaft will be extended to an external location to allow the operator to install supplemental cams, namely under the following conditions:

— In the case in which the machine is designed to use both internal and/or external cams, or:

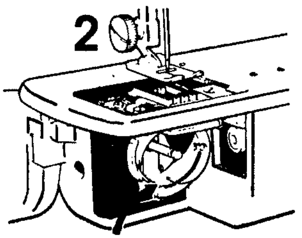
— In the case in which there are no internal cams, and the operator makes all cam changes externally.

☐ Virtually all machines, in their new condition, were provided with accessory presser feet and needle plates.

☐ If a machine is bought without a cabinet, it is a simple job to install the machine head in a cabinet, provided, however, that you make sure that the separate component that you intend buying does in fact match the component you already have. In other words, heads and cabinets of various brands do not universally match each other.

☐ Although the sewing machine industry has standardized needle systems so that one system fits virtually all *fairly recent* models, you may encounter some exceptions to this general-rule, and especially when fitting needles to older European-made machines. Needle selection will be discussed in some detail in Chapter 2.

In this chapter we have given an overview of basic sewing machine mechanisms, which should provide a grounding for the more technical information contained in the following chapters.



2 Sewing And Machine Adjustment Maintenance

It is axiomatic that most professional repairman believe that at least 75 percent of the sewing machine problems that they encounter are caused by the operator. However, this could be true only to the extent that the operator is unfamiliar with a machine, inexperienced or uninformed. The purpose of this chapter is to present a few facts that will be a substitute for experience, and to inform you of a few basic procedures that will minimize operator-caused trouble. In the discussion, we will assume that you already have a sewing machine, or that you are contemplating buying either a new or used machine.

BUYING A NEW SEWING MACHINE

If you read the preface to this book you will remember that we said that a new sewing machine is one of the less expensive quality items that you can buy in these times of inflation. Currently, excellent new straight-stitch machines are priced from about $80; new zig-zag machines from about $125 (to as much as $900, however); and if you are a patient shopper, you can probably find an excellent used machine—often with a console cabinet for $50 and up. The prices of these new machines are representative of *heads only*—machines without cabinets.

The perplexing problem of whether to buy an inexpensive new machine, or a used machine that was obviously a top-line model when new, is one that can be solved only on an individual basis. And if your budget will allow it, the problem further becomes one of whether to buy a new economy model for as low as $125, or a top-line model for several times that amount. In making this choice, one general principle applies: Insofar as functional value is concerned, the additional dollars that you pay for a sewing machine are simply for convenience features, since there are few functional differences between the lower and higher-priced models. However, if you pay as much as $500 to $900 (circa 1979) for a machine, you can reasonably expect more years of trouble-free service than you would get from the $125 model.

The purpose of this book, however, is not to tell you how to solve what is essentially a budget problem but to tell you how to get the best results from the machine that you do buy or the one that you already have.

Buying a new sewing machine implies that you will buy it from a dealer who deals in sewing machines more or less exclusively, although many sewing machine dealers also handle a line of small appliances-supplemented perhaps with a supply of sewing accessories and supplies. More importantly, he will most likely be able to provide repair and maintenance for your new machine, backed by a manufacturer's warranty (usually a long-term, limited warranty) and service manuals.

The Demonstration

Insist on a comprehensive demonstration, and don't be put off by the fact that the dealer seems to have too many diversions to make a demonstration. A comprehensive demonstration should include showing you how to do the following:

- Load an empty bobbin.
- Place the bobbin in the bobbin case and thread the bobbin case. In the case of the bobbin case as a separate component place the complete assembly in the machine.
- Select the correct needle plate for the particular sewing demonstration.
- Remove and replace the needle plate.
- Select the correct needle to match the thread and material being used.
- Clamp the needle in the needle bar.
- Top-thread the machine, matching the top thread to the bobbin thread.
- Select the correct presser foot for the particular sewing demonstration.
- Install the presser foot on the presser bar.

- Select material and thread to demonstrate a certain sewing principle or machine function.
- Pick-up the bobbin thread with the needle thread.
- Adjust the pressure of the presser foot in accordance with the material being sewn.
- Adjust the top tension regulator.
- Set the stitch length regulator. When sewing, the stitch length regulator should be set through the complete range of stitch lengths, including 0, or no-feed.
- Select a cam pattern and stitch width, in the case of a zig-zag machine.
- Set the needle bar, and thus the needle, in the left, center and right positions in the case of a zig-zag machine.
- Start the machine.
- Sew, using all the functions that are available on the machine.
- Install a double needle, top-threading the machine accordingly, and sew.

When the demonstrator is sewing, ask him to demonstrate the following procedures:

- Sewing with the stitch length regulator set at 0. The needle should enter the material in exactly the same place on each stroke.
- Reversing the direction of stitching. In the case that reversing is accomplished with a push-button (as on most recent zig-zag machines), the length of the reverse stitch need only be approximately that of the forward stitch.
- Changing the setting of the upper tension regulator to demonstrate the effects of unequal tension between the upper tension regulator and bobbin tensioner, with the following points in mind:

—When the tension is correct, the stitch should be tight and invisibly interlocked.

—When the top tension is too loose in relation to the bobbin tension, the interlocking loops will show on the bottom of the material.

—When the bobbin tension is too loose, in relation to the top tension, the interlocking loops will show on the top of the material. The demonstrator will undoubtedly tell you that the tensions are equalized by regulating only the top tension regulator; however, there are times when regulation of the bobbin tensioner is necessary.

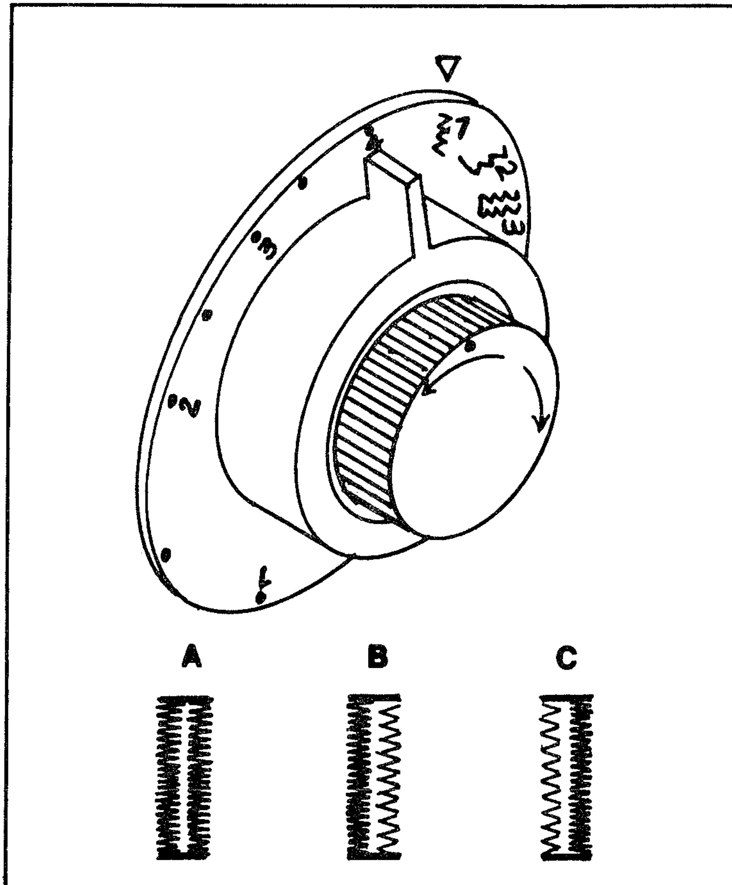


Fig. 2-1. On the relatively inexpensive Singer Model 248, the reverse push button is also the external adjustment which equalizes the densities of the right and left buttonhole stitches. The dot on the button should be aligned under the top arrow to produce the balanced buttonhole of A. If this setting produces a coarse stitch on the right of the buttonhole as in B, a slight clockwise turn of the button should balance the stitch; but if the central setting of the dot produces a coarse stitch on the left as in C, the button should be slightly turned counterclockwise.

- Regulating the tension of the bobbin thread, and explaining in what circumstances you should make this regulation.
- Sewing a button hole. In the case of a straight-stitch machine, this will have to be done with a special attachment. However, you should be able to sew a button-hole with a zig-zag machine, either manually by selecting an appropriate cam and manipulating the stitch width, length

and direction controls at your discretion, or automatically by setting dials or pushing buttons in a prescribed sequence. In the case of a zig-zag machine, the criterion for a button-hole stitch, apart from a tight, durable stitch, is that the stitch *width* and *length* is the same on both sides of the button-hole. Ask to be shown how to equalize, or *balance* the button-hole stitch (Fig. 2-1).

- Sewing on a button is possible only on the zig-zag machine. There are several ways to accomplish 0 stitching; that is, no travel of the button:

— By setting the stitch length regulator at 0.
— By lowering or dropping the feed dogs.
— By using a special needle plate that is raised so that the feed dogs will not contact the underside of the material. Ask the demonstrator to show you all of these methods.

- Sewing different kinds of material especially rayon and denim to demonstrate the effects of regulating the pressure of the presser foot. When the pressure is correct, the material should be fed evenly and uniformly, without either slipping or puckering under the presser foot.
- Sewing a variety of decorative stitching (Fig. 2-2), in the case of the zig-zag machine, through a range of machine speeds from low to high. Also ask to be shown the effects on the appearance of the stitching caused by changing the *needle position* (left, center and right) and the *stitch width*.
- Sewing a straight stitch, through a range of stitch lengths, with the zig-zag machine. There should be no slight zig-zagging of the stitch.

The foregoing demonstration points are not suggested as a means for the dealer to show you the versatility or convenience of the machine (he will have his own demonstration procedure to point up these factors), but for two purposes: One is to familiarize you with the machine and the other is to reveal adjustment problems or defects in the machine which can be corrected before you take the machine from the shop.

If you buy a sewing machine from a mail-order company (such as Montgomery Ward or Sears), a dealer demonstration is generally available only if you buy the machine directly from the Ward or Sears store, but *generally* not available if you buy it through a catalog branch. However, dealer service will be available within the terms of the warranty.

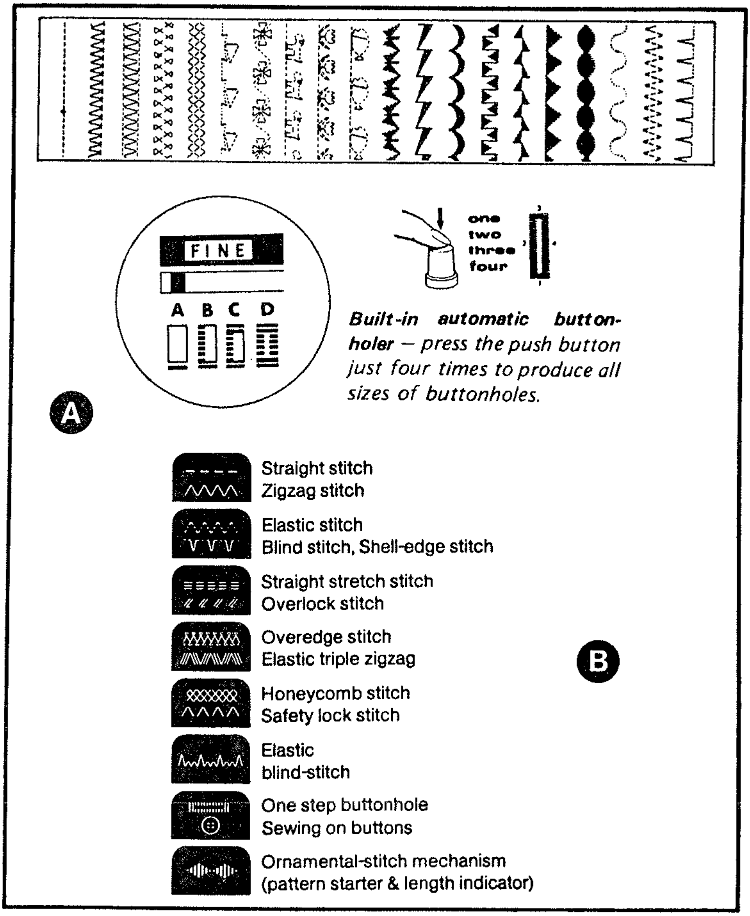


Fig. 2-2. The decorative stitches of A are possible on the Brother Model 701. The decorative stitches of B are possible on the Pfaff 1222-E, Electronic.

Dealer Service

When you buy a new machine, the manufacturer's warranty is normally implemented by dealer service, within the specified warranty period. During this warranty period, if trouble occurs, read your Owner's Manual and the first three chapters of this book to assure yourself that the trouble is not one that can be corrected by simple changing a sewing technique, or making some minor regulation of the machine. Then, to protect your rights under the warranty, call a serviceman that is authorized by the manufacturer to provide in-warranty service under the terms of your new machine warranty. In the case of a machine purchased from either Sears or Montgomery Ward, the procedure for obtaining in-warranty service may depend upon whether your contact is with a full-service store or a catalog branch. In any case, you will proceed according to specific instructions. In the former case, you may be instructed to take the machine to the store for service; in the latter case you may be instructed to take the machine to either a designated service center in your area, or to an independent service center of your own choice. In either case, the service center will bill the firm from whom you bought the machine. In most cases, you will be required to take the machine to the service center yourself.

Owner Maintenance and the Owner's Manual

When you are sure that your new sewing machine is in proper working order, and you have learned all the common sense sewing techniques possible from the dealer to prevent problems, ask him to give you some maintenance procedure suggestions. Ask him especially to explain when, how and where to oil the machine, and how to clean it. He may suggest that all this information is contained in your new Owner's Manual, but owners' manuals are notoriously superficial in maintenance instructions. They are, however, indispensable, in that they provide a wealth of information regarding the use of accessories, dial settings, etc., for certain sewing applications.

When you leave the dealer, you should have a basic understanding of whether or not the machine will require periodic oiling (most machines still do), and if it does, you should be supplied with sewing machine oil. Further, if you wish to perform a comprehensive periodic lubricating of your machine, as explained later in this chapter, you should also be supplied with sewing machine gear grease.

BUYING A USED SEWING MACHINE

The primary considerations in buying a used sewing machine are: *model* (the model, within limits, can be related to age); *appearance; mechanical condition; and price.* Unless you are thoroughly familiar with a variety of sewing machine brands and corresponding models, it may be difficult for you to relate the model to a reasonable used retail price. You can get this information, however, by writing to Bobbette Industries, Inc. 2401 S. Hill Street, Los Angeles, CA 90007. Ask for the *Sewing Machine Blue Book*, which lists the *suggested wholesale* values of hundreds of the used sewing machines that are on the market today. There is a charge for the *Blue Book,*

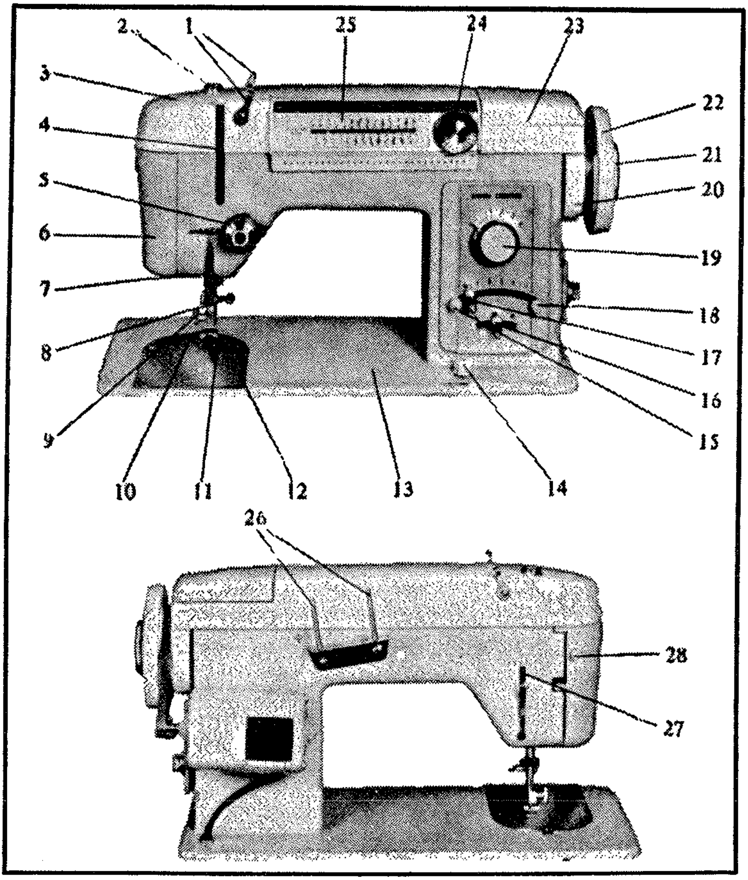


Fig. 2-3. This is a front and rear view of the White Model 960. It shows the locations of the external operator controls. 1. Arm Thread Guide; 2. Presser Release Darner; 3. Arm Top Cover; 4. Thread Take Up Lever; 5. Thread Tension Dial; 6. Face Plate; 7. Bulb; 8. Needle Clamp Screw; 9. Presser Foot Thumb Screw; 10. Needle Plate; 11. Presser Foot; 12. Slide Plate; 13. Bed; 14. Drop Feed Regulating Knob; 15. Zigzag Width Limiter (Left); 16. Needle Position Regulating Lever; 17. Zigzag Width Lever; 18. Zigzag Width Limiter (Right); 19. Reverse Push Button; 20. Stitch Length Regulating Dial; 21. Stop Motion; 22. Balance Wheel; 23. Bobbin Winder Cover; 24. Pattern Selecting Dial; 25. Pattern Indicating Emblem; 26. Spool Pin and Base; 27. Presser Bar Lifter; and 28. Switch Button.

which you will have to determine by calling or writing Bobbette in advance of ordering the book. With this information, you can use your own judgment in establishing a relationship between the suggested wholesale price and what you might expect to pay for the machine on a retail basis. It is here that the appearance and mechanical condition of the machine must be considered.

The relationship between appearance and mechanical condition may be rather tenuous, unless excessive dirt or damaged outer parts reveal that the machine was poorly cared for. Therefore, if you are buying the machine as is, it would be advisable to operate the machine, or watch it in operation, before buying it. If you are planning to shop in flea markets or general second-hand stores, you should supply yourself with the following:

- Two or three needles, of the Type 15X1, size 14.
- A spool of 50 mercerized cotton, or a quality, cotton-wrapped polyester thread.
- Several swatches of light to medium-weight material.
- A small and a medium-sized screwdriver.

The Visual Inspection

First of all, inspect the machine to see that it has all the controls mentioned in Chapter 1. Also refer to Figs. 2-3 and 2-4. Remove the face plate (# 6 in Fig. 2-3) and check the needle bar, presser bar and the needle bar and take-up lever mechanisms for dirt and rust. Tip the head of the machine back. In the case of a machine without a cabinet, you may have to remove the bottom cover, which should be held on by a wing nut; or, in the case of the free-arm machine, you will have to remove the free-arm cover. Inspect the mechanism under the bed of the machine for dirt, rust, obviously missing parts, broken screw heads or screwdriver marks which would indicate ineffectual repairs. Inspect the drive belt to determine its condition and tension. (The procedure for adjusting the drive belt tension will be explained later in this chapter.) With the needle removed and the presser foot up, rotate the balance wheel (always toward you) to see that all the mechanisms are working freely. At the same time, you can determine if the machine has the vibrating, oscillating or rotating shuttle. If it is a zig-zag machine, ask the dealer to remove the cover from the top arm, which will reveal not only the zig-zag mechanism but also sections of the main drive shaft, oiling points, etc. Disengage the balance wheel, and turn it by hand to determine that it will turn freely without turning the drive shaft. Inspect the electrical cord and plug for broken or disconnected wires.

If all the above inspections seem to reveal no problems, you can replace the face plate, re-engage the balance wheel and assume that the machine is operable provided that there are no hidden mechanical or electrical problems.

The Demonstration

If the dealer is for some reason unable to demonstrate the machine, your only recourse is to do it yourself. First, run the

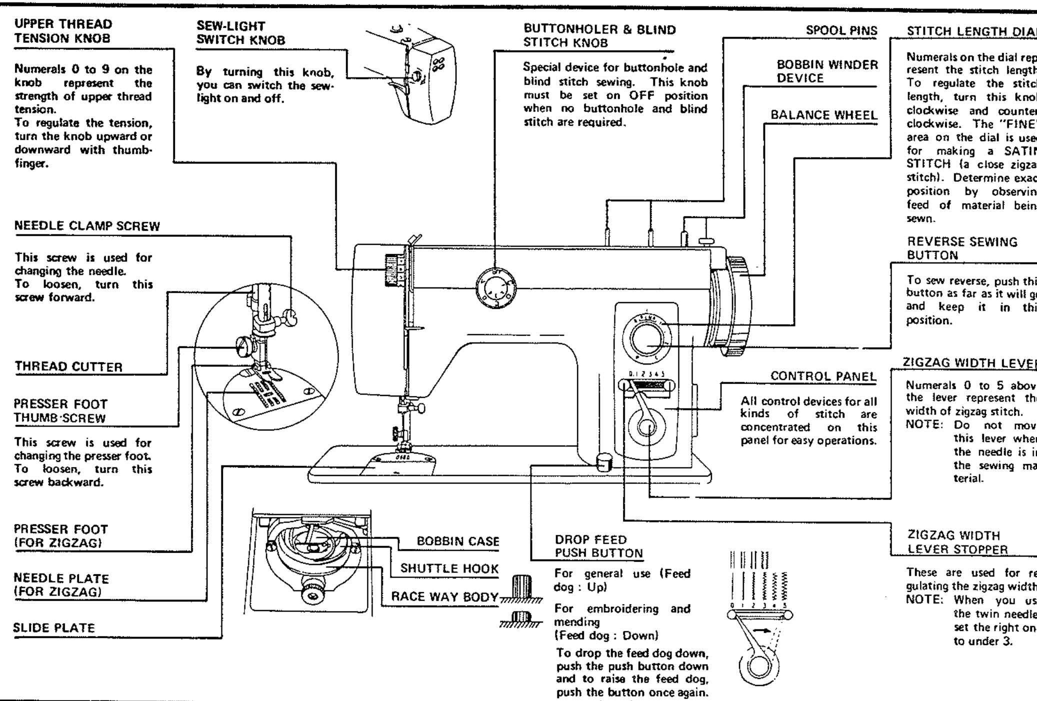


Fig. 2-4. This is a front view sketch of the Brother Model 801. The external operator controls are shown. Note the drop feed push button.

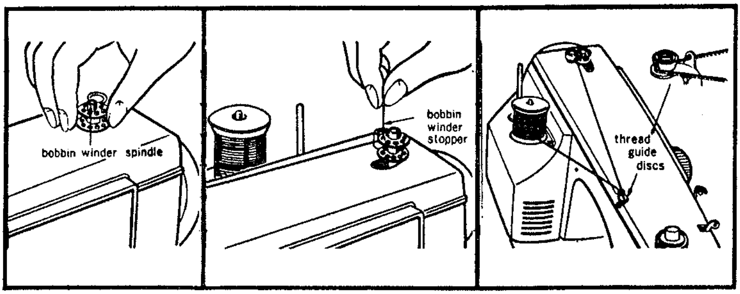


Fig. 2-5. Loading a bobbin on the New Home Model 545. Note, in the last drawing, that the thread is passed through thread guide discs. If these discs are missing on your machine, they can probably be replaced with discs from some other model or brand since there are no critical adjustments necessary at this point of tension.

machine at a slow to moderate speed, with the needle still removed and the presser foot still up. At this point, if the machine is dirty or gummy from old oil you may be misled to believe that the motor control is sticking. In this case the machine will start as if under a heavy load, or start abruptly only after you have depressed the motor control past the position that would normally start the machine at a low speed.

If the machine appears to run all right under these conditions (some sluggishness would be acceptable if you have reason to believe that the mechanisms need cleaning and oiling), you are ready to:

- Load a bobbin (Fig. 2-5).
- Install the bobbin, remembering to thread the bobbin case (Fig. 2-6).
- Install the needle. Note that the shank of the needle has one flat side, which will *generally* allow it to be installed only one way. However, if it can be installed more than one way, assume that the flat goes to the back or right side and that breaking of the thread indicates it is wrongly installed (Fig. 2-7).
- In the case of a zig-zag machine, note that the needle plate and presser foot are cross slotted.
- Rotate the machine a few rotations by hand to see that the needle does not strike the presser foot or needle plate.
- Top-thread the machine in the following sequence:

— Place the spool of thread over the spool spindle, nothing that in the case of horizontal spindle, there must be some provision for retaining the spool in place.

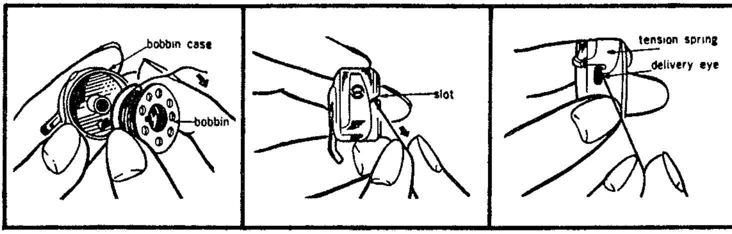


Fig. 2-6. Installing the loaded bobbin in the bobbin case and threading the bobbin case of the New Home Model 545. Note that when the bobbin and bobbin case are held as in the first drawing, the thread end extends from the loaded bobbin in a clockwise direction. This is a general rule that applies for loading most bobbin cases.

- Lead the end of the thread through the nearest guide that will direct it to the tension regulator.
- Loop the thread around and between the tension discs (Fig. 2-8), noting that in the case of a double-needle machine there will be two sets of discs (three discs in all, and it makes no difference which set you use.)

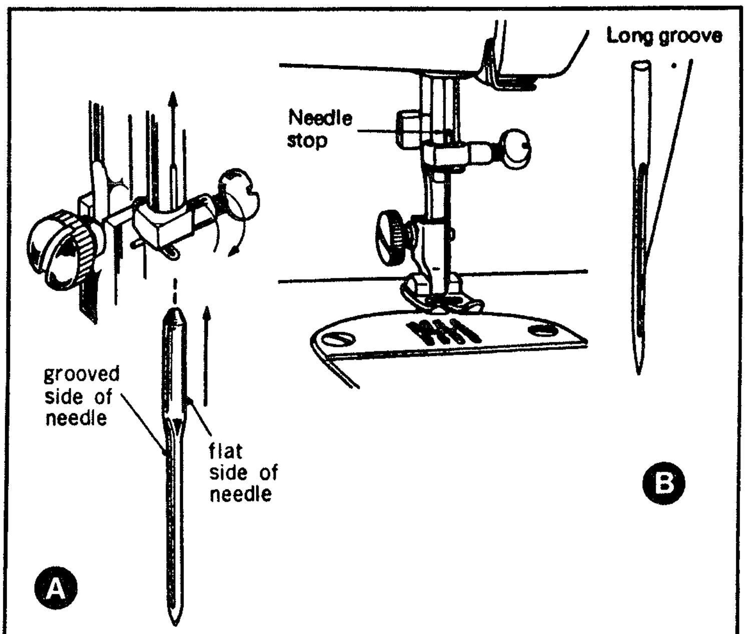


Fig. 2-7.(A) shows the method of inserting the needle in the New Home Model 545 and (B) shows the method of inserting the needle in the Brother Model B801.

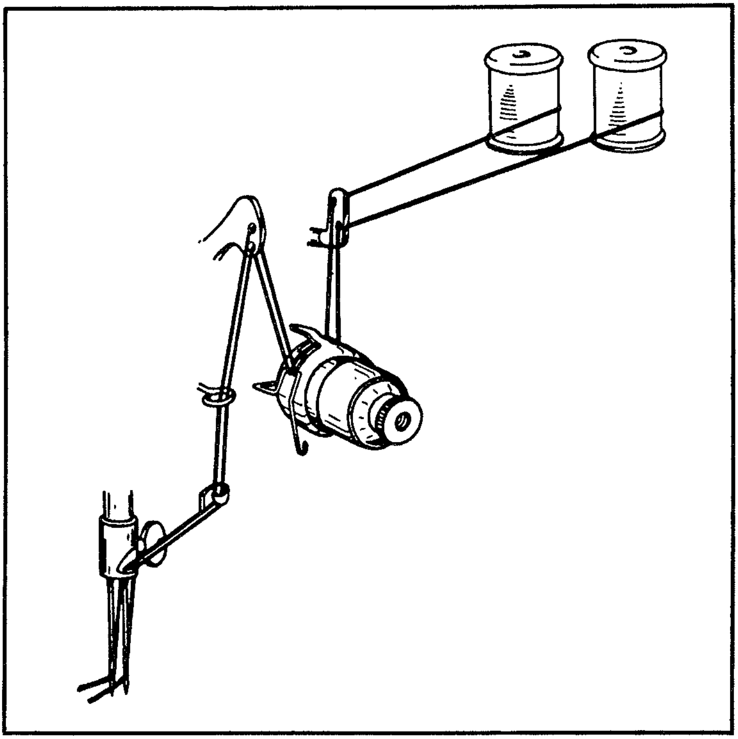


Fig. 2-8. Threading the top tension regulator on the Pfaff 230/332 Automatic.

—Pull the thread through the tension discs, noting that with the presser foot raised, there is no tension on the thread.

—Pass the thread through the eye of the take-up lever.

—Pass the thread through every thread guide that you can see between the take-up lever and the needle.

—Thread the needle, inserting the thread in the eye of the needle on the side of the needle opposite the flat of the shank. Pulling 7 or 8 inches of thread through the needle eye.

- Pick up the bobbin thread as follows: Leave the presser foot in the up position and in your left hand hold the end of the thread that has been threaded through the needle. With your right hand rotate the balance wheel toward you. If the timing of the shuttle hook is correct, the top thread should interlock the bobbin thread in one complete rotation of the balance wheel. A little difficulty in picking up the loop is tolerable, however, since the loop does not form readily with no material in the machine. Still holding and pulling the thread in your left hand, when the interlocked threads appear above the needle plate, pull them through the slot of the presser foot, so that they are both under the foot and toward the back of the machine (Fig. 2-9).

- Make an initial setting of the top tension regulator. For most normal sewing applications, a setting about halfway between the lowest and highest setting will be correct. Further regulation may be necessary after you have examined the stitch.

- Make an initial setting of the presser foot pressure. If the material is light to medium-weight cotton, a setting about halfway between the lowest and highest setting of the dial will be correct. Further regulation may be necessary when you see how the material is fed through the machine.

The machine should now be ready to sew. At this point, no written instructions can replace on-the-spot judgment regarding the operating condition of the machine. In general, however, problems can be classed as either those that can be corrected by making some external adjustment and modifying a sewing technique, or those that can only be corrected by going into the machine to make internal adjustments or repairs.

Troubleshooting the Used Machine

Faulty or Non-starting of Machine Motor. If the trouble symptom is faulty or if there is a non-starting of the machine motor, the underlying cause may be:

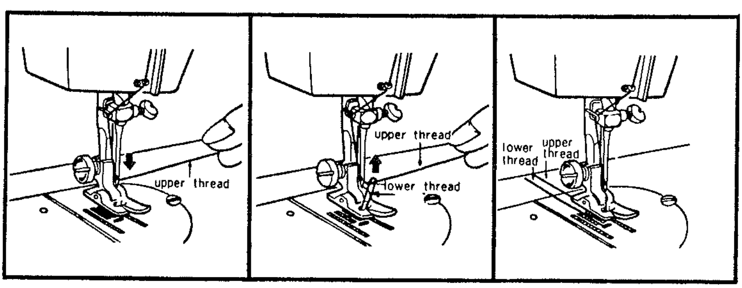


Fig. 2-9. Use the top thread to pick up the bobbin thread. It is necessary to maintain a slight, constant pressure on the thread with the left hand, while turning the balance wheel toward you with your right hand.

- broken wires or loose connections in the electrical circuit.
- worn motor brushes.
- motor in need of lubricating.
- worn motor bushings.
- sewing light is removed or burned out.

Noisy Running. The underlying cause of a noisily running machine may be:

- a dirty, corroded, incorrectly oiled or gummy machine. Assuming that corrosion is superficial, this problem can be corrected by cleaning and oiling the machine.
- a needle that is glancing the edge of the presser foot, the edge of the needle plate or the shuttle hook. The needle will most likely break, however. This may be caused by a bent needle. If the needle is bent, you are not able to get the smooth sewing. To check the bent of needle, place the flat side of needle down on a straight and flat surface as shown in Fig. 2-10. Or it may be caused by a needle of an incorrect type or size (selecting a needle for a few of the older European-made machines can be problematic); or you may be pulling on the material as it is being fed, thus springing the needle to the side; or the needle bar height may be incorrect; or the timing of the shuttle hook may be incorrect. Correcting the latter two problems will be explained in Chapter 3.
- A faulty mechanism. This would indicate an internal correction.

Stitch Skipping. This may be caused by:

- a needle that is incorrect for the machine, or for the thread being used; or a needle that is bent, incorrectly installed or incorrectly threaded. The Size 14 needle and 50 mercerized cotton or cotton-wrapped polyester thread should be compatible, however.
- incorrect needle bar height.
- incorrect timing of the shuttle hook.

Breaking Needle Thread. This may be caused by:

- any of the needle problems discussed above.
- the use of poor or knotty thread.
- a burred hole in the needle plate. You can correct this by smoothing the hole with a fine emery cloth.

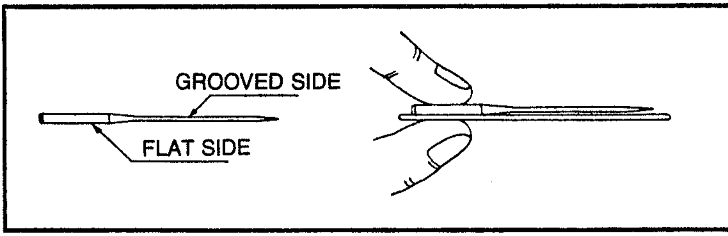


Fig. 2-10. A Brother operator's manual demonstrates how to check a needle for straightness. It is poor economy to try and use a needle that is even slightly bent.

- sewing through too many thicknesses of material, or stitching too many times in a no-feed position.
- a shuttle that is dirty, needs oiling or has thread snarled around it. This may indicate a minor problem, inasmuch excessive lint, snarled thread, etc., can sometimes be easily removed. Or it may indicate a slightly more serious problem, inasmuch as the accumulation of offending material may be so severe that the shuttle will have to be disassembled and cleaned. One method of cleaning the shuttle will be discussed in this chapter, and disassembling the shuttle will be discussed in Chapter 3.
- too much tension on either the top or bobbin thread or both. This can be caused by incorrect regulation of the top tension; lint or dirt between the tension discs of the top tension regulator; the use of certain polyester threads, which might cause tensioning problems in either the tip tension regulator or bobbin tensioner; incorrect regulation of the bobbin tensioner; or an incorrectly wound bobbin. To be sure the bobbin is level-wound, pass the thread through the bobbin winding guide, rather that letting it slip through your fingers as the bobbin is wound, which might result in cross layering of the thread. In any case, for best sewing results, use the same type and size of thread for both the bobbin and top thread.

Non-Feeding or Erratic Feeding of Material. This may be caused by:

- incorrect pressure of the presser foot. This would be in the case of erratic feeding assuming that the presser bar spring is not broken. This spring is visible behind the face plate in many models. If it is not visible, you can make an approximate determination of its tension by lowering the presser bar and lifting it by pushing upward on the presser foot, while at the same time changing the setting of the presser bar regulator screw. In general, the setting is determined by the texture of the material. Lightweight, soft fabrics and piled fabrics, such as velvet require a lower setting than a heavy or crisp fabric. Alternatively, the presser bar might be sticking where it goes through the machine housing, which can probably be corrected by cleaning and oiling.

- an accumulation of lint between the rows of feed dog teeth.
- a worn-smooth top surface of the feed dogs, which can be corrected by replacing the feed dogs.
- a special needle plate that has its top surface above the top edge of the feed dog teeth at their highest point.
- feed dogs that have been lowered so as to be inoperative for previous darning, embroidering, etc.
- a stitch length set at 0.
- a faulty feed drive mechanism.

Faulty Stitching. Faulty stitching may be caused by:

- incorrect thread tension, if the interlocking is incorrect. Loose stitching, with the interlocking appearing on either the top or bottom of the material is incorrect. If you cannot correct this by regulating the top or bobbin thread tension, you may have to clean the top tension regulator or the bobbin case.
- poor or Knotty thread. Use the best thread you can buy, and if you use polyester thread, you may learn that certain brands create tensioning problems. In any case, good quality mercerized cotton or cotton-wrapped polyesters give consistently good results if the machine is operating correctly and the tensions are correctly regulated.
- incorrect needle for the type and size of thread being used.
- a faulty or sticking zig-zag mechanism or needle bar in the case of a non-uniform zig-zag stitch. This may be corrected by cleaning and oiling the machine or internal adjustments and repairs may be indicated.

Binding or StickingMechanisms. This may be caused by:

- engaged bobbin winding mechanism.
- snarled thread between balance wheel and the bushing.
- snarled thread around the shuttle mechanism.
- a dirty gummy machine.

- a faulty mechanism, or one that has been ineffectually repaired.
- an oil-soaked timing belt. Generally this is only applicable if the material of the timing belt is fibrous.
- slipping or binding drive belt from the motor to the balance wheel. A belt that is too loose will slip around the drive pulley. A belt that is too tight may put too much pressure on the bearings.

In this section, you'll remember, we have been discussing what factors to consider when deciding whether or not to buy a certain used sewing machine. You will have noted that we referred to possible problems that would require internal adjustments or repair procedures, but without explaining the procedure. When you read Chapter 3 you will discover that there are a few more trouble symptoms and causes which we never referred to at all. This is because the purpose of this section is to give you enough elementary facts about trouble symptoms and causes to prevent you from buying a used machine that seems to have only a minor problem, but which will prove too expensive or impractical to repair, or conversely to prevent you from passing up an excellent used machine that appears to have a major problem, but which can be corrected by cleaning, oiling and making adjustments.

For example, timing a shuttle hook or adjusting the needle bar height may sound like a formidable task, but will sound simpler after you have read Chapter 3. Cleaning and oiling a machine is a simple procedure which can eliminate many trouble symptoms. A machine may not feed material simply because the feed dogs have been dropped for a certain sewing application. Perhaps the most risky buy is the machine that won't operate, especially if it is evident through broken screw heads, etc., that repairs have been attempted on it. The danger in such a case is that certain vital parts may be missing and you will not be aware of it. Even experienced repairmen ponder the possibility of missing parts when it is obvious that repairs have been attempted on a machine. Similarly, you can assume that replacing a timing belt that extends from the lower mechanism to the main shaft in the upper arm of the machine will be a major job, or a challenge, depending upon your point of view.

Finally, when you do decide to buy a used machine, make an effort to obtain the owner's manual that was supplied with the machine when it was new. If it has been lost, you may be able to obtain a manual from the manufacturer or distributor. The owner's manual will not give you an in-depth service or maintenance instructions, but it will provide oiling instructions, as well as general operating instructions which may keep you from creating operator-caused problems with an unfamiliar machine.

In the remainder of this chapter, we will tell you how to initiate an ongoing maintenance program for your sewing machine, without the help of an owner's manual; how to select and use threads, needles and materials to get optimum machine performance; and how and in what circumstances to make external adjustments, which will also give you optimum machine performance.

READYING THE MACHINE FOR SERVICE

If the shop demonstration proved the machine to be operable, the initial steps that you take at home to ready it for use will simply be a part of the continuing maintenance program on that machine. The electrical components should be checked, the drive belt tension should be adjusted and the machine should be cleaned and oiled.

CHECKING THE ELECTRICAL COMPONENTS

Even though the machine is operable, the electrical components should be checked for worn or frayed cords, broken plugs, etc. The worn parts should be replaced. Check the motor brushes and replace them if necessary. Access to the motor brushes may be gained in one of a variety of methods:

- On some motors, the brushes are located under screw caps (Fig. 2-11). They are generally found in the end of the motor housing opposite the pulley, with the two caps 180 degrees from each other.
- On some motors, the brushes will be found by removing small covers (two in all) at the end of the motor housing (Fig. 2-12). They are generally found opposite the pulley end of the motor.
- On some motors, the brushes will be found by removing the entire motor housing (Fig. 2-13).

To assure the correct replacement brush, take the model number of your sewing machine and the information on the name plate of the motor to your sewing machine service center, or write to the appropriate manufacturer or distributor.

ADJUSTING THE DRIVE BELT TENSION

The drive belt tension is about right if you can depress the belt about 3/16 inch (5mm) with your finger and you experience no

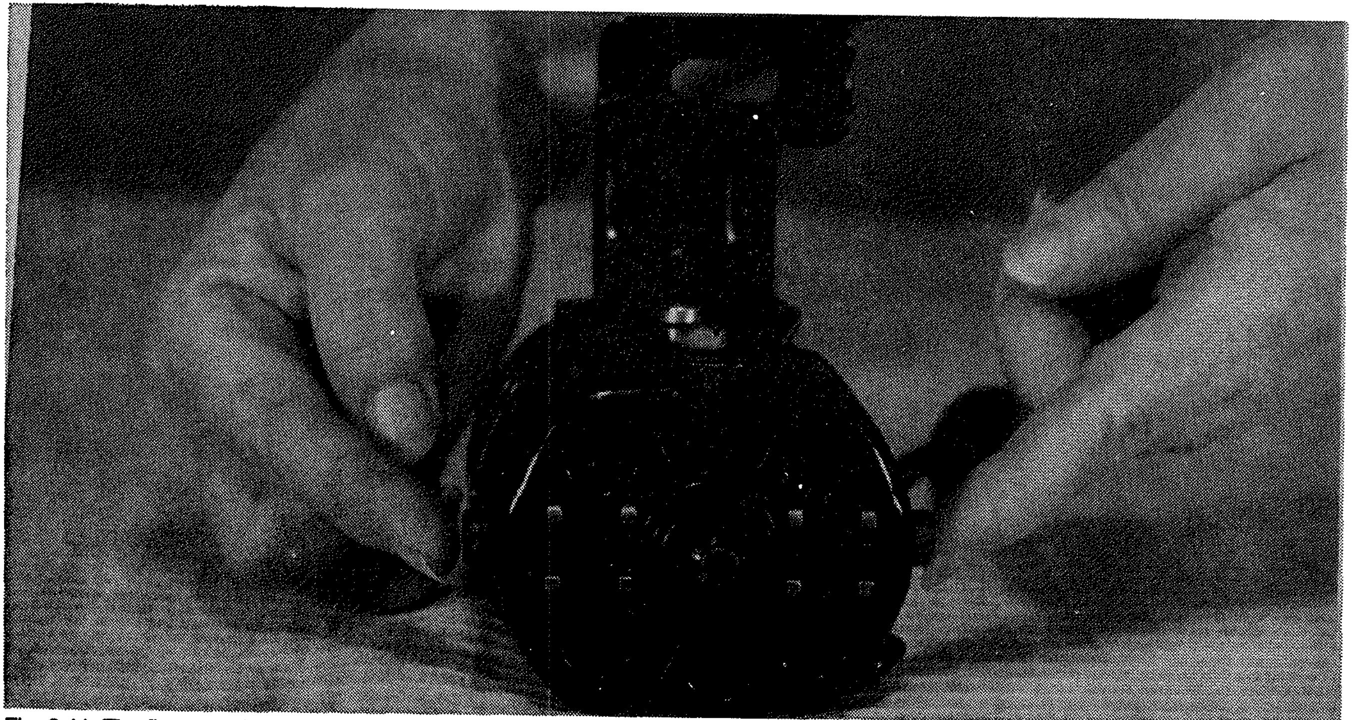


Fig. 2-11. The fingers point to the caps that cover the brushes on this motor from an old Bel-Air straight-stitch sewing machine.

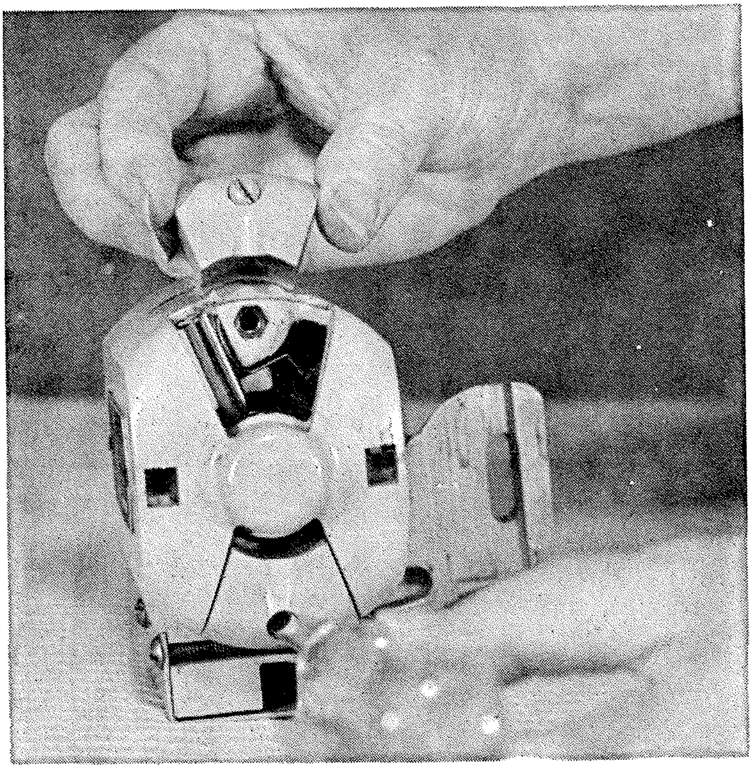


Fig. 2-12. The motor brushes on the Singer Model 319W motor are made accessible by removing covers on the end of the motor opposite the pulley.

starting or running problems. The tension can be adjusted by loosening the motor mount bracket bolt and moving the motor up or down to get the correct tension on the belt, then tightening the motor bracket bolt (Fig. 2-14). In case the belt is too long to make the adjustment by moving the motor, you might be able to effect a temporary repair by cutting the belt, removing a small section from it and splicing it back together by punching holes (from the underside of the belt) in the ends and abutting them and securing them with a piece of wire or a leather throng laced through the holes.

CLEANING AND OILING THE MACHINE THE FIRST TIME

Oiling a sewing machine, even in the absence of specific instructions is not a mysterious or complex procedure, providing you understand some basic principles. First of all, you can't injure a *metal bearing point* (a point where there is friction between metal moving parts) by oiling it with the proper oil, although over oiling

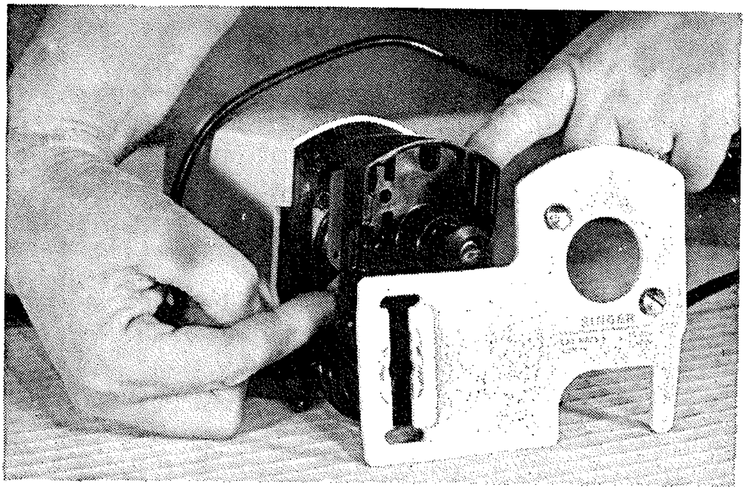


Fig. 2-13. On the Singer Model 248, the motor brushes are made acessible by removing the entire motor housing.

may result in a build-up of oily residue that will atract dust. Secondly, any parts that are not metal, such as neoprene or nylon gears or belts, or rubber or fabric belts or other parts, should *not* be oiled. Grease should be applied only to metal gears.

At the outset, assume that any machine that has not been used for a while should be cleaned and oiled. To do this, first equip yourself with the following:

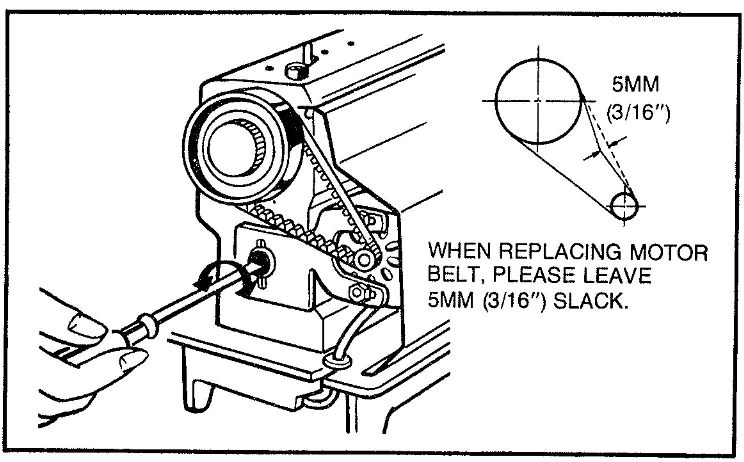


Fig. 2-14. This is how to adjust the tension of the motor drive belt on the New Home Model 545. A correctly tensioned drive belt creates a more efficiently operating machine.

- benzine or pure kerosene in a clean oil squirt can.
- sewing machine oil in a squirt container.
- sewing machine gear lubricant (applicable only if your machine has gears).
- an aerosol can of silicone lubricant (not oil).
- lint-free rags.
- a small stiff-bristled brush and a small soft-bristled brush (such as a ½ inch paint brush), both of *good quality*.

Then oil the motor with two drops of oil (applicable only if the motor is equipped with oil holes). Remove the face plate to expose the needle bar, presser bar, linkages, etc.

You'll also need to remove the throat plate and the needle plate. If the needle plate is held down with screws, you should use a screwdriver with a 12 inch or 14 inch blade, so that in working around the top arm of the machine, the screwdriver blade can be inserted vertically in the screw slots.

Remove the top cover from the upper arm of the machine, which will usually be held on by two visible screws (Fig. 2-15). This is applicable only to zig-zag machines.

Remove the bobbin and bobbin case. In the front or side-loading machine, the bobbin and bobbin case come out together. In the top-loading or drop-in machine, the bobbin case is removed in an extra step, generally by swinging a spring clip sidewise and lifting upward on the bobbin case.

Gain access to the lower mechanism of the machine:

- swinging the machine up and back, if it is in a console or portable cabinet.
- removing the bottom cover, which is usually held on with one wing nut, if the machine is not in a cabinet.
- removing the free-arm cover, in the case of a free-arm machine.

With most of the mechanisms accessible, you can brush away all the loose surface lint and dirt with the soft brush, being sure that none of the soft bristles breaks off and lodges in any of the mechanisms. The, use the stiff-bristled brush to work into close areas, especially around the feed dogs and the bobbin shuttle. To proceed with the cleaning and oiling, you can assume that all bearing points and rotating parts need oiling. Before oiling them, they should be flushed with the kerosene or benzine. Avoid getting

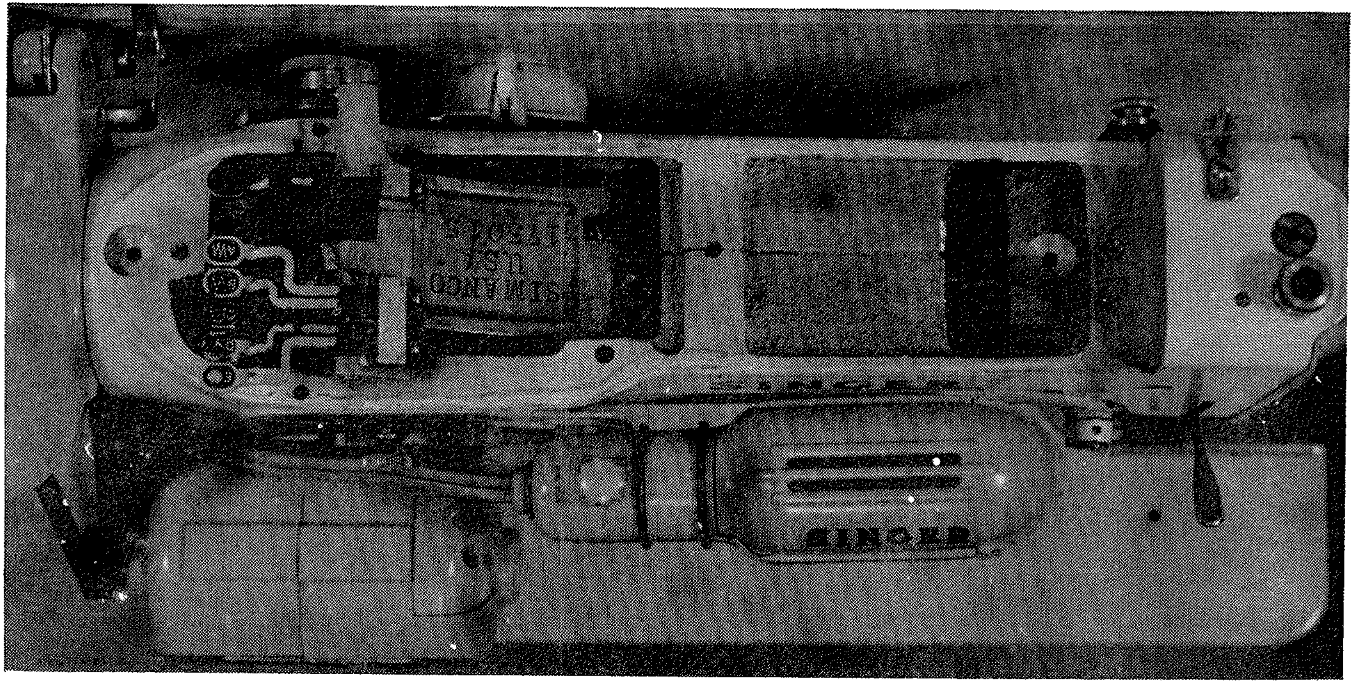


Fig. 2-15. This a view under the top of the upper arm cover (cover removed) on the Singer Model 319W. On most zig-zag machines, removing the top cover will give you access to the zig-zag mechanism.

either the oil or the cleaning agent on any gears, on the timing belt or drive belt, or on any other non-metallic parts.

Squirt ample cleaning agent in all the oil holes; on the levers, around the points where the needle bar and presser bar go through the machine housing; around the levers and mechanisms behind the face plate; in all bearing points in the top arm of the machine (some of these points may be supplied by oil holes through the top cover that you removed, but with this cover removed, you will have easier access to these oiling points); and around the shuttle. Then raise the bed of the machine (in the case of a free-arm machine, remove the free-arm cover) and squirt the cleaner in all bearing and rotating parts that are not supplied by oil holes through the bed of the machine.

With the presser foot raised, and preferably with the needle removed, run the machine at high speeds for a few seconds to flush out dirt, lint and old oil residue.

Let the machine stand for five minutes, then wipe away all the excess cleaning agent with a lint-free rag. Examine the machine for cleanliness, and if necessary, work at stubborn areas with the stiff brush. Repeat the flushing procedure with these areas.

Proceed with oiling, assuming that from now on it will be a routing maintenance chore. *Periodic oilings are better than using a lot of oil at one time*. Squirt two drops of oil in each oil hole and bearing point that you flushed with the cleaner, except those holes that supply the main bearings of the main shaft, in which you should squirt three drops of oil. Put one drop of oil in the shuttle race.

Lightly lubricate all the gears with the gear lubricant. Some gears will be exposed. Others might be enclosed in a gear box, in which case you will have to remove a cover to gain access to the gears. If the gears seem to be adequately lubricated with old grease, wipe away part of the old grease and replace it with the new grease.

Using a flashlight for visibility, spray the silicone lubricant around rollers and other moving parts in the vertical arm of the machine. The silicone will not harm rubber or neoprene parts.

Run the machine at moderate to high speed for about 30 seconds. Let it stand for five minutes, then wipe away all the excess oil.

Reassemble all the disassembled parts, replace the covers and thread the machine. It should now be ready for use. Sew a scrap of material to sew off excess oil.

PERIODIC CLEANING AND OILING

The general rules for routine cleaning and oiling of a machine are:

- If the machine is used for about an hour a day, oil it once a week
- If the machine is used for several hours a day, oil it once a day.
- In periodic oilings, one drop of oil at each oiling point is sufficient, except at the main bearings of the main shaft, which require two drops.
- The areas around the feed dogs and shuttle hook should be cleaned and oiled at each routine oiling of the machine. Use a good quality, stiff-bristled brush to clean around the shuttle, as soft bristles tend to break off and lodge in the shuttle mechanism.
- Regardless of whether the machine is used frequently, infrequently or is in disuse for long periods, it should be flushed with benzine or pure kerosene every six months, and the machine, including the gears should be completely lubricated.
- Never use all-purpose or household lubricants on a sewing machine. Buy sewing machine oil and gear lubricant from your sewing service center.

NEEDLES, THREADS AND MATERIALS

If you have read this chapter in its entirety, you will have learned that there is a definite relationship between the needle/thread/material combination that is used and the kinds of sewing problems that you might experience. Inasmuch as faulty stitches, breaking thread, etc., may often appear to be the symptoms of a malfunctioning machine, it is important to understand the basic principles of this relationship.

Selecting Needles

In selecting a needle, there is a distinction to be made between needle *type* and needle *size*.

Needle Type. The words *type* and *system* are used interchangeably to designate needles that can be used with certain brands and models of machines, so that some kind of standardization can be achieved in fitting needles to the hundreds of sewing machines that are to be found on the market. Among the different needle systems are the System 287, which is a round-shanked needle; the System 130R or 130B, which may be either a round or flat-shanked needle with a clearance cut; and the European System 705, which is also called the U.S.A. Ty-e 15X1. It is by far the most widely used type in the U.S. (Table 2-1). However, since an in-depth discussion of needle systems is not within the scope of this book, the best way that you can be assured of getting the correct needle type for your machine is to provide your supplier with the brand and model number of your machine.

Needle Size. The size of the needle that you select should have a definite relationship to the thread being used, which is determined by the material being sewn. Most sewing machine owners' manuals, as well as the packets that needles are supplied in, contain charts (Table 2-2) with information regarding the needle/thread/material combination to be used.

Specialized Needles. With the advent of polyester and double-knit materials, special needles have been developed which are usually recommended by sewing machine manufacturers by brand name. One such special needle is the ball point needle. It pushes the fibers apart, rather than piercing the material.

Selecting Threads

Always buy the best quality thread that you can find. Since it will be almost impossible for you to judge thread quality by its appearance, you will have to depend on brand names to guide you in your choice. Sewing machine dealers generally stock the more reliable thread brands, since they understand that better results can be obtained with their sewing machines if quality threads are used.

Apart from quality, the factors to consider in selecting thread are the material it is made from and its size. The most common threads to be found on the U.S. market today are cotton threads, silk threads and synthetic threads.

Cotton Threads. Cotton thread may be a plain cotton or mercerized cotton. A mercerized cotton thread is one that has been treated with a caustic soda solution to make it soft and glossy. It resists shrinking when the garment is washed. As a very general rule, mercerized cotton, if selected in the proper size is suitable for almost any sewing job. It is one of the most trouble-free threads that you can use. However, cotton thread is becoming hard to find because the demand for synthetic threads has increased with the wide preference for synthetic materials, and dealers are reluctant to stock the comparatively slow-selling cotton thread.

Table 2-1. Needle Types.

NEEDLE TYPES.									
15 × 1 (European 705)	20 × 1	1 × 2	40F1	1 × 4	50N1	130R (European 705H)	16 × 87	16 × 231 (European 1738)	127 × 1
All Singers White Rotary Domestic Rotary Kenmore Rotary National N50 Standard	*New Home Vibrator Eldredge Free West 8F, 52F Montgomery Ward Vibrator White Vibrator*	*Davis Long*	*New Home Rotary Free West Rotary*	*Domestic*	*Eldredge Rotary National Rotary Montgomery Rotary*	*Bernina 530, 540 Calanda Pfaff 130, 230*	*Anker Free New Home*	*Bell 401 Bernina 117L borletti 2000 Seamstress Designer*	*Wheeler & Wilson*
Davis Short New Home K, LN Adler Bernina 125J Brother Classic								*New Home Minerva Phoenix 282, 283 Viking*	
Meister 102, 302 Elna Necchi 3F, BV Pfaff 30 Phoenix 250, 350 Vigorelli									

Silk Threads. Silk thread, especially the A *twist*, is used, but it has a more limited application that either the cotton, mercerized cotton or synthetic threads.

Synthetic Thread. Nylon and polyester threads are the most commonly used synthetic threads, with polyester being by far the most popular. Nylon thread is ocasionally used when an invisible stitch is wanted, but it has a tendency to kink, making it rather difficult to use. The strong preference for polyester threads when sewing polyester materials is based on its strength, and the fact that it has an elasticity that will prevent seams from breaking when the material is stretched. However, even when using polyester thread, the only insurance against broken seams is to use the *stretch stitch*. This is a variation of the zig-zag stitch, available only with certain machines and zig-zag cams. Or you can use a modification of the stretch stitch, such as a short, narrow zig-zag stitch. This is possible with the standard zig-zag cam. Even a certain sewing technique can be used which allows you to use either a straight or zig-zag stitch.

The most common problems experienced when using polyester threads are missed stitches (failure of the hook to pick up a loop at every cycle), tensioning problems and the breaking of threads while sewing. As a general rule, these problems can be solved as follows:

- In the case of missed stitches, try using the needles developed especially for stretch fabrics. For example, *Brother* supplies such a special needle, under the registered trade name Golden Stretch Stitch Needle.
- In the case of tensioning problems, experiment with different settings of the top tension regulator and regulating of the bobbin tensioner. As a general rule, loosening both tensions slightly can be helpful.
- In the case of breaking threads while sewing, the thread may be inferior, the needle eye may be too small or the tension may have to be decreased.
- In any case, if the trouble persists after you have made the adjustments, *try switching thread brands until you find one brand that is trouble-free*.

Thread sizes. A numbering system is used to designate the size of mercerized cotton thread, with lower numbers representing heavier thread (Table 2-2). A 50 cotton or mercerized cotton is considered a *medium thread*. It has a wide range of applications. For best results, however, you should follow the guidelines of Table

Table 2-2. Needle/Thread/Material Combinations.

SEWING MATERIAL		NEEDLE SIZE	THREAD SIZES
VERY THIN	*Fine tricot, Fine lace, Thin linen, Silk, Tulle, Chiffon*	*9*	*Cotton: 80-120* *Synthetic* *Fine Mercerized Cotton*
LIGHTWEIGHT	*Organdy, Jersey, Viole, Taffeta, Synthetics, Silk, Batiste*	*11*	*Cotton: 60-80* *Silk: "A"* *Synthetic* *Mercerized 50*
MEDIUM	*Cotton, Gingham, Poplin, Percale, Pique, Satin, Velvet, Lightweight wool, Fine corduroy, Suitings*	*14*	*Cotton: 50-60* *Silk: "A"* *Synthetic* *Mercerized 50-60*
HEAVY	*Denim, Gabardine, Tweed, Corduroy*	*16*	*Cotton: 40-50* *Mercerized Heavy Duty*
VERY HEAVY	*Canvas, Overcoatings, Upholstery*	*18*	*Cotton: 30-40* *Mercerized Heavy Duty*

2-2. In the case of cotton threads, always match the thread size to the needle size. At this writing, there appears to be no numbering system for polyester threads, with one size recommended for all sewing jobs. A 100 percent polyester thread may be problematic, in as much as it tends to hang up in the eye of the needle. It also presents a surface to the tension regulator in which a build-up of heat, resulting in expansion and erratic tensioning, is possible. These problems can to some extent be avoided by buying a cotton-wrapped polyester thread. Futhermore since there appears to be some relationship between thread price and thread quality, switching to a more expensive thread may solve the problems of breaking and erratic tensioning of polyester threads.

Selecting Materials

Any fabric that is available in consumer outlets is suitable to be sewn on consumer machines, and fabrics are necessarily chosen because they are the most suitable for the desired garment, with no considerations regarding the machine. By using the information in Table 2-2 you can match the needle and thread to the fabric. Some fabrics, particularly the synthetics, tend to rather quickly place a deposit of lint around the feed dogs and the shuttle hook. Therefore when sewing these materials, frequent cleaning of these machine areas is doubly important. As noted earlier in this section, some change in the presser foot pressure may be necessary when changing from one fabric to another.

REGULATING THE MACHINE

Throughout these first two chapters, we have repeatedly referred to machine adjustments and regulations that the most

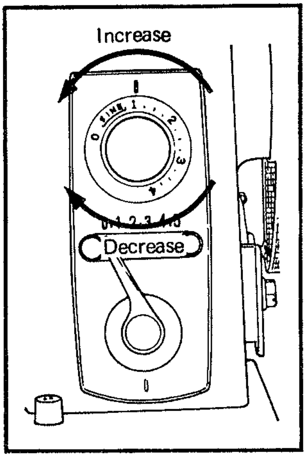


Fig. 2-16 This is the stitch length regulator knob for the Brother Model B801.

unexperienced operator can and should make to achieve the best sewing results. These adjustments and regulations affect the mechanisms, either directly or indirectly. But a distinction should be made between those adjustments and regulations which only affect certain sewing applications and those that actually affect the quality of either the stitching or machine performance. For example, an extremely long stitch which can be achieved by regulating the stitch length regulator, may be incorrect for one sewing application, such as normal sewing, but correct for another such as a basting stitch, in which the top tension should also be decreased. This will not affect the quality of the machine performance. An incorrectly regulated top or bobbin tension, on the other hand, often appears to be the result of a malfunctioning machine. This can cause an unnecessary trip to the repair shop.

First and foremost, you should understand that the dials and levers that provide for operator adjustments and regulations are installed on the machines for a purpose. They are movable, and they must occasionally be moved if you are to achieve the best swing results possible.

Stitch Length and Reverse Regulator

Different settings of the stitch length regulator simply change the length of the stitches on the straight-stitch machine, or the distance between the points of a zig-zag stitch on a zig-zag machine. This does not affect the quality of the machine performance. The stitch length is regulated by turning the stitch length regulator knob (Fig. 2-16). Numerals on the dial represent the stitch length. To

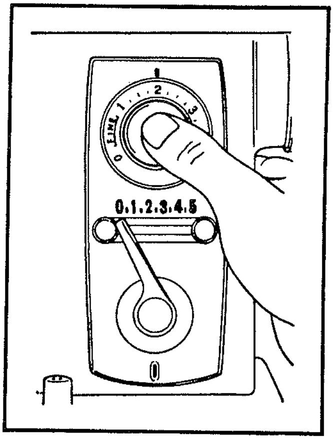


Fig. 2-17. Push the reverse stitch control when you want to sew in reverse with the Brother Model B801 machine.

increase the stitch length, turn stitch length regulator knob counter-clockwise to larger number on the dial. To *decrease* the stitch length, turn knob clockwise to smaller number on the dial. The *0* on the dial means that the material is not fed. The FINE area on the dial is used for making a SATIN STITCH (a close zig-zag stitch). You determine the exact position by observing the feed of the material being sewn.

To sew reverse stitching, push the reverse sewing button as far as it will go and keep it in this position until you wish to sew forward (Fig. 2-17). Reverse stitching is used for reinforcing and finishing all seams.

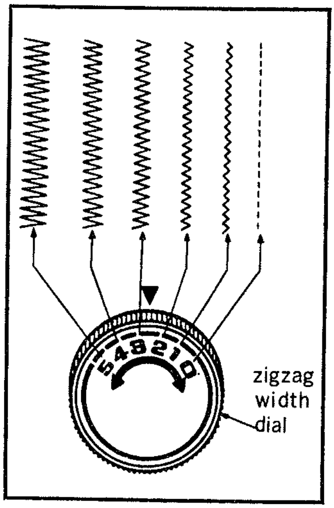


Fig. 2-18. This is a sketch of the zig-zag width regulator on the New Home Model 545.

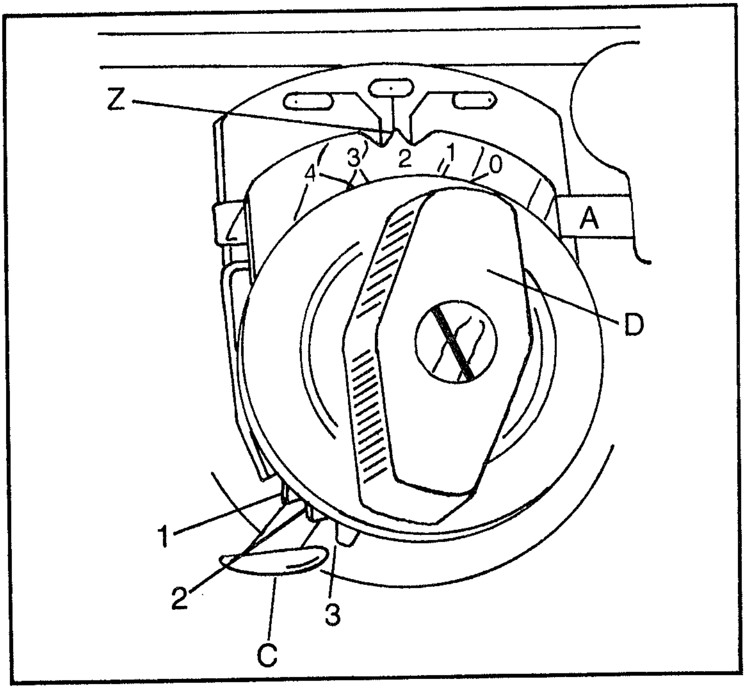


Fig. 2-19. On the Pfaff Models 230/332 Automatic, the zig-zag width is regulated by knob D, and the needle position by the lever indicated with the numbers 1, 2, and 3. C indicates the center position of the needle.

Zig-Zag Width Regulator

The zig-zag stitch regulator (Fig. 2-18) works in conjunction with the contour of the particular zig-zag cam to regulate the width of the stitch, from 0mm to about 5mm. It is important to understand that the width of a zig-zag stitch cannot be increased beyond certain limits if the cam contours are shallow. Conversely, the width of a zig-zag stitch will be limited by a low setting of the stitch regulator, and will decrease to 0 (straight stitch) as the regulator is moved to 0.

Needle Position Regulator

On most zig-zag machines, a needle position dial or lever allows you to move the entire needle bar to the left, center or right position (Fig. 2-19). If the needle bar is in any position other than *CENTER*, a zig-zag presser foot and needle plate must be used to keep the needle from striking the foot or plate on its downward stroke, even in straight stitching.

Presser Foot Regulator

For most normal sweeping sewing applications, a *normal* setting of the presser foot regulator (Fig. 2-20) is about right. The general rules for adjusting the presser foot pressure are:

- Medium weight materials require normal pressure with a presser bar pressure setting about halfway between the lowest and highest settings of the dial or screw.
- Thin or delicate materials require more presser foot pressure than heavier materials.
- If the fabric puckers under the presser foot, the pressure should be decreased.
- If the material moves erratically, or seems to slide under the presser foot, the pressure should be increased.
- If the pressure is reduced to zero, the feed dog will have only a slight feeding effect on the fabric, and you will be able to move the material by hand without the action of the feed dog.

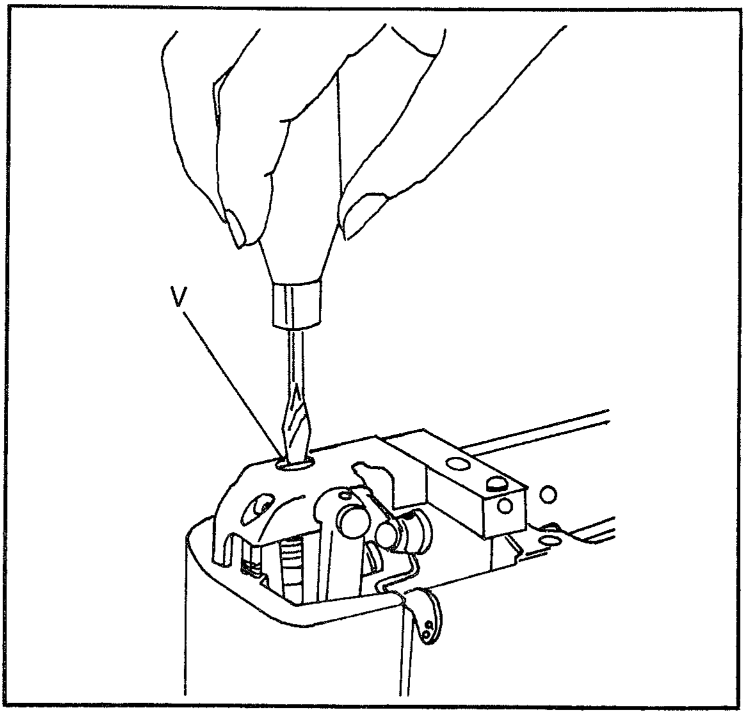


Fig. 2-20. The operator uses a screwdriver to regulate the presser foot pressure on Pfaff Models 230/332 Automatic.

FEED DOG DROPPING

Many machines have some provision for dropping the feed dog so that the top surface of the feed dog teeth will not contact the material when the machine is running. This feature is used for sewing on buttons, monogramming, darning and embroidering. In the latter three applications, the presser foot pressure is also reduced, so that the material can be moved under the presser foot in a free-hand manner. On most machines, the feed dogs can be dropped by depressing an externally located button. On other machines the adjustment is made by loosening a screw under the bed of the machine (Fig. 2-21).

On less expensive machines, disengagement from the feed dogs can be accomplished by installing an accessory needle plate (Fig. 2-22) with a top surface that is raised above the top edge of the feed dog when it is in the highest position. If an older or less expensive machine has neither a drop feed nor an accessory plate to accomplish the same purpose, you may through trial and error, accomplish this purpose by setting the stitch length regulator and presser foot pressure at 0. However, this method does have the disadvantage that the feed dog teeth will contact the material as the feed mechanism goes through its up-and-down cycle, making it difficult to move the material under the presser foot.

If the feed dogs are mistakenly left in the dropped position, the machine will not feed the fabric in normal sewing jobs.

PRESSER FEET

As a general rule, a presser foot that is slotted crosswise to provide clearance for zig-zag sewing can be used for most normal sewing jobs. However, certain types of zig-zag presser feet do provide better visibility for certain sewing applications. For example, if you have trouble sewing a straight stitch along a uniform line with a zig-zag machine you should use a straight stitch presser foot. Be sure, however, to set the needle position at CENTER for the appropriate position on your particular machine, with the stitch width dial set at 0.

TENSION REGULATION

While owner's manuals usually have a considerable amount to say about thread tension regulation, they leave the reader with the impression that once the regulation is set at the recommended average pressure, minimal changes are all that will be required from then on. This may be true as long as you keep the top tension

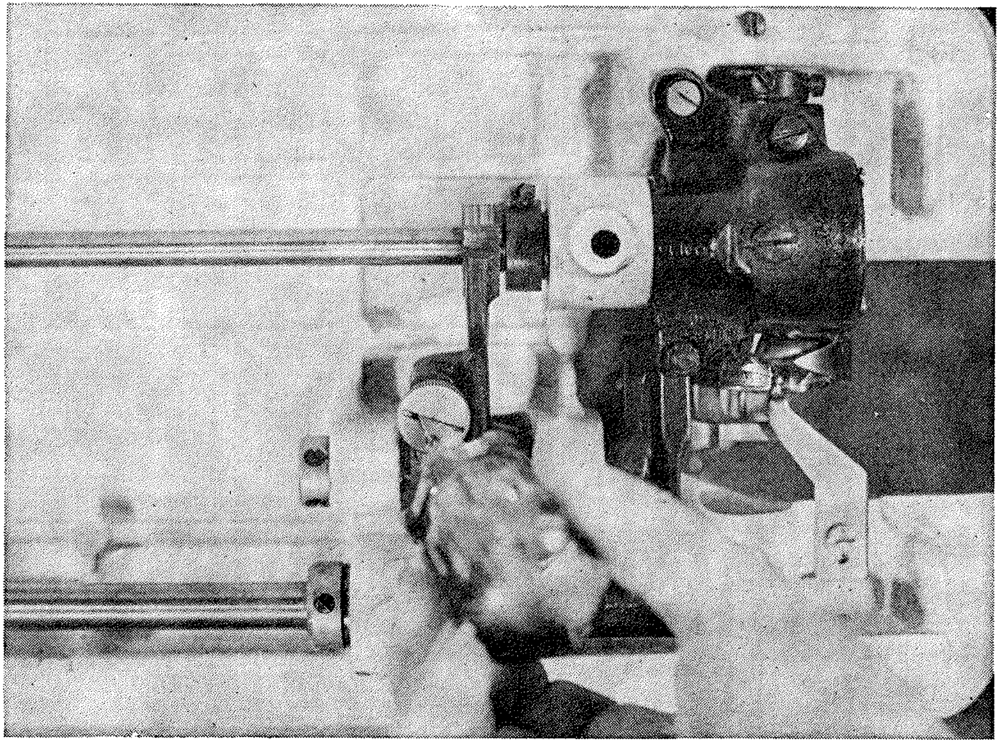


Fig. 2-21. Dropping the feed dogs is accomplished by different means on different machines. On the Singer Model 319W (relatively old model), the operator tips the head of the machine back and loosens the screw with the head of the machine back and loosens the screw with the large head that is both slotted and knurled.

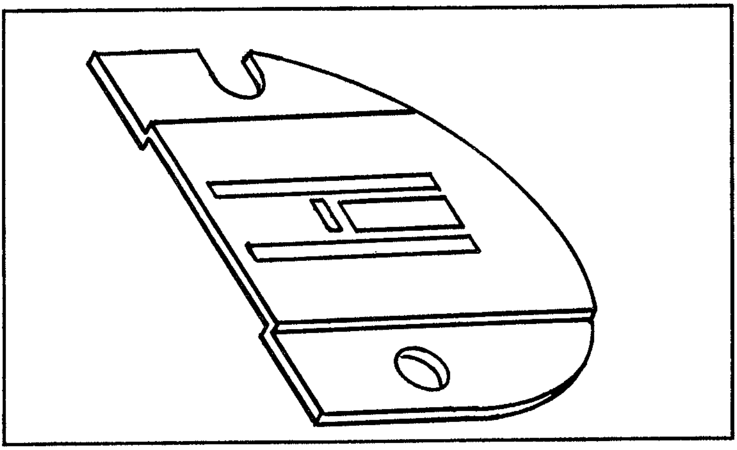


Fig. 2-22. On the Singer Model 248, a relatively new but relatively inexpensive model, isolation from the feed dog is accomplished by installing a special needle plate, with the sewing surface raised above the feed dog.

regulator and bobbin tensioner clean, as long as you consistently sew with non-problematic materials and thread and as long as someone else does not change the setting of the top tension regulator.

When one of these conditions is not fulfilled, however, you may experience tensioning problems. It is then that a basic understanding of how much and in what circumstances to change these settings is essential, if you are to get consistently good sewing results. Moreover, poor tensioning often manifests itself as breaking thread, faulty stitching, etc. This can easily be misinterpreted as a faulty mechanism in the machine. The most probable symptoms of poor tensioning are:

- Puckering of the material. This can also be caused by too much presser foot pressure.
- Breaking of the thread while sewing. As a general rule, if the top thread breaks, the top tension is too tight. If the bottom thread breaks, the bobbin tension is too tight. However, other factors that can lead to breaking of threads while sewing (and mislead the operator to believe that the cause is poor tensioning) are cheap polyester threads, usually 100 percent polyester), which ravel and hang up in either the needle or the bobbin tensioner. Cross layering of the bobbin thread as it is wound on the bobbin can also be the cause of broken threads.

- The point of interlocking of the top and bottom stitches appearing on either the bottom or top of the material (Fig. 2-23), rather than being virtually invisible between the fabrics.

The general rule for correct tensioning is that the top tension should be set halfway between the lowest and highest setting, and the tension spring in the bobbin case should be regulated so that when you let the weight of the bobbin case pull against the thread, no thread will be pulled from the bobbin case. It should take only a slight additional pull to pull the thread from the bobbin case. Once this setting of the bobbin tensioner is established, all subsequent tensioning adjustments should be made at the top tension regulator. Remember, however, that a change of threads in the bobbin *may* require a change of the bobbin tension.

Correct Tensioning

To experiment with tensioning, use your favorite quality thread, set the bobbin tension as described and set the top tension at an intermediate setting. At these settings, the stitches should be interlocked between the fabrics. Then, as you turn the top tension to 0, the interlocking should appear on the bottom of the fabrics, and at 0, noticeable loops should appear on the bottom of the fabrics. When you turn the top tension to the highest setting, the interlocking will begin to appear on the top of the fabrics, until at the highest setting, where there will be loops on top of the fabrics. When changing threads or fabrics, it may be necessary to adjust the top tension setting slightly to one side or the other of the intermediate setting. You may find that if you switch from cotton to polyester threads, the tension will have to be decreased in both the bobbin and top tension regulator.

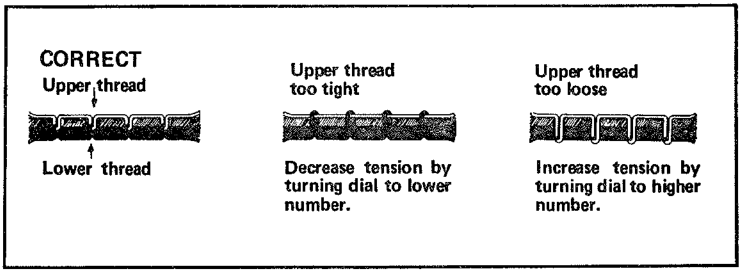


Fig. 2-23. This drawing from the Brother Model B801 operator's manual presents an inside view of what occurs in stitch interlocking.

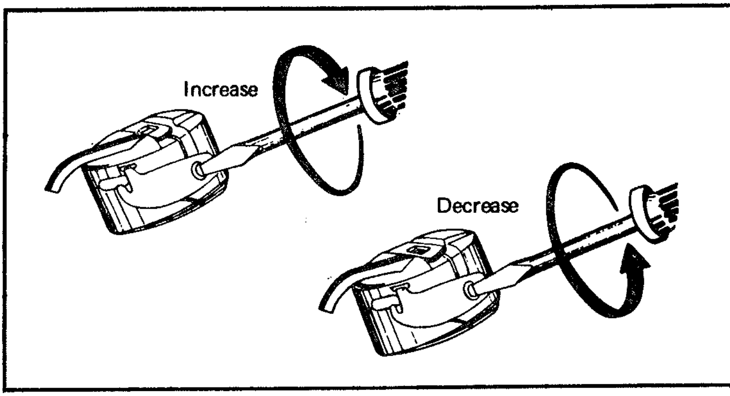


Fig. 2-24. This drawing from the Brother Model B801 operator's manual shows how to increase or decrease the bobbin tension. The adjustments should be slight until the results are noted. Your local repairman might advise you not to make this adjustment, but sewing perfectionists recognize the importance of a variable bobbin tension.

Regulating the Bobbin Tension

To regulate the tension of the tension spring in the bobbin case, it is best to remove the bobbin case, even in the case of the top-load machine. Examine it carefully under a good light. Some bobbin cases have calibrated dials to indicate higher and lower settings of the tension, and many do not.

Generally, you will see two screws on the tension spring (Fig. 2-24). The screw at the extreme end of the spring is there to hold the spring in place, and the other screw is the tensioning screw. To decrease the bobbin tension, turn the tension spring screw counterclockwise. To increase the tension, turn it clockwise. At the beginning of the procedure, make a mental note of the position of the screw, as determined by the direction of the screw slot. Turn the screw only about ⅛ turn in the appropriate direction before checking the tension. If synthetic threads are your choice, remember to always use quality, cotton-wrapped polyester, thereby avoiding subsequent changes in the bobbin tension.

Using the Top Tension Regulator

First and foremost, when threading the machine, you must pass the thread between two tension discs in the top tension regulator assembly. If the machine is not designed to use a double needle, there will be only two tension discs. But if the machine is designed to use a double needle, there will be three discs. These

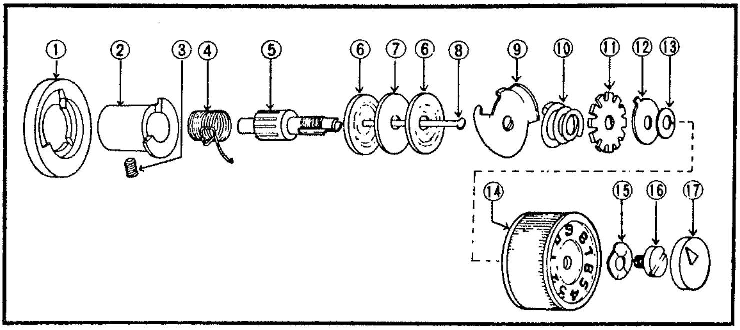


Fig. 2-25. This drawing of the upper tension regulator is taken from the White Service Manual for oscillating shuttle machines. 1. Base; 2. Tension Barrel; 3. Set screw; 4. Check Spring; 5. Tension Stud; 6. Tension Disc; 7. Tension Washer; 8. Tension Release Pin; 9. Tension Presser Tray; 10. Beehive Tension Spring; 11. Nut Tension Dial Stopper; 12. Adjusting Washer; 13. Tension Dail; 14. Spring Washer; 15. Set Screw; 16. Cap.

can be considered as two pair. In the latter case, if you use the optional double needle, and thus two top threads, a thread must be passed between both pairs of discs. If you use a single needle, the single top thread may be passed between either pair of discs.

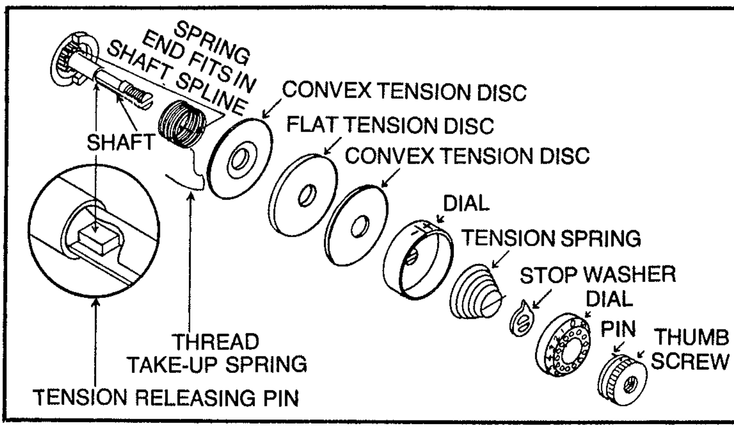


Fig. 2-26. This drawing shows the upper tension regulator disassembled on the Singer Model 319W. The thread take-up spring, or the thread check spring, is inserted so that the spring end fits in the appropriate spline to create a slight tension when the thread pulls the spring counterclockwise. The appropriate spline might have to be found by experimentation. The tension releasing pin, shown in the enlarged view, releases the tension of the tension spring when the presser bar lever is raised. The thread tension can be correlated to the numbered dial by depressing the numbered dial while screwing on the thumb screw, and when the actual tension corresponds to the number on the dial, engaging the thumb screw pin in the appropriate hole in the numbered dial.

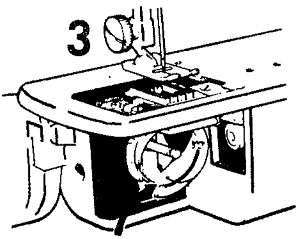
If you suspect missing or misarranged parts in your tension regulator assembly, refer to Figs. 2-25 and 2-26 for representative assemblies. In reassembling the discs, note that each disc has a concave, and a corresponding convex side. In the single needle machine, the discs should be installed with the convex sides adjacent. In the double needle machine, the convex sides of two discs should be adjacent to the flat sides of the center disc.

As part of your ongoing mainteance program, the top tension regulator should occasionally be disassembled and cleaned.

SUMMARY

In this chapter we have covered machine maintenance and adjustment procedures which should be performed routinely by the operator. With the exception of changing the motor brushes, which is applicable only to machines not under warranty, none of the procedures discussed in this chapter will void your new machine warranty. However, in the next chapter, we will discuss internal adjustments and repair procedures which you should undertake only if there is no chance that it will jeopardize your service warranty.

3 Internal Repair and Adjustments



No adjustment procedures, and very few repair procedures, require an extensive disassembly of a sewing machine. Most repair procedures, even major ones, can be made by localizing the disassembly in the problem area. If the main bushings or main drive shaft need replacing, most of the disassembly would be required in the upper arm of the machine, with the pivot points of the forked connections being disconnected below the bed of the machine so that these parts can be dropped to disengage the upper ends of the connecting rods from the main drive shaft. In the case of replacing the timing belt that extends from the upper shaft to the shuttle driving shaft in the lower mechanism (Figs. 3-1 and 3-2), the extent of the disassembly in the lower mechanism will depend upon the brand and model of the machine.

Since there is no specific disassembly procedure that can apply to all machines, we will only attempt to state some of the basic principles of disassembly.

DISASSEMBLY PROCEDURE

The general sequence for disassembling the parts in the upper arm of a machine is as follows (all procedures refer to zig-zag machines):

- Loosen the motor bracket bolt and remove the main drive belt.
- Remove the face plate.

- Set the stitch length and width indicators at 0, and the needle in the position for straight-stitch sewing.
- Remove the top cover and any covers on the front or rear of the upper arm. It may also be necessary to remove the sewing light.
- To aid in reassembly, note the positions of all the visible connecting rods from the zig-zag mechanism, and the position of the balance wheel. Without changing any dial settings, remove the zig-zag mechanism.
- Examine the main shaft to find a coupling collar. It is usually located toward the left end of the drive shaft. *Right* and *left* is determined as you face the machine as you would for sewing. This is the dividing point, from which segments of the shaft may be moved to the right or left.
- Rotate the balance wheel and note the set screws in the coupling collar. If these screws are only visible through a hole in the arm housing, they will be recessed below the surface of the housing, not flush with it. The set screws must be loosened before either of the shaft segments can be moved to either the right or left. To loosen the screws, use a *good quality* screwdriver, with a point of the correct size to fit snugly in the screw heads and a handle of the type that will give you added power if the screws are frozen. If you cannot loosen the screws in this manner, use a screwdriver with a metal handle. Insert the point of the screwdriver firmly into the screw slot, and while simultaneously pressing and twisting the screwdriver, tap the end of the handle with a light hammer. If the set screws cannot be loosened, you will still be able to remove the drive shaft, but you will have additional parts to disassemble.
- The next step in the procedure depends upon whether or not you were successful in loosening the set screws on the coupling collar; whether or not you want to remove the left portion of the shaft through the left end of the machine; or whether or not you want to remove the right segment of the shaft to the right, or balance wheel, end of the machine.

If you couldn't loosen the coupling collar set screws, the easiest way to remove the entire drive shaft will probably be by removing the balance wheel and sliding the entire shaft through the left end bushing. To do this, note the relative positions of the feed dog, shuttle, needle bar, etc., to the crank bend or cam position of the main shaft (or the upper sprocket of the timing belt, if approp-

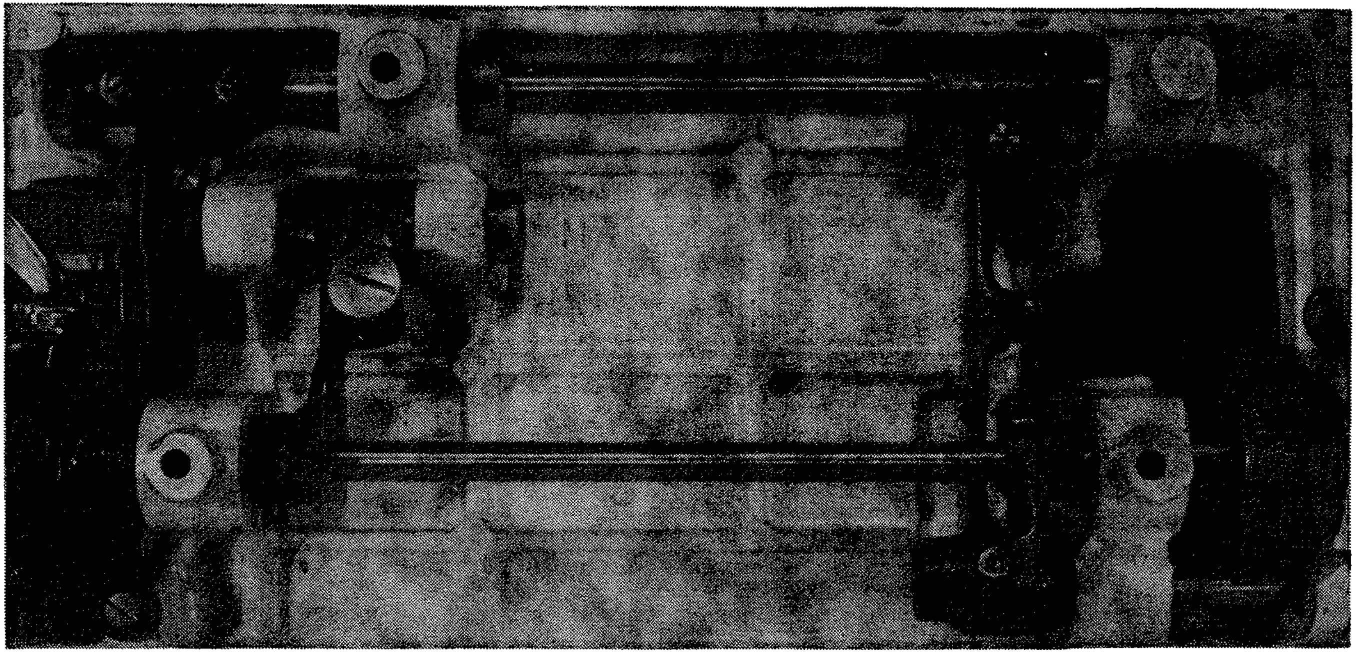


Fig. 3-1. The underside of a Singer 319W is shown with the timing belt around the timing sprocket of the shuttle driving shaft. The upper end of this belt (not visible in the photo) is around the timing sprocket of the main drive shaft. It would be necessary to pull the main shaft to replace this belt. On this particular machine the belt is fibrous material, and if it were to become oily it would possibly shrink and bind the mechanism.

riate), so that you will not reassemble the machine with these components grossly out of time. Remove the balance wheel and back off any set screws to allow the shaft to slide through the right end bushing. Disconnect the lower ends of the forked connecting rods in the lower mechanism of the machine. Loosen the set screws in the upper timing belt sprocket. This will probably require hex wrenches. Next you loosen the set screws in the stop collars, etc. Then disconnect the linkages behind the face plate, remove the presser foot pressure rod assembly and after disconnecting the needle bar, drop it to clear the shaft as it is pulled through the right end bushing. Pull the forked rods down so the forks are clear of the shaft. The stitch length regulator mechanism may have to be removed to allow the forked rods to drop down. The drive shaft should now be free to slide to the left.

If you loosened the coupling collar set screws and want to remove the shaft segment to the left through the left-end bushing, disconnect the linkages behind the face plate, remove the presser foot pressure rod assembly and after disconnecting the needle bar, drop it to clear the shaft as it is pulled through the left-end bushing. If the coupling collar set screws have been backed off sufficiently, the left segment of the shaft should be free to be pulled through the left-end bushing.

If you have loosened the coupling collar set screws and want to remove the right segment of the drive shaft to the right through the right-end bushing, go through the entire procedure just described. However, you won't have to disconnect the linkages. Generally, you will not be able to pull the drive shaft without removing the balance wheel and unpinning the shaft from the clutch mechanism.

When reassembling the drive shaft assembly, observe the following precautions:

- Be sure that the relative positions of the feed dog, needle bar and shuttle are such that the machine will be in time, or only require minor adjustments to correct the timing.
- Be sure that the forked ends of the forked rods engage the crank bends or cams of the upper shaft appropriately, and that the groove-and-roller assembly of the stitch length regulator is correctly fitted. To aid in the correct timing of the shuttle and needle bar, as well as the zig-zag mechanism, note that the stitch length indicator, other dial settings and the balance wheel are in the same positions as when you began the disassembly.

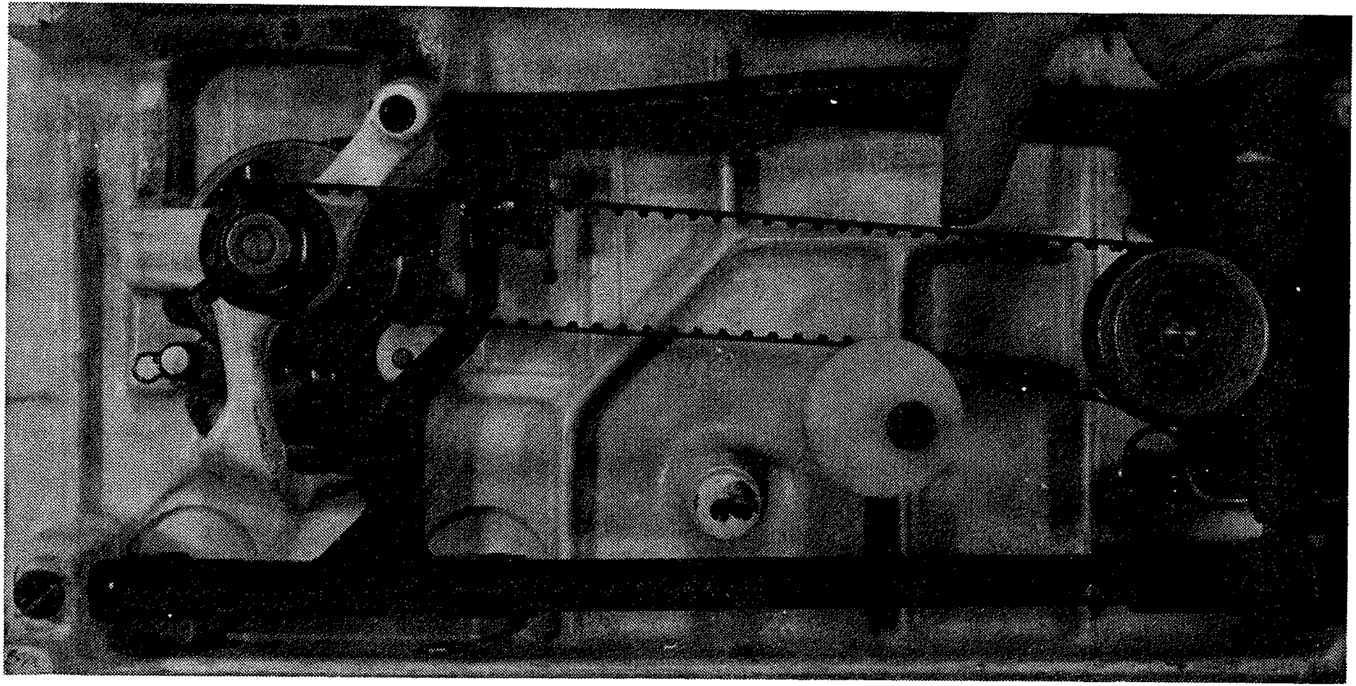


Fig. 3-2. Another Singer Model (Model 248) is illustrated with the timing belt fully accessible under the bed of the machine. Care must be used when removing and replacing any timing belt so that the rough timing of the machine will not be altered.

- If there are provisions for adjusting the drive shaft end-play, such as stop collars, etc. be sure to adjust the shaft end-play correctly (Fig. 3-3).
- When meshing gears, be sure to adjust the clearance and alignment between the gear teeth to avoid machine noise. This procedure will be described for specific models in the chapters that follow.
- When the assembly is complete, turn it a few turns to be sure it turns freely. Then lubricate the bearing points with sewing machine oil, and the gears with sewing machine gear lube.

By the time you have gone through the above procedure, you will have noted that all the parts in the upper horizontal arm of the machine can be removed by pulling them to either the right or left, that all the parts in the vertical arm of the machine can be removed by pulling them downward or through the side of the arm (specifically in the case of stitch length regulator levers, etc.) and that all the parts in the lower mechanism and behind the face plate are visible and readily accessible.

TOOLS

Most manufacturers recommend or make available special tools for sewing machine adjustments and repairs, but any do-it-yourselfer who takes pride in his workmanship has probably equipped himself with most of the necessary tools. A list of the basic tools includes:

—A set of screwdrivers, including the typical small sewing machine screwdriver and a long screwdriver for removing the needle plate (provided the needle plate is in fact held on with screws). There should be enough variety in the point sizes of the screwdrivers to allow you to select one that fits the screw slot correctly. Included in the assortment should be some with phillip heads. In addition to screwdrivers with conventional handles, one of the Stanley (or comparable) screwdrivers with interchangeable blades, ratchet drive and power handle is extremely helpful. Screwdrivers with magnetized tips are helpful and, as mentioned previously screwdrivers with knurled metal handles can be used with a small hammer to emulate the action of an impact driver.

—A set of small end wrenches. A few end wrenches with offset ends are helpful.

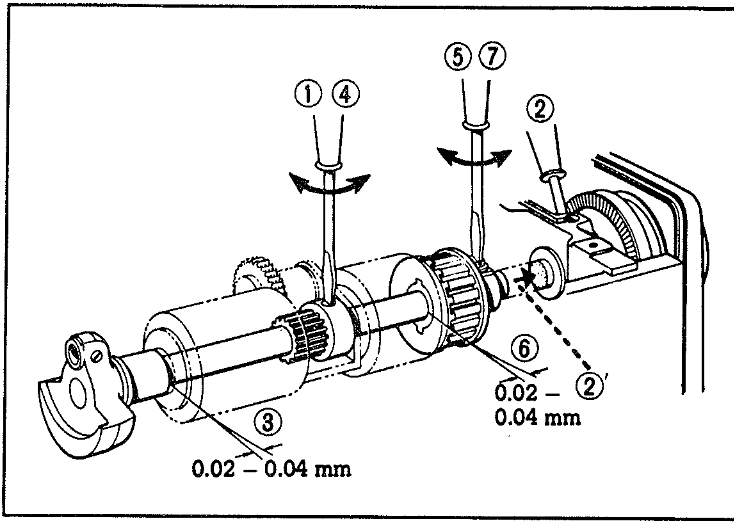


Fig. 3-3. This illustration shows how to adjust the main shaft end-play on the Brother XL5001. The numbers indicate the sequence of the adjustment steps. Number 2 shows the screwdriver being used to move the shaft to the extreme right. In number 3, the clearance between the pattern cam driving pinion and the bushing is set to 0.002mm—0.04 mm.

—A set of small box-end wrenches. A few with offset ends are helpful.
—A set of socket wrenches, preferably with deep wells.
—A set of hex wrenches.
—A set of feeler gauges.
—A small trouble light.
—A portable electric drill and assortment of bits.
—An assortment of pliers, including needle-nose pliers, adjustable end wrenches, a small hammer, etc.
—A magnetic nut retriever.
—An aerosol can of silicone lubricant.

Whether the fixed size wrenches are of the standard or metric size depends upon your particular sewing machine. Of the older models, the general rule is that American manufacturers used standard size machine screws, while many European manufacturers used the metric size.

In selecting tools, there are two pitfalls to consider. On many of the older models, the set screws are of extremely hard material, and some of them can become quite stubborn in their removal, necessitating screwdrivers of quality material that fit the screw slots well. Conversely, some European manufacturers have fitted their machines with screws of soft material, which require special screwdrivers to avoid damage to the screws, on the premise that damaged screw heads would indicate to the factory-authorized repairman that the homeowner has attempted repairs, thus violating the terms of the warranty. Therefore, if you begin a repair job on a machine on which the warranty is a consideration, you should feel competent enough to carry the job to completion, or face the consequences of a void warranty if you begin repairs and ultimately take the machine to a factory-authorized repairman.

ADJUSTMENTS

A correctly operating sewing machine depends upon close synchronization of the various moving parts, and upon the maintenance of certain specified spacing tolerances between the moving parts. It therefore becomes necessary in the manufacture of machines to incorporate adjustment devices that will allow the mechanic to maintain the synchronization and tolerances.

In a general discussion of adjustment procedures, it is impossible to describe universal procedures that would apply to all the hundreds of brands and models that have been produced over the years and are still in regular use. Moreover, since each manufacturer publishes his own technical publications, written from his own particular viewpoint and with his own terminology, it becomes necessary to arbitrarily adopt a standardized terminology in a general discussion. For example, a Pfaff Manual refers to *Correcting a Wavering Straight Stitch*, as *Zeroing the Needle for Straight Stitching*. A White Manual frames it in the context of a problem by calling it *Uneven Wavering Straight Stitch* and New Home Manual calls the procedure *Correcting Staggered Straight Stitch*.

In this chapter we have adopted the following policy: Every problem that can be corrected with an adjustment is framed in the context of a procedure. A standardized terminology has been adopted which should be fairly descriptive of the procedure on any machine you encounter.

In the chapters that follow, we will maintain the standardized terminology in the main headings, but use the factory manual terminology in the descriptive text.

The following adjustment procedures have been selected as representative of correcting the most commonly encountered problems in sewing machines:

Correcting Wavering Straight Stitch

When the stitch-width dial on a zig-zag sewing machine is set at 0, the machine should sew a stitch of unwavering straightness. The superficial cause of a wavering straight stitch is vibration of the needle bar slightly from side to side. The underlying cause can usually be traced to the zig-zag mechanism, to the linkages between the zig-zag mechanism and the needle bar or to the mechanism that links the external controls (stitch-width dial) to the internal mechanism or linkages. Due to the variety of ways in which zig-zag control is accomplished and adjusted by various manufacturers, there is no universal correction for this problem that would apply to every machine. In the chapters that follow, the correction is described for certain Pfaff Models, White Models, New Home Models and Brother Models.

A convenient way of checking for stitch straightness is to set the stitch-length regulator at 0, the stitch-width regulator at 0, place a piece of white cardboard between the presser foot and needle plate, and turn the balance wheel by hand to see if the needle stitches into the same hole on each down stroke of the needle.

Adjusting Feed-Dog Height

If material is fed erratically or not at all, it may be because the top edge of the feed dog teeth are not being raised high enough above the surface of the needle plate during the sewing cycle. The optimum feed dog height varies on various models from .5mm to 1mm, with .8mm (.032) being about average. If you determine that your feed-dog height needs adjustment, rotate the balance wheel until the feed dog is at its highest point, and in the lower mechanism, locate an adjustment point. This is generally a set screw which secures the feed-dog rise mechanism to the feed-dog rocker shaft. Loosen this screw, and without rotating the balance wheel, move the feed dog up or down as required, then tighten the set screw. This procedure will be described for certain Pfaff Models, White Models, New Home Models and Brother Models.

When checking the feed-dog height, be sure the feed-dog drop is set to allow the feed dogs to be raised on the sewing cycle.

Adjusting Lateral Position of Feed Dogs

If material is not fed straight during the sewing cycle, it may be because the feed dogs are not parallel to the edges of the needle-plate slots. On many models, the feed dogs should also be centered between the edges of the needle-plate slots.

• Generally, the adjustment points for aligning the feed dogs between the needle-plate slots will be found on the ends of the frame, in the form of screws. They are secured by locking nuts pressing against the bearing ends of the feed-dog rocker shaft. If this is the case on your particular machine, loosen the locking nuts on both ends of the shaft, turn the screws in the appropriate directions, check the alignment of the feed dogs and when correct, tighten the locking nuts. This procedure will be explained in detail later for certain Pfaff Models and White Models.

Adjusting Feed-Dog End Clearance

If there seems to be an excessive amount of clearance between the ends of the feed dog and needle-plate slot on the forward or reverse cycle of the feed-dog motion and a minimal amount of clearance on the reciprocal cycle, adjustment of the feed-dog end clearance may be required. This procedure will also be described for certain Pfaff Models and White Models.

Adjusting Presser-Bar Height

On most sewing machine models, with the presser foot in the UP position, there is an optimum height at which the bottom surface of the presser foot should be set above the top surface of the needle plate used for normal sewing jobs. This height varies from about 7/32 inch (5.5mm) to 9/32 inch (7mm) on various models. To locate the adjustment point for this height, remove the face plate and you will find a set screw that secures the presser bar into place against the tension of the presser-bar spring (Fig. 3-4). To make the adjustment, raise the presser bar, loosen the screw, and raise or lower the presser bar to adjust the presser foot to a specified height, or to a height which gives best feeding results. Before tightening the set screw, turn the presser bar slightly in one direction or the other to align the foot parallel with the edges of the needle plate. Then tighten the screw. This procedure will also be described for certain Pfaff Models, White Models and Brother Models.

Adjusting Presser-Foot Alignment

If the needle strikes the edge of the presser foot even though a correct foot and needle setting is being used, the presser foot may not be parallel to the edges of the needle plate, thus misaligning the

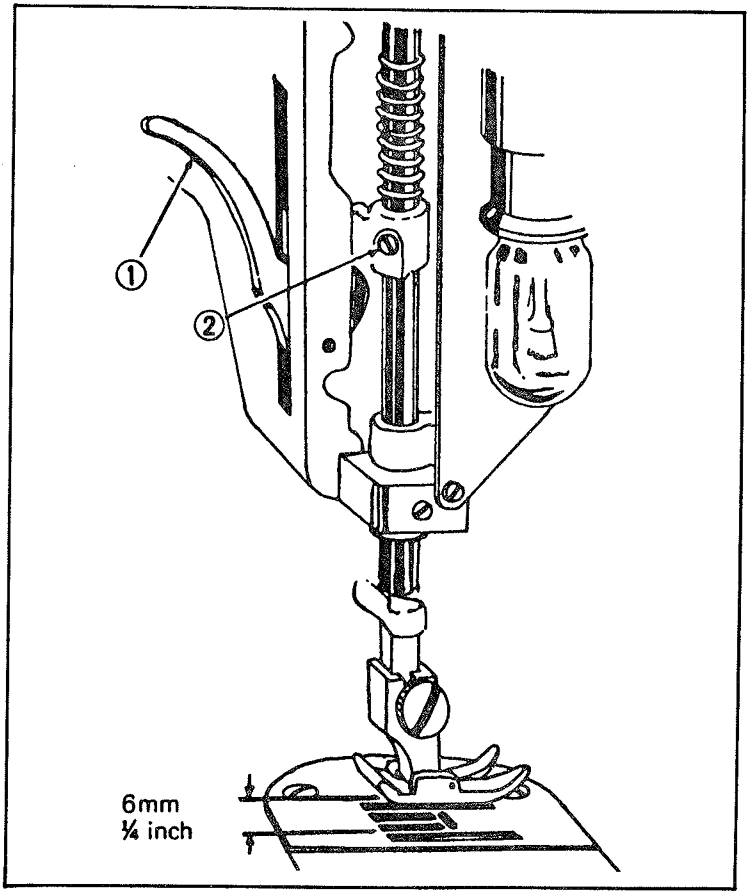


Fig. 3-4. This illustration from a White Service Manual will give you an idea where the set screw for the presser bar is located on the great majority of sewing machines. When you loosen this screw to raise or lower the pressure bar you may also rotate the presser bar to align the slot of the presser foot with the needle-plate slot.

presser-foot slot in relation to the centering of the needle drop. Assuming that the presser foot is secured tightly to the presser bar, this is caused by the presser bar being turned slightly. To align the presser foot, raise the presser foot to its highest point, remove the face plate, loosen the set screw that secures the presser bar and rotate the bar slightly by grasping the presser foot and twisting until the alignment is correct. Be careful not to disturb the presser bar height. Then tighten the set screw. This procedure will be described for certain Pfaff Models, and White Models.

Timing Shuttle to Needle

Missed stitches, or the failure of the top thread to pick up the bobbin thread on each cycle, may be the symptom of an incorrectly timed bobbin shuttle. However, exhaust other underlying causes, such as poor thread, incorrect needle, etc. You will remember from reading the previous chapters that the shuttle needle timing is the result of three factors: One is the positions of the needle eye and shuttle hook in relation to each other as the shuttle hook travels along its circular path and the needle has risen slightly to form a thread loop. The second factor is the over-all length of the needle bar and needle. This determines the *elevated* location of the needle eye in relation to the shuttle hook when the needle has reached its lowest point and risen slightly to form a thread loop. The third factor is clearance between the shuttle hook and the side of the needle when the needle has risen to form a thread loop.

Since the correct timing is dependent upon the three-way relationship of these three factors, they should be adjusted in one procedure, generally in the following sequence:

- Adjust the shuttle hook position to coincide with the needle-bar rise.
- Adjust the needle-bar height.
- Adjust the clearance between the shuttle hook and the side of the needle.

Before beginning the procedure, be sure a correct needle is used. Also, be sure that it is correctly inserted. The side of the needle with the *shorter* groove should be adjacent to the shuttle.

Adjusting the Hook to Needle-Bar Rise

On a zig-zag machine, to achieve the most accurate timing, the positional relationship of the shuttle hook and needle eye should be checked on both the left and right positions of the needle swing. The actual distance of the needle bar rise will be slightly different on the left than on the right swing, in accordance with this principle: If the shuttle rotates counterclockwise, the needle-bar rise will be slightly more on the left swing of the needle than on the right. Conversely, if the shuttle rotates clockwise, the needle-bar rise will be slightly more on the right swing of the needle than on the left. To apply this principle to an oscillating shuttle, observe whether the shuttle hook is positioned to pick up a loop on a clockwise or counterclockwise direction in its oscillating path. Generally speaking, the actual amount of needle-bar rise when the hook is in position to pick up a loop is about 2mm on the short rise and about 4mm on the higher rise. In any case, in the absence of exact data, the shuttle hook should be slightly above the center of the needle eye so that it will engage a thread loop on both the left and right swing of the needle. The size of the loop provides the necessary leeway.

When the needle has risen the appropriate amount (a loop must be formed), two conditions must be satisfied for accurate timing. The shuttle hook should be opposite the center line of the needle and the height of the needle should be such that the shuttle hook is only slightly above the top of the needle eye.

If condition number one is not satisfied, the position of the shuttle hook must be adjusted in its circular path. If this is not possible (as might be the case with some oscillating shuttle machines), the needle-bar height must be adjusted to make the formation of the loop occur when the shuttle hook is in position to pick it up.

If the second condition is not satisfied, the needle-bar height must be adjusted.

The method for adjusting the position of the shuttle hook varies widely between different machines. On most machines, at some point from the short, transverse, shuttle shaft to the opposite end of the shuttle-driving shaft, you will find set screws that secure the shuttle to its driving mechanism. Loosen these screws to disengage the shuttle from its driving mechanism, turn the shuttle by hand, without moving any other mechanism, to achieve the correct position of the shuttle hook in relation to the center line of the needle. If there is no way to disengage the shuttle from the driving mechanism on a rotating shuttle machine, you may be able to change the position of the timing belt by engaging a different notch of the belt in the *lower* timing belt sprocket. To do this, it will be necessary to rotate the top mechanism slightly. It is not advisible to change the position of the upper timing sprocket on the main drive shaft.

Adjusting Needle-Bar Height

If the height of the needle eye is not correct when the *center line of the needle* coincides with the position of the shuttle hook, the needle bar must be raised or lowered. To adjust the needle bar, remove the face plate and loosen the set screw that secures the needle bar (Fig. 3-5). Raise or lower the needle bar until the top of the needle eye is slightly below the shuttle hook.

Adjusting Clearance Between Shuttle Hook and Side of Needle

If the clearance between the point of the shuttle hook and the side of the needle is too large, the machine may skip stitches even though the timing of the hook and needle bar rise is correct. If there are set screws securing the shuttle to the transverse shaft, you should automatically make this clearance adjustment at the same time you set the circular position of the hook to the needle-bar rise. The adjustment is made by simply moving the shuttle along the short shaft to obtain the correct clearance. The hook point and needle should be as close together as possible without touching each other to obtain this correct clearance. Or, if you wish to make an actual measurement, set the clearance at .15mm (.006).

When you determine that the top thread will pick up a loop on every cycle when the stitch width is set at maximum, change the setting to 0 (straight stitch), and check the timing with the needle in the normal sewing position. Be sure the shuttle raceway is clean and lubricated.

Adjusting Needle-Shuttle Clearance

This adjustment is essentially the same as described above. It will be described later as a separate procedure for certain White Models and Brother Models.

Adjusting Needle-Bar Height

This adjustment is essentially the same as described in the previous section. It will be described later as a separate procedure for certain Pfaff Models, White Models, New Home Models and Brother Models.

Adjusting Needle Position

The various manufacturers have established adjustment procedures for centering the needle in the center of the needle plate hole when the needle position is set at *Center*, and for equalizing the width of the zig-zag stitch on the left and right needle swing. These procedures will also be described later for certain Pfaff Models, White Models, New Home Models and Brother Models.

Equalizing Forward-Reverse Stitch

For most normal sewing applications, such as reverse stitching to lock the end of the seam of stitching, it is neither desirable nor practical for the forward and reverse stitches to be exactly the same length. However, in certain applications such as decorative stitching or buttonhole stitching, it may be desirable to equalize the length of these stitches. The procedure for doing so will be given for

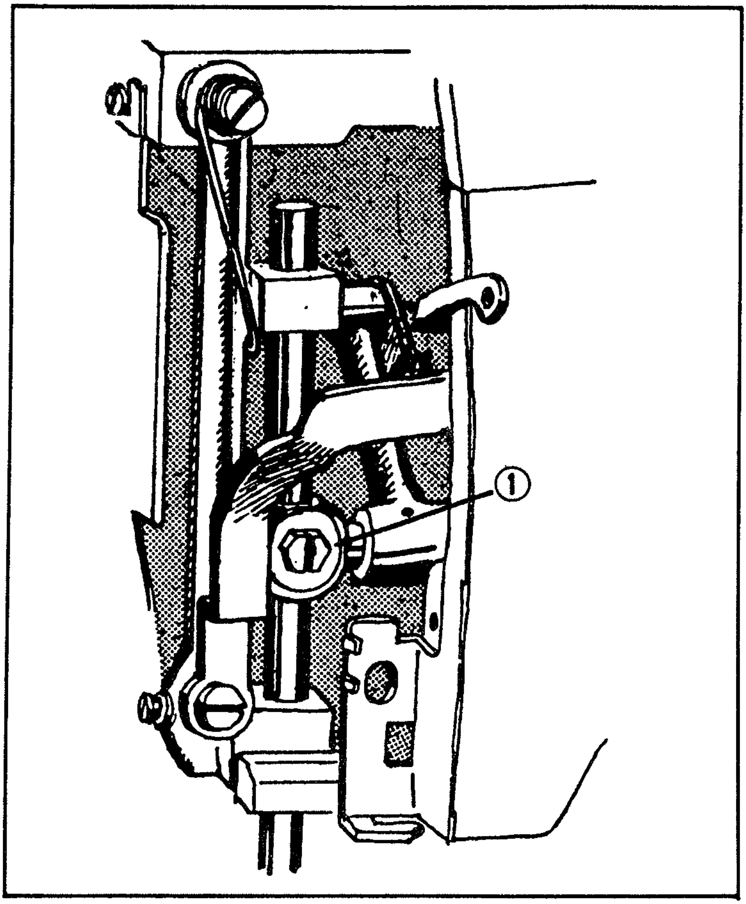


Fig. 3-5. This illustration from a White Service Manual will give you an idea where the set screw for the needle bar is located on most machines. It is behind the face plate. The screw indicated by the number 1.

certain Pfaff Models, White Models, New Home Models and Brother Models.

Adjusting Cutting Space of Buttonhole Stitch

On the zig-zag machines with an automatic buttonhole device, the optimum width of the space between the left and right buttonhole stitches is generally set, and should be maintained at about .5mm (.02 inches). The procedure for adjusting this space will be given for certain White Models and New Home Models in later chapters.

Timing Needle-Bar Swing

In zig-zag sewing, the needle should only swing to the right or left when it is above the material being sewn. The procedure for timing the needle bar swing will be given for certain Pfaff Models, White Models, New Home Models and Brother Models.

Cleaning the Shuttle

As explained in earlier chapters, best sewing results will be obtained if the shuttle is kept clean and oiled. The procedure for dismantling the hook will be given for certain Pfaff Models and all White Models with the oscillating shuttles in the following chapters.

Adjusting Gear Meshing

If the cam shaft gear is incorrectly meshed to the main drive shaft gear, noisy running will result. The procedure for adjusting this meshing will be given for certain White Models, New Home Models and Brother Models.

Adjusting and Maintaining Upper Tension Control

Incorrect tension control vies with the incorrect needle-shuttle timing as the most commonly encountered problem in sewing. Many of the older sewing machine owners' manuals give a detailed description of how to disassemble and clean the upper tensioner, but a few of the owners' manuals provided with more recent models do not contain these instructions. In the absence of specific instructions, some care must be taken to reassemble the parts of the tensioner so that the reading of the dial corresponds to the actual tension setting.

With the dial set at the lowest setting, the thread should slip between the tension discs with no discernible tension. As the dial setting is increased, the thread tension should become moderate at a median setting, increasing to a tight tension as the dial is set to its highest setting. Also observe the following general rules:

- If the assembly has only one pair of discs, each with a concave and a convex side, the discs should be assembled with the convex sides adjacent to each other.
- If there are three discs, one disc will probably have two flat sides, and it should be placed between the convex sides of the other two discs.
- As a general statement, the tension control will not exert a tension on the thread, regardless of its setting, as long as the presser foot is in the UP position. This is because the

lifting of the presser-bar lift lever depresses a pin that protrudes through the center of the tension control *stud*, against the tension of the tensioner, releasing the tension of the tension spring. Before assembling the tension control parts on the stud, be sure that the release pin is correctly in place.

- The innocuous looking, hair-like spring that protrudes from the body of the machine at the outer circumference of the tension control stud (this spring is the last item to be removed when disassembling the tension control) is called the *thread check spring*. It serves the purpose of holding the thread slightly taut as the needle descends into the material. The tension of this spring is established by the way it is installed. More details on installing and adjusting the thread check spring will be given in the section that follows.

Instructions will be given for adjusting and maintaining the upper tension control for certain Pfaff Models, White Models, New Home Models and Brother Models.

Replacing and Adjusting Thread Check Spring

As explained above, the thread check spring holds the thread taut as it would otherwise slacken on the down stroke of the take-up lever, which might allow the needle to pierce the thread. As the needle enters the material, the thread check spring hits a stop, thus releasing the needle thread. It can then slacken so the loop can be formed. The tension of the *thread check spring* exerts a cyclic, *slight* tension on the thread, holding it taut and then releasing it as the needle goes through its cycle. The *tension spring* exerts a constant, *moderate* tension-depending on the setting of the dial-during all cycles of the sewing.

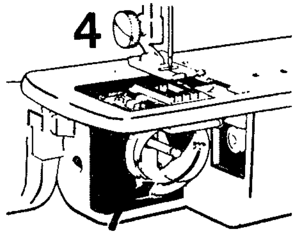
The purposes of these two tensions should not be confused with each other. On many machines, the tension of the thread check spring is set by engaging a trailing end of the spring in the appropriate spline of the tension-control stud. With the spring correctly installed and tensioned, the thread is threaded through the looped end of the spring, then downward and under a guide; to the take-up lever; and then to the needle eye.

To observe the action of the spring, thread the machine appropriately, place a scrap of material under the foot and rotate the balance wheel by hand. The following sequence of actions should be observed: On the up-stroke of the needle bar and take-up lever, the thread check spring will be pulled by the thread downward against a stop. This position will be maintained until the instant the needle pierces the material. At that time the down-stroke of the take-up lever will allow the spring to return to its untensioned position. Thus, with the take-up lever descending and the tension of the check spring released, the thread will be slackened so that a loop can be formed on the needle bar rise.

The procedure for replacing and adjusting the thread check spring will be given for certain Pfaff Models, White Models and New Home Models.

Adjustment and Repair Procedures For Pfaff Models

4



All Pfaff sewing machines are manufactured in Germany with U.S. sales and service implemented through U.S. distributors and retail dealers. The U.S. address of the Pfaff U.S. distributor is *Pfaff American Sales Corp.*, 610 Winters Avenue, P.O. Box 566, Paramus, N. J. 07652.

In this chapter we will discuss adjustment procedures for *Pfaff* Models 260, 262, 360 and 362; and the 230 and 332 including automatics. The Models 260, 262, 360 and 362 are identical except for a few minor details. They are zig-zag machines with fully rotating hooks and timing belts that extend from the sprocket on the hook-driving shaft in the lower mechanism to the sprocket on the main shaft (Fig. 4-1).

The Models 230 and 332 are also zig-zag machines with fully rotating hooks and timing belts that extend from the sprocket on the hook-driving shaft on the lower mechanism to the sproket on the main drive shaft (Figs. 4-2 and 4-3).

For working on Models 260, 262, 360 and 362, the Pfaff technical department recommends the following special tools:

- Needle rise gauge: Z 70.67-1.
- Clamp for the above gauge Z 70.68-1.
- Machine feed gauge: 106614-100-1.0 6.8.
- Feed stroke gauge: 7.501.00 251.
- Bobbin case position slot gauge: 8951-100.

In addition the following tools will prove useful in carrying out certain repair jobs:

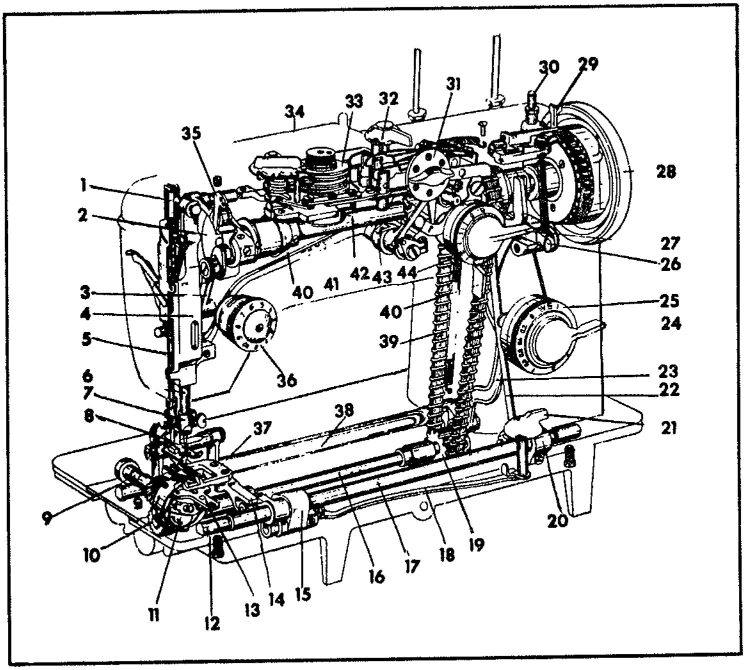


Fig. 4-1. The exposed mechanisms of the Pfaff Models 260, 262, 360 and 362. Minor differences in these models are pointed up in the text. The needle plate has been omitted to afford a better view. 1. Pressure regulating screw; 2. Needle bar crank (driving needle bar and take-up mechanisms); 3. Needle bar connecting link; 4. Needle bar frame; 5. Threader bar; 6. Needle bar; 7. Needle holder; 8. Presser foot; 9 Hook shaft with helical gear; 10. Hook drive shaft helical gear; 11. Hook with bobbin case; 12. Center for shafts 17 and 38; 13. Bobbin case position finger; 14. Feed bar; 15. Feed lifting shaft crank, front; 16. Hook drive shaft; 17. Feed lifting shaft; 18. Drop feed connecting rod; 19. Driving belt sprocker, lower; 20. Feed lifting shaft crank, rear; 21. Drop feed knob; 22. Feed lifting connection; 23. Feed forked connection; 24. Reverse feed control H; 25. Stitch length dial G; 26. Feed regulator; 27. Zigzag finger-tip control F; 28. Balance wheel; 29. Bobbin winder thumb lever; 30. Bobbin winder spindle; 31. Engaging lever dial C; 32. Pattern length lever E; 33. Cam assembly; 34. Cam selector dial D; 35. Take-up lever; 36. Tension dial M; 37. Feed dog; 38. Feed rock shaft; 39. Driving belt (cord); 40. Driving eccentric for automatic embroidery mechanism; 41. Needle bar frame pitman; 42. Arm shaft; 43. Zigzag regulator stud; 44. Stitch width dial A; 45. Needle position lever B.

- Special wrench for zig-zag regulator stud: 10 6300-306.
- Special wrench for zig-zag regulator mechanism: 10 6300-303.
- Special wrench for stitch-length control barrel: 10 6300-304.
- Special box wrench 7 & 5.5mm: 129 496.

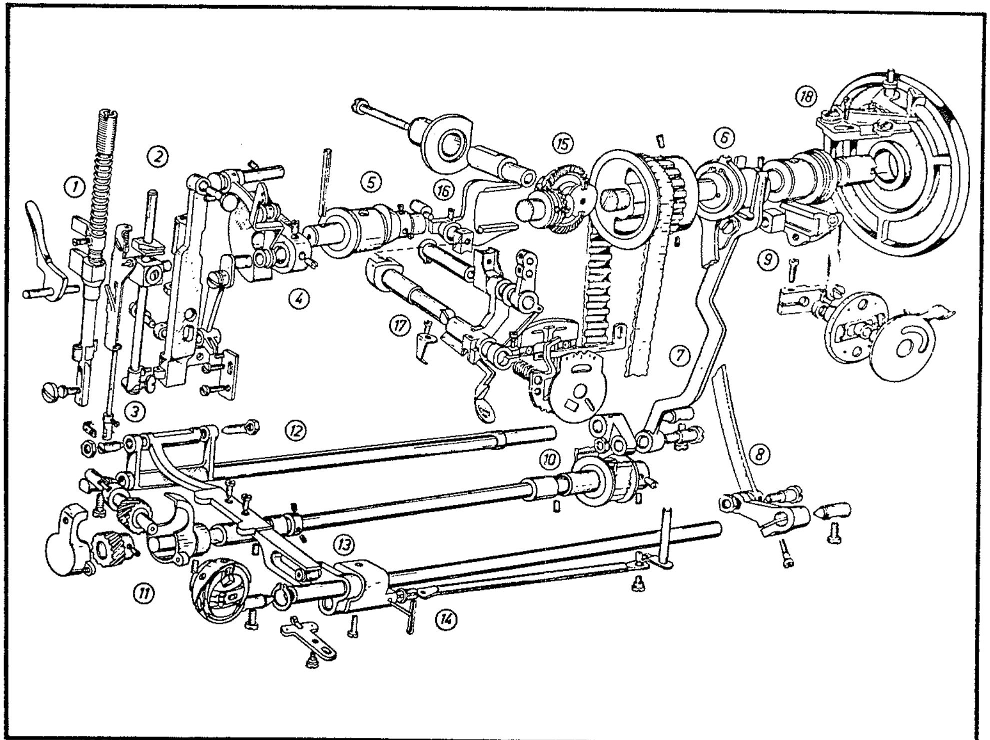


Fig. 4-2. The basic mechanisms of the Pfaff 230 and 332. For a better view of the sewing mechanisms, the zig-zag mechanism is omitted. An important difference between Models 230 and 332 is the way the shuttle is mounted on the tranverse shaft. 1. Presser bar assembly; 2. Needle bar assembly; 3. Needle threader; 4. Link take-up; 5. Arm shaft front bushing with automatic mechanism driving eccentric; 6. Feed driving and lifting eccentric; 7. Feed-driving connecting (feed-forked connection); 8. Feed-lifting connection with feed-lifting shaft and rear crank; 9. Stitch-regulator mechanism; 10. Hook-drive shaft with Synchroflex belt sprocket wheel; 11. Sewing hook with driving mechanism; 12. Feed-driving shaft (feed-rock shaft) with feed-dog carrier; 13. Feed-lifting shaft with front crank; 14. Drop-feed mechanism; 15. Needle vibrating eccentric and bevel gear assembly; 16. Needle-bar frame pitman; 17. Stitch-width regulator mechanism; 18. Bobbin winder.

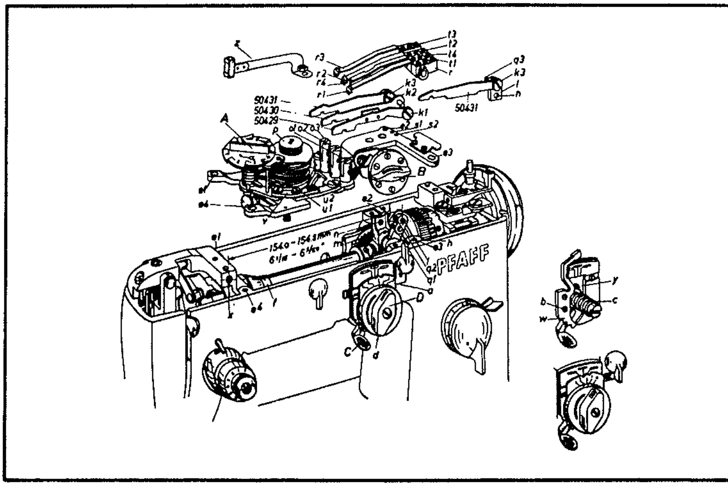


Fig. 4-3. The zig-zag mechanism of the Pfaff 230 and 332. A. Cam selector dial; B. Clutch bar dial; C. Needle position lever; D. Zigzag button (Dial-A-Stitch control); E. Pattern length lever (not illustrated); a. Stitch width scale (105162); b. Lower set screw (175) of notched member (105163); c. Pressure spring (105167) for zigzag button; d. Set screws (687) for zigzag button, e_1-e_4. Set screws (72) for base plate; f. Driving eccentric (105061) for Automatic Mechanism; h. Spacer (obsolete 105094); (two-part 105095/96); i. Connection (105089); k_1-k_3. Eccentric studs (50432); i. Clutch bar bearing bracket (50436) m. Stitch width regulator arm; n. Set screw (486) for clutch bar bearing bracket; o_1-o_3. Clutch bar driving studs (50384); p. Stack of pattern cams with nut; q_1-q_3. Set screws (543) for eccentric studs k_1-k_3; r. Spring carrier blocks (50457); r_1-r_3. Leaf springs (50433) for clutch bars; r_1. Reinforcing spring (50435) for front clutch bar; s_1-s_3. Screwholes for spring assembly bracket (50455); t_1-t_4. Regulating screws (701034); u_1-u_3. Screws (407) for connections (50401/50402); v. Two-part connection (50400); w. Notched member (105163); x. Hole for gauge (105999-108); y. Set screw (624) for crank (105093); and z. Oil pad carrier spring (50492).

The Pfaff technical department also recommends certain special tools for working on Pfaff Models 230 and 332.

The adjustment procedures for Models 260, 262, 360 and 362 will be discussed separately from those for Models 230 and 332. It is essential that you make the adjustments in the sequence as they are given since certain adjustments may ruin previous adjustments.

FEEDING MECHANISM ON MODELS 260, 262, 360 and 362

When the feed dog is at its highest position, the points of its teeth should be 0.9mm above the needle plate.

To check this setting, place gauge No. 106614-100 6.8 on the needle plate. This combination gauge, which is also used to measure the presser-bar height, is a block 6.8mm in thickness with a 1mm recess on its bottom side. The recess is used for measuring the height of the presser foot above the needle plate. The gauge should be placed on the needle plate so that its 0.9mm recess is over the feed dog. Then turn the balance wheel until the feed dog is at its highest position (Fig. 4-4).

If adjustment is required on the Pfaff machines 260 and 262, tilt the machine back, loosen the binding screw on the front-feed lifting shaft crank, and turn the crank slightly up or down on its shaft, as appropriate. To adjust the feed-dog height on Pfaff Models 360 and 362, remove the needle plate. Then proceed as instructed for Models 260 and 262.

To double check this setting, again bring the feed dog to its highest position and check to see that its teeth just contact the underside of the recessed portion of the gauge.

After adjusting the feed-dog height, go to the next step—zeroing the stitch-length control.

STITCH LENGTH CONTROL ON MODLELS 260, 262, 360 AND 362

When the stitch-length dial *G* is set on 0, the feed dog should only move up and down, but not horizontally. Moreover, the machine should make stitches of exactly the same length in sewing forward and backward when the stitch length dial is set on 0.2 and on the first mark to the right of 0, respectively.

To check this setting, place a piece of paper or fabric under the presser foot and let the machine make a few stitches. When you set the stitch length dial on 0, the machine must move the paper neither backward nor forward.

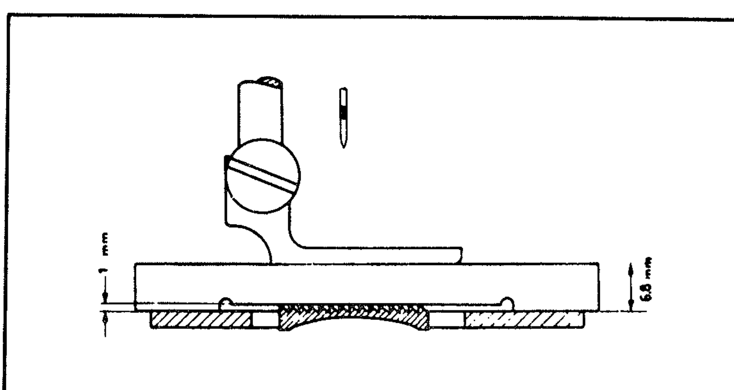


Fig. 4-4. Cutaway view showing the method of simultaneously adjusting the feed-dog height and presser-bar height on Pfaff Models 260, 262, 360 and 362.

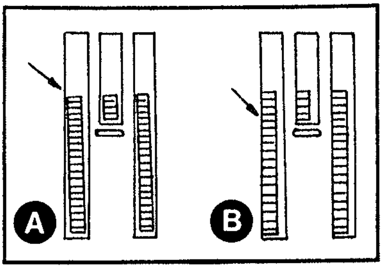


Fig. 4-5. A shows the feed dog set obliquely in the feed slots, indicating an adjustment at the feed dog itself. B shows the feed dog not centered in the slots, indicating that on Models 260 and 262, the feed-rocker shaft must be moved endwise. On Models 360 and 362, either the cylinder arm top cover or feed bar must be adjusted.

If adjustment is required, proceed as follows:

On Models 260 and 262, get access to the lower mechanism by tilting the machine back.

On Models 360 and 362, get access to the lower mechanism by first dismantling the motor and its base plate.

Next, loosen the set screw on the stitch-length regulator mechanism. Then, turn the stitch-length regulator mechanism to the right or left, as appropriate. When the adjustment is complete, tighten the set screw. (This adjustment will be made easier by the use of wrench No. 106 300.304).

To double check the above adjustment, place the paper under the presser foot and proceed as explained in the beginning of these instructions.

LATERAL POSITION OF FEED DOGS ON MODELS 260, 262, 360 and 362

To be sure to which Pfaff Models the next procedures apply, read the following headings carefully.

Models 260 and 262

The feed dog should be centered correctly in the feed slots. There should be the same amount of clearance between the feed rows and the walls of the feed slots on either side.

Refer to Fig. 4-5. If the feed dogs are wedged in the feed slots, as in Fig. 4-5A, loosen both feed dog set screws and adjust.

If the feed dogs are laterally aligned, but pressing against one side or the other of the feed slots (Fig. 4-5B), they can be centered by loosening the set screws on the feed-rock shaft centers and tapping the shaft into the correct position.

If the feed-rock shaft has been moved endwise too much in the process, move its rear crank back by the same distance so that the feed-forked connection will bear against the feed regulator only lightly.

Models 360 and 362

If the feed dogs are not correctly centered in the feed slots on the Models 360 and 362, loosen the three set screws in the cylinder arm top cover and adjust the position of the cover, as appropriate. However, if adjusting the position of the cylinder arm cover does not remedy the misalignment, you may adjust the feed bar (Fig. 4-6) rather than the entire feed-rock shaft.

To make this adjustment, remove the cylinder arm top cover and loosen the jam nuts on both center screws. Turn both center screws, thus adjusting the position of the feed bar laterally until the feed rows are correctly centered in the feed slots of the needle plate. When you re-tighten the jam nuts after this adjustment, hold the center screws in the correct position with a screwdriver so they will not turn together with the nuts and jam the feed bar. Check to see whether the feed bar swings up and down easily without any lateral play. After the adjustment, screw down the cylinder arm top cover, making sure it is positioned correctly so as not to disturb the feed dog alignment.

FEED DOG END CLEARANCE ON MODELS 260, 262, 360 and 362

When the stitch-length dial is set on 4, the central feed row should rise as close to the near end of the feed slot as possible. Also, when the machine is set for the longest forward or backward stitch, or any other stitch length, the feed dog must strike neither the near nor far end of the feed slots.

If adjustment is required, set the stitch-length dial on 4 and turn the balance wheel until the feed dog emerges close to the near end of the feed slots. Loosen the binding screw on the feed-rock shaft crank and turn the crank on its shaft until there is a clearance of about 1/32 inch (1mm) between the first tooth in the central feed row and the end of the respective feed slot. To make this adjust-

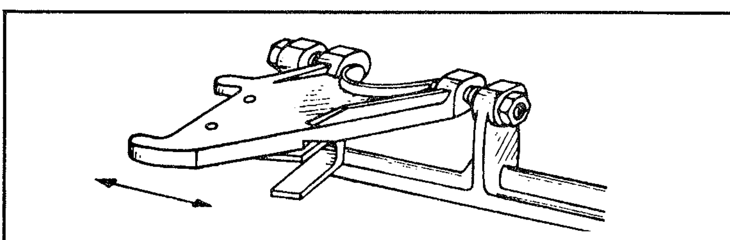


Fig. 4-6. To center the feed dog in the slots on the 360 and 362, move the feed bar one direction or the other.

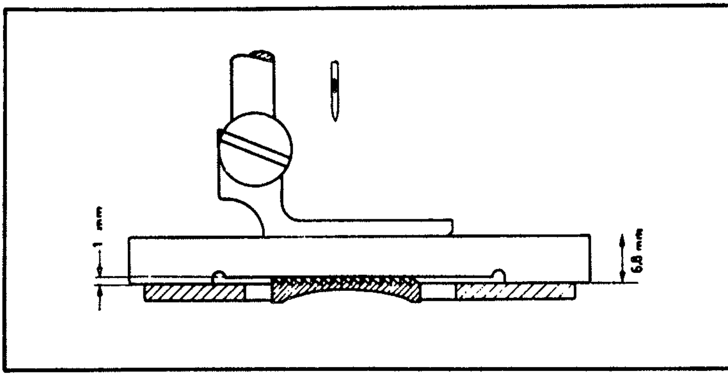


Fig. 4-7. Adjusting the presser-bar height on the Pfaff Models 260, 262, 360 and 362 as a separate procedure.

ment on Models 360 and 362 you must first strip the motor and its base plate. When the adjustment is complete, tighten the binding screw securely.

PRESSER BAR HEIGHT ON MODELS 260, 262, 360 AND 362

On Pfaff Models 260, 262, 360 and 362, the presser bar is set at the correct height when there is a clearance of 6.8mm between the needle plate and the presser-foot sole when the presser-bar lifter is raised. To make this adjustment, raise the presser bar and place something of the correct thickness (such as the gauge No. 106614 1.0 6.8) between the presser foot and needle plate (Fig. 4-7). Remove the face plate, loosen the presser-bar binding screw and set the height of the presser bar. Then tighten the screw.

THE VIBRATOR ON MODELS 260, 262, 360 and 362

When at its lowest position, the darning foot should be about 0.1mm above the needle plate. In other words, while darning, the darning foot must not press onto the needle plate, but should just touch a ply of fabric. This setting should result automatically if the clearance between the sole of the zig-zag presser foot and needle plate is correct (6.8 mm) when the presser bar lifter is raised.

If adjustment is required, screw on the darning foot No. 53670, and turn the balance wheel until the foot is at its lowest position. Loosen nut A of the regulating screw B, which is located on top of the presser bar guide collar (Fig. 4-8). Turn the regulating screw in or out until the correct amount of presser foot clearance has been obtained. Then tighten nut A securely.

To double check this setting, place a single ply of fabric under the darning foot and see that the darning foot just touches the material when the machine is in operation. When you replace the darning foot by the zig-zag foot, the eccentric located back of the needle bar crank should clear the feeler finger without touching it.

ZIG-ZAG MECHANISM ON MODELS 260, 262, 360 AND 362

When the needle position lever (Fig. 4-9) is in the central notch, it should point downward perpendicularly. The needle position cam finger *D* (Fig. 4-10) should contact the needle position cam *G* in the middle of its central dent. As you move the needle position lever *B* to the right and left slightly, thus rotating the needle position cam *G*, the point of contact of the cam finger should remain within the central dent on the needle position cam. It must move neither down on the left nor up on the right.

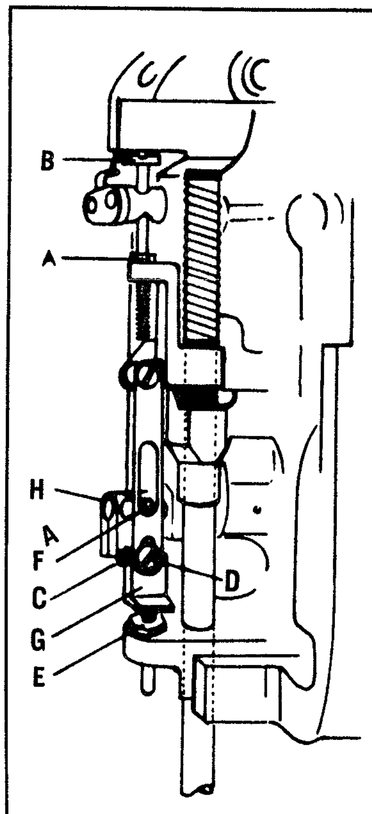


Fig. 4-8. Adjusting the vibrator on Pfaff Models 260, 262, 360 and 362.

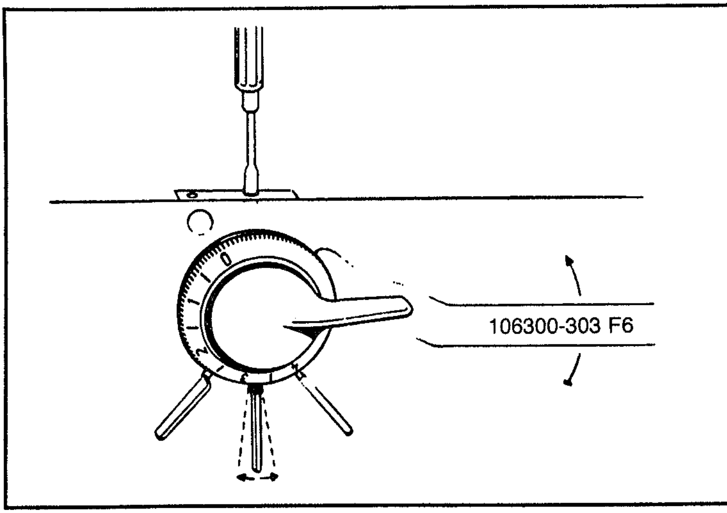


Fig. 4-9. Adjusting the zig-zag regulator on Models 260, 262, 360 and 362.

To check this setting, turn the stitch-width dial *A* to 0 and the needle position lever *B* in the central notch. Turn the balance wheel until the needle point is flush with the surface of the needle plate. As you move the needle position lever *B* to the right or left slightly, as indicated in Fig. 4-9, the needle must not vibrate. If the needle should vibrate instantly, loosen the set screw on the zig-zag regulator barrel and rotate the latter to the right or left, as appropriate. To do this, use tool No. 106300-303. When the adjustment is complete, tighten the set screw securely.

On earlier machines, push the zig-zag regulator barrel into the machine arm until the needle position cam finger *D* rests on the needle position cam *G*.

When the latter adjustment is complete, check to see that the zig-zag regulator barrel is pushed into the machine arm as for as it will go and that the stitch-width dial *A* turns easily. Tighten the set screw securely and double-check the adjustment.

NEEDLE BAR SWING ON MODELS 260, 262, 360 and 362

In zig-zag sewing, the needle should start to swing sideways after it has risen clear of the thickest material which is normally sewn on the machine. The sideways motion may commence when the needle has just left the fabric, and must be completed before the needle enters the material again. In other words, the ascending needle should begin to swing sideways when its point has reached a

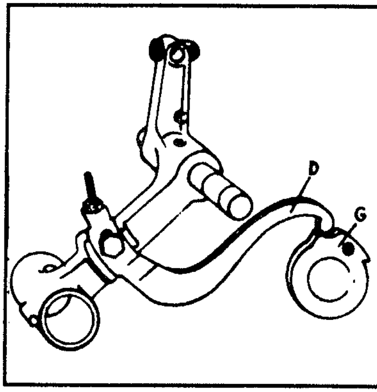


Fig. 4-10. A requirement for the correct adjustment of the zig-zag regulator is that the point of the contact finger remains in the central dent on the needle position cam as the needle position lever is shifted slightly to the right or left.

position about 3/16 inch (5mm) above the needle plate. The sideways motion of the needle should be completed when the point of the needle has reached a position about 9/32 inch (7mm) above the needle plate.

To check this setting, turn the arm shaft until the feed eccentric timing mark is at the top. With the arm shaft in this position, the timing marks on the flanged bushing and the needle vibrating bevel gear should be exactly in line (Fig. 4-11). If the timing mark on the needle vibrating eccentric happens to be not visible, rotate the arm shaft by 360 degrees until the feed eccentric timing mark points up again. Check to see that the timing marks on the flanged bushing and the needle vibrating bevel gear are properly aligned. If they are not, loosen the two set screws on the arm shaft bevel gear. While keeping it in mesh with the needle vibrating bevel gear, turn it until both timing marks are in line. Then tighten both set screws securely.

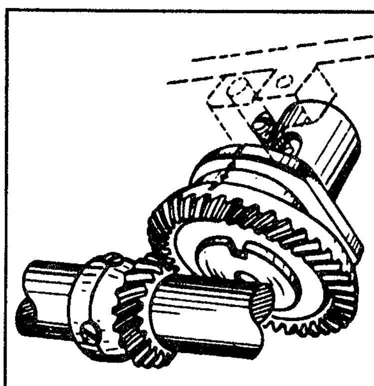


Fig. 4-11. The positional relationship between the cam shaft gear and main drive shaft gear determines the timing of the needle bar swing on Models 260, 262, 360 and 362.

In case there is no timing mark on the needle vibrating bevel gear, turn the arm shaft until the feed eccentric timing mark is at the top. Hold the arm shaft in position and turn the arm shaft bevel gear until the lobe of the needle vibrating eccentric is at the top.

On recent machines which have no marked flange on the bushing, set the timing mark on the needle vibrating bevel gear so that it is exactly opposite the center of the bushing sew screw. Then tighten both set screws on the arm shaft bevel gear securely. Now check to see that the descending needle has completed its sideways motion when it has reached a position about 9/32 inch (7mm) above the needle plate and that it enters the needle plate slot perpendicularly. If necessary, adjust the position of the large or small bevel gear to ensure that both gears are set at right angles to each other and the tips of their teeth meet in one point.

At the same time, make sure that the amount of play is minimized and that smooth running of the gears is ensured.

If the needle bar frame pitman has no lateral guidance, adjust the position of the flanged bushing, as required. After this adjustment, tighten all screws securely.

Double check this setting to see that the needle starts vibrating after it has risen clear of the thickest fabric which is normally stitched. The needle vibration should begin when the needle has left the fabric and should be completed when the point of the descending needle has reached a position about 9/32 inch (7mm) above the needle plate.

FINGER-TIP CONTROL ON MODELS 260, 262, 360 AND 362

The machine should sew a perfectly straight seam when the stitch width dial *A* is set for zig-zag stitching and the finger-tip control *F* is pushed up as far as it will go. To check this setting, drop the machine feed and insert a new No. 80 needle, System 130/705H. Place a piece of thin cardboard under the sewing foot.

Turn the stitch-width dial *A* to 4 and put the needle position lever *B* in the central notch. Push the finger-tip control *F* up as far as it will go. Turn the balance wheel forward and backward cautiously and let the needle stitch into the cardboard lightly. If the needle does not stitch accurately into the same hole twice, loosen the binding screw on the zig-zag regulator crank 15 (Fig. 4-12) just sufficiently to permit the zig-zag regulator stud 16 to be turned with a screwdriver to tool No. 106 300-306. As you turn the zig-zag regulator stud to eliminate any needle vibration, let the machine run and push up finger-tip control F.

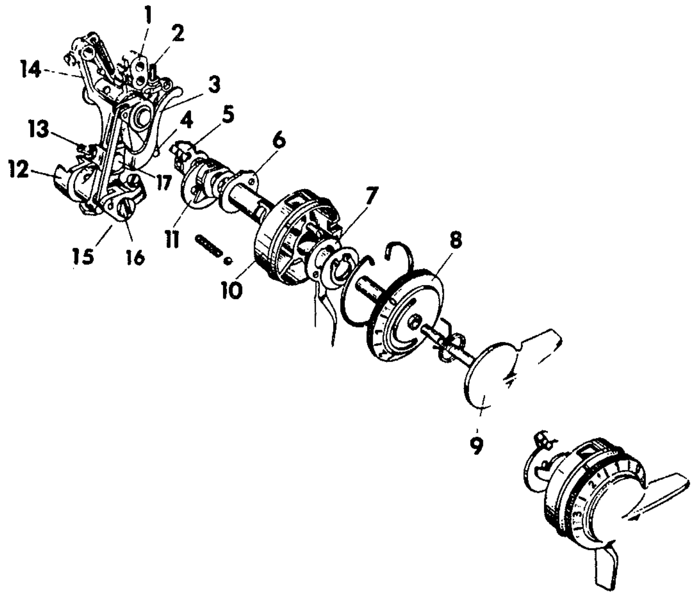


Fig. 4-12. An exploded view of the zig-zag control mechanism of models 260, 262, 360 and 362. 1. Cam finger; 2. Regulating screw; 3. Needle position cam finger; 4. Connecting crank for zigzag and straight stitching; 5. Cam finger; 6. Needle position cam; 7. Needle position lever; 8. Stitch width dial; 9. Zigzag finger-tip control; 10. Zigzag regulator barrel; 11. Zigzag cam; 12. Zigzag regulator; 13. Regulating screw; 14. Zigzag regulator arm; 15. Zigzag regulator crank with connecting rod; 16. Zigzag regulator stud; and 17. Hexagon screw.

After the adjustment, tighten the binding screw on the zig-zag regulator crank 15 securely. To double check this setting, repeat the cardboard test.

STITCH-WIDTH DIAL ON MODELS 260, 262, 360 AND 362

The machine should sew a perfectly straight seam when the stitch-width dial *A* is set on 0. To check this setting, drop the machine feed and insert a new No. 80 needle, System 130/705H. Place a piece of thin cardboard under the sewing foot.

Turn the balance wheel forward and backward cautiously and let the needle stitch into the cardboard lightly. If the needle should

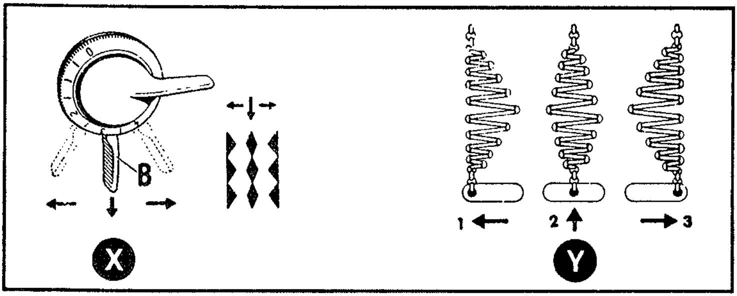


Fig. 4-13. The needle position lever (X) adjusts the needle position (Y) on Models 260, 262, 360 and 362.

not stitch into the same hole twice, loosen the jam nut on the regulating screw 2 (Fig. 4-12) with a wrench. Run the machine and touch the needle bar frame with your fingers to see whether it swings sideways or not. To adjust, turn the regulating screw *2* in or out, as required, to eliminate any needle vibration.

When the adjustment is complete, tighten the jam nut firmly and double check the setting by repeating the cardboard test.

NEEDLE POSITION ON MODELS 260, 262, 360 AND 362

When the machine is set for straight stitching and the needle position lever *B* (Fig. 4-13X) is put in the right and left notches respectively, the needle should stitch into the same spot as when the machine is set for the widest zig-zag stitch. To check this setting, turn the stitch-width dial *A* to 4 and put the needle position lever *B* in the left notch. Turn the balance wheel until the needle descends on the left of its throw. Check to see that it makes no perceptible sideways motion when you push the finger tip control *F*. If the needle swings sideways, the position of the zig-zag regulator arm *E* (Fig. 4-14) must be adjusted.

To make this adjustment, take a suitable wrench (or box wrench No. 129496, as recommended by *Pfaff*) and loosen hexagon screw *C* on the needle position cam finger *D* just a little. Loosen jam nut *B* on regulating screw *A* and turn regulating screw *A* a few turns. Then push the zig-zag regulator arm *E* firmly against regulating screw *A*. As you move finger tip control *F* up and down repeatedly, turn in regulating screw *A* until the needle ceases to swing sideways. Make this adjustment carefully on the left position, because the left position is used for sewing buttonholes. Securely tighten both hexagon screw *C* and jam nut *A* on the needle position cam finger *D*.

To double check this setting, flick the needle position lever *B* to its right and left position, respectively, and check to see that the needle makes no sideways motion.

To adjust the needle throw in relation to the central needle puncture, proceed as follows: With the needle position lever *B* in the central notch, observe the right and left needle punctures made with the machine set for the widest zig-zag stitch. When this width is correct, the stitches should be equidistant from the central puncture made with the machine set for straight stitching (Fig. 4-13Y). To check this setting, set stitch-width dial *A* on 0 and put needle position lever *B* in the central notch. Drop the machine feed and place a piece of cardboard under the sewing foot. Turn the balance wheel until the needle stitches into it lightly. Turn stitch-width dial *A* to 4 and turn the balance wheel forward, then backward, until the needle, on the right and left of its throw, stitches into the cardboard again.

To adjust, loosen sew screw *F* (Fig. 4-15) and rotate eccentric stud *E* until the central puncture is located exactly midway between both outer punctures. To double check this setting, repeat the cardboard test.

To center the needle throw in the needle plate slot, proceed as follows: Set the needle position lever *B* in the central notch and observe where the needle descends through the needle plate. This position is correct when the needle is centered in the slot, and, descending on the right and left of its throw, it should clear both ends of the slot at the same distance (Fig. 4-16). If adjustment is

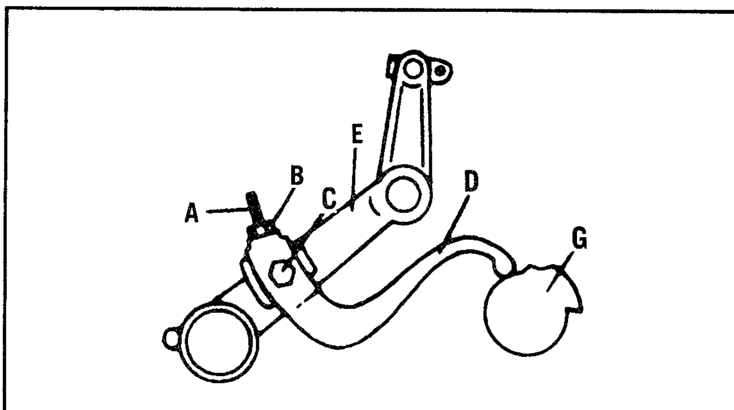


Fig. 4-14. Adjusting the zig-zag regulator arm E on Models 260, 262, 360 and 362.

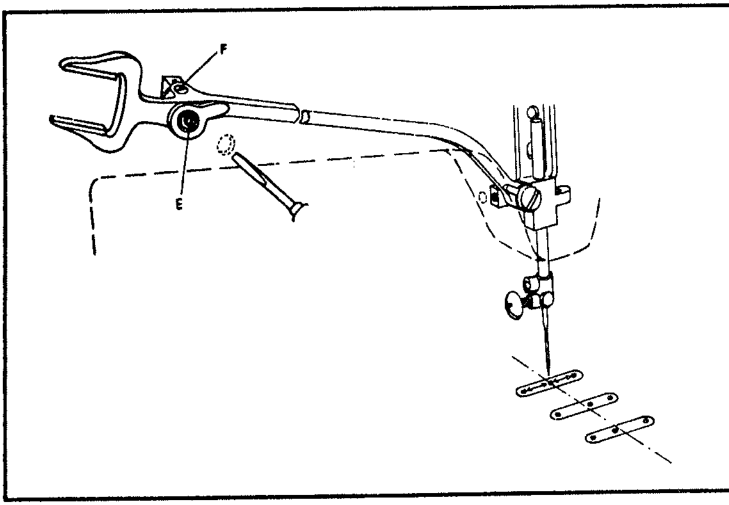


Fig. 4-15. Adjusting the needle throw in relation to the central needle puncture on Models 260, 262, 360 and 362.

required, loosen set screw *C* on the eccentric stud *D* in the needle bar frame. It can be reached through an opening in the bend of the machine arm. Insert a wide blade screwdriver through the opening on the back of the machine arm and turn eccentric stud *D* to the right or left until the central puncture is centered in the needle plate slot correctly and the needle, descending on the right and left of its throw, clears both ends of the slot at the same distance. Check your results, and if satisfactory, tighten set screw *C* securely.

Since the adjustment of the needle position is correlated with the centering of the needle throw in the needle-plate slot and in relation to the central needle puncture, each setting must be checked again. If necessary repeat all the adjustments in the sequence given above until all the settings are correct.

AUTOMATIC MECHANISM ON MODELS 260, 262, 360 AND 362

To adjust all the engaging levers, turn the dial *D* to 4 and turn the cam assembly clockwise until the fourth contact finger from the bottom is opposite the dent, or lowest point, on the rim of the opposite cam. The levers to be adjusted are:

- The front engaging lever controlling the entire stitch width
- The central engaging lever controlling half the stitch width
- The rear engaging lever controlling the needle position.

Front Engaging Lever Controlling Entire Stitch Width

To check this setting, set stitch-width dial *A* on 0, dial *C* on 4 and the needle position lever *B* at its central position. Check that the square notch in the front engaging lever 3 (Fig. 4-17) fits readily over the pin in clutch stud 15. If it does not, loosen the set screw on eccentric stud 4 and turn the stud until its lobe is at the top. Then turn the eccentric stud to the right or left, as appropriate, until the engaging lever fits over the pin in the clutch stud. Tighten the set screw securely.

To check the entire mechanism, turn the cam assembly by hand while engaging lever 3 is engaged until the contact finger is opposite the lobe of the cam. Check whether the contact finger negotiates the lobe of the cam smoothly, without binding, and whether the engaging lever can be lifted easily out of the front clutch stud.

If there is a bind, turn the eccentric stud until the contact finger negotiates the lobe and the dent of the cam with equal ease. If you can't find such an intermediary position, readjust the position of the two-part connections 25 and 27 (Fig. 4-17).

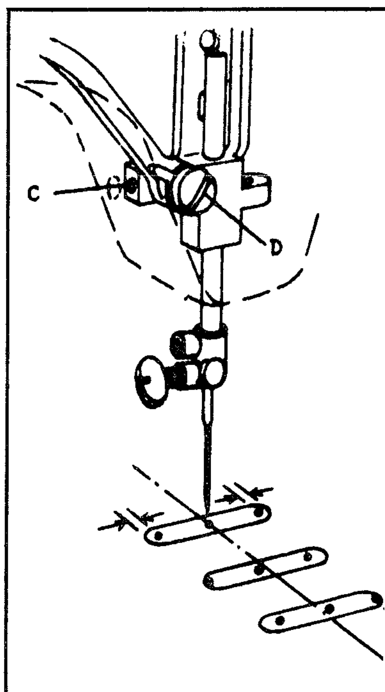


Fig. 4-16. Centering the needle throw in the needle plate slot on Models 260, 262, 360 and 362.

To double check this setting, turn the cam assembly so that the contact finger is alternately positioned opposite the highest and lowest points on the rim of the cam opposite. When the finger is opposite the dent in the rim of the cam, the engaging lever should fit over the pin in the clutch stud easily. In addition, the contact finger should negotiate the lobe of the cam with ease.

Central Engaging Lever Controlling Half The Stitch Width

To check this setting, set stitch-width dial *A* on 0, the needle position lever *B* at its central position and dial *C* on 1. Check that the square notch in the central engaging lever 2 (Fig. 4-17) fits readily over the pin in clutch stud 14. If it does not, loosen the set screw on the eccentric stud 4 and turn the stud until its lobe is at the top. Then turn the eccentric stud to the right or left, as appropriate, until engaging lever 2 fits over the pin in clutch stud 14. Tighten the set screw securely.

Rear Engaging Lever Controlling Needle Position

To check this setting, set stitch-width dial *A* on C, the needle position lever *B* at its left position and dial *C* on 3. Check that the square notch in the rear engaging lever 1 (Fig. 4-17) fits easily over the pin in clutch stud 13. If it does not, loosen the set screw on eccentric stud 4 and turn the stud until its lobe is at the top. Then turn the eccentric stud to the right or left, as appropriate, until the

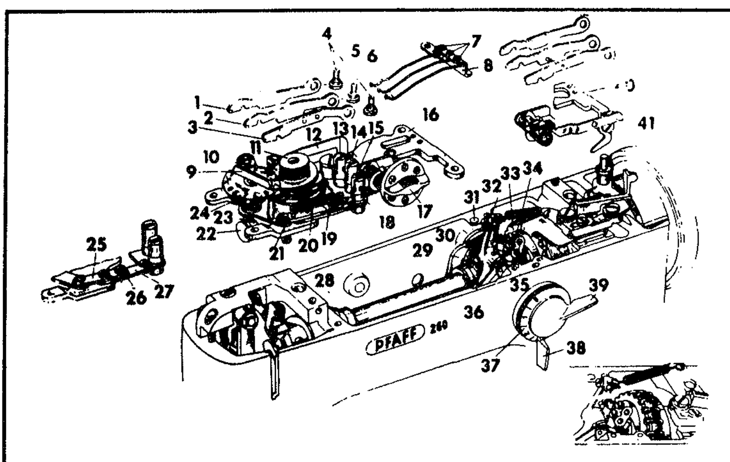


Fig. 4-17 This figure is indispensable when used in conjunction with the text, in adjusting the engaging levers on Models 260, 262, 360 and 362.

engaging lever *1* fits over the pin in the clutch stud. Make sure that the left edge of the cutout in the engaging lever just touches the pin in clutch stud 13. Tighten the set screw securely.

To double check this setting, turn the cam assembly by hand while engaging lever *1* is engaged until the contact finger is opposite the lobe of the cam. The descending needle now should be in the same position as if it descends on the right of its throw when the machine is set for its widest stitch. Make sure, however, that it does not strike the right edge of the needle plate slot. If the needle should be positioned too far to the right, rotate the engaging lever eccentric stud until it is at the correct position. As you turn the cam assembly further until the contact finger is opposite the dent on the rim of the cam, engaging lever *1* should fit readily over the pin in clutch stud 13. If necessary, turn the engaging lever eccentric stud until all requirements are met. Then tighten the set screw securely.

TIMING THE SEWING MECHANISM ON MODELS 260 AND 262

Timing the sewing hook involves adjusting the amount of needle-bar rise required to form the loop, and setting the hook at the centerline of the needle.

On Pfaff Models 260 and 262, turn the stitch-width dial *A* to 0 and put the needle position lever *B* in the central notch. On automatics also set dial *C* on 0.

Remove the sewing foot and the needle plate.

To obtain an accurate setting, it is advisible to remove the bobbin case cap and base. Insert a new No. 80 needle System 130/705H. Turn the balance wheel until the needle has reached the lowest point of its stroke (Fig. 4-18A).

To proceed with this adjustment as recommended by Pfaff technical department, you should have the needle bar clamp No. Z 70.68-1 and rise gauge No. Z 70.67-1. However, in the absence of these special Pfaff tools, you should understand that the recommended rise of the needle bar after it has reached its lowest point is (2mm.)

If you have the needle bar clamp and rise gauge, first turn the balance wheel until the needle is at the bottom of its stroke, then secure the clamp to the needle bar and tighten the screw lightly. Then insert the 2mm gauge over the needle bar, directly above the clamp. Push the clamp and gauge securely against the bottom surface of the machine arm and tighten the clamp screw securely. Finally, remove the gauge (note that the space between the top of the clamp and the bottom of the machine arm is now 2mm, as set by

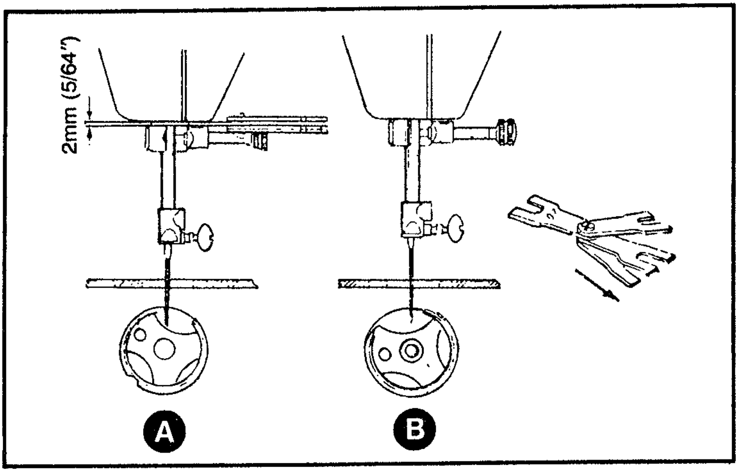


Fig. 4-18. Special gauges are used in timing the hook to the needle-bar rise, but the careful craftsmen should be able to improvise some method of establishing a 2mm needle-bar rise. Make this adjustment with the needle in the central position. A. The needle reaches the lowest point; B. The clamp touches.

the gauge) and rotate the balance wheel until the clamp touches the bottom of the machine arm (Fig. 4-18B).

Once you have established the correct needle-bar rise, the hook point should be opposite the centerline of the needle. If it is not, loosen the two hook set screws and rotate the sewing hook by letting it slip on its shaft until the point is opposite the centerline of the needle. Tighten the hook set screws lightly and double check the amount of needle-bar rise and the position of the hook point in relation to the centerline of the needle.

At this time, the clearance between the hook and the side of the needle should also be adjusted. This procedure will be explained later in this chapter. When all the adjustments are made, tighten the hook set screws securely.

TIMING THE HOOK TO THE NEEDLE ON MODELS 360 AND 362

On Pfaff Models 360 and 362, the hook can be timed only by adjusting the position of the lower driving belt sprocket *3* (Fig. 4-19). It is not possible to time the sewing hook by adjusting the position of the helical gears on the short hook shaft or the long hook driving shaft. Nor must the upper driving belt sprocket be adjusted on its shaft as this would disturb the balancing of the shaft.

Turn stitch-width dial *A* to 0 and put needle position lever *B* in the central notch. On automatics, also set dial *C* on 0. Remove the sewing foot and the cylinder arm top cover. To obtain an accurate setting, it is advisible to remove the bobbin case cap and the base. Insert a new No. 80 needle, System 130/705H.

The set screws on the lower driving belt sprocket can be reached through the second opening on the back of the machine base, as viewed from the balance wheel end. To obtain a better view of the set screws on the sprocket, remove grille 8 (Fig. 4-20). Take out the screws in the *Stopmatic switch box* and turn the latter so that you can see the lower driving belt sprocket. Now loosen the two set screws on the lower driving belt sprocket.

If for some reason it should be impossible to get at the screws, take out the motor. Turn the balance wheel until the needle bar has reached the lowest point of its stroke.

At this point in the procedure, use the needle bar clamp No. Z 70.68-1 and rise gauge No. Z 70.67-1, if available. Otherwise, the recommended needle-bar is 2mm.

When, by one method or the other, you have established a needle-bar rise of 2mm, loosen the set screws in the lower sprocket, and rotate the hook until the hook point is opposite the centerline of the needle. Tighten the set screws in the lower sprocket.

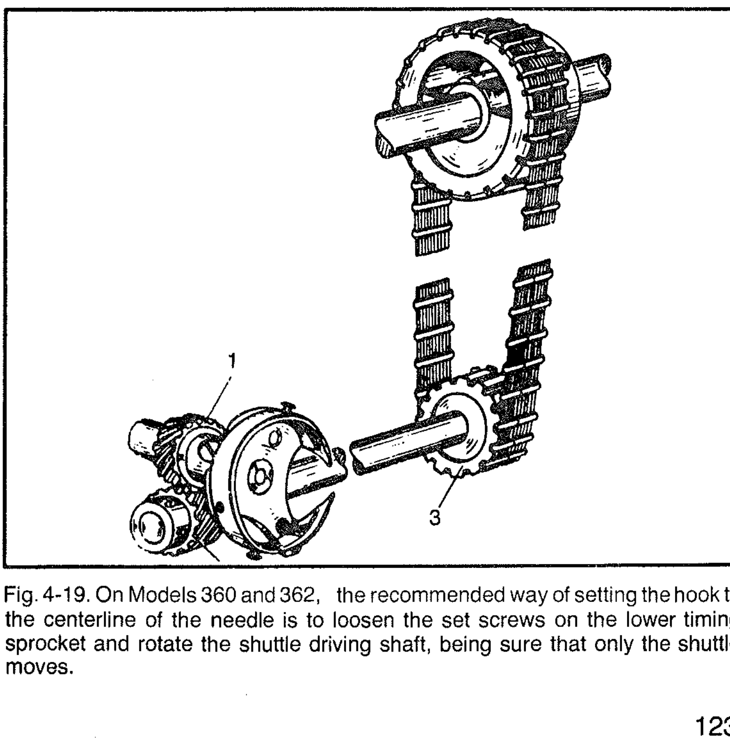


Fig. 4-19. On Models 360 and 362, the recommended way of setting the hook to the centerline of the needle is to loosen the set screws on the lower timing sprocket and rotate the shuttle driving shaft, being sure that only the shuttle moves.

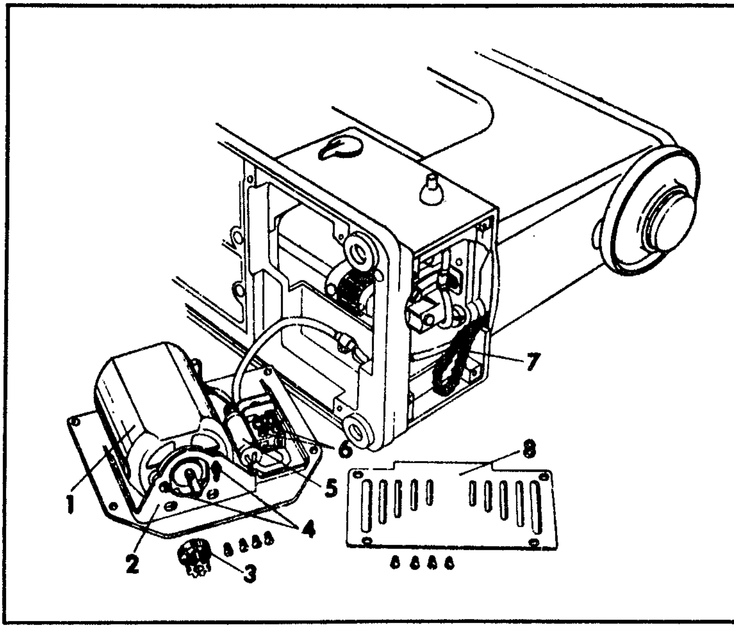


Fig. 4-20. Gaining access to the lower timing sprocket on Models 360 and 362. In orienting this figure to the instructions in the text, don't mistake the main drive belt (cord belt 7) with the timing belt. 1. Motor; 2. Motor base plate; 3. Motor belt sprocket; 4. Set screws; 5. Capacitor; 6. Terminal screws; 7. Cord belt; and 8. Grille.

NEEDLE BAR HEIGHT ON MODELS 260, 262, 360 AND 362

The foregoing instructions on timing the hook to the needle-bar rise assume that the correct positional relationship between the hook and needle-bar rise could be obtained by simply changing the position of the hook in its circular path so the hook point would be the centerline of the needle when the needle-bar rise was 2mm. If you thus set the hook and find that it will not pick up a loop, it may be that the vertical distance of the hook from the needle eye is not correct. This would indicate that the needle-bar height must be adjusted.

On Models 260, 262, 360 and 362, when the needle descends on the right of its throw, the hook point reaches the needle a little earlier than the centered needle in straight sewing. Conversely, when the needle descends on the left of its throw, the hook point reaches the needle a little later than the centered needle in straight stitching. As a result, the hook point is positioned higher above the needle eye when the needle descends on the right than when it descends on the left of its throw. For this reason, great care must be applied in setting the needle bar at the correct height.

To make this adjustment, turn stitch-width dial *A* on 4 and put needle position lever *B* in the central notch. On automatics, also turn dial *C* to 0. Remove the face cover, sewing foot and needle plate. Insert a new No. 80 needle, System 130/705H. Turn the balance wheel until the needle descends on the left of its throw. Continue turning the balance wheel until the hook point is opposite the centerline of the ascending needle (Fig. 4-21). The needle-bar height is correct when the hook point is about 0.5mm above the tip of the needle eye. If adjustment is required, loosen the needle bar set screw *A* (Fig. 4-21) and set the needle bar higher or lower, as appropriate. Tighten the needle set screw *A* securely.

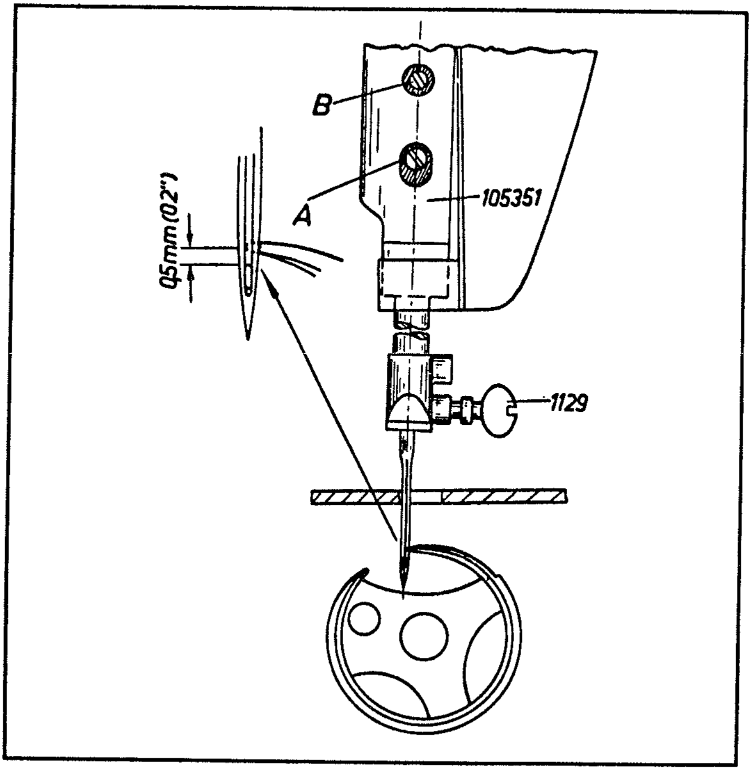


Fig. 4-21. Study this figure carefully to note that three conditions must be met for correct hook-needle timing on Models 260, 262, 360 and 362: The needle has descended on the left of its throw and risen 2mm; the hook is at the centerline of the needle; and the hook point is 0.5mm above the top edge of the needle eye. This latter condition can be met by raising or lowering the needle bar.

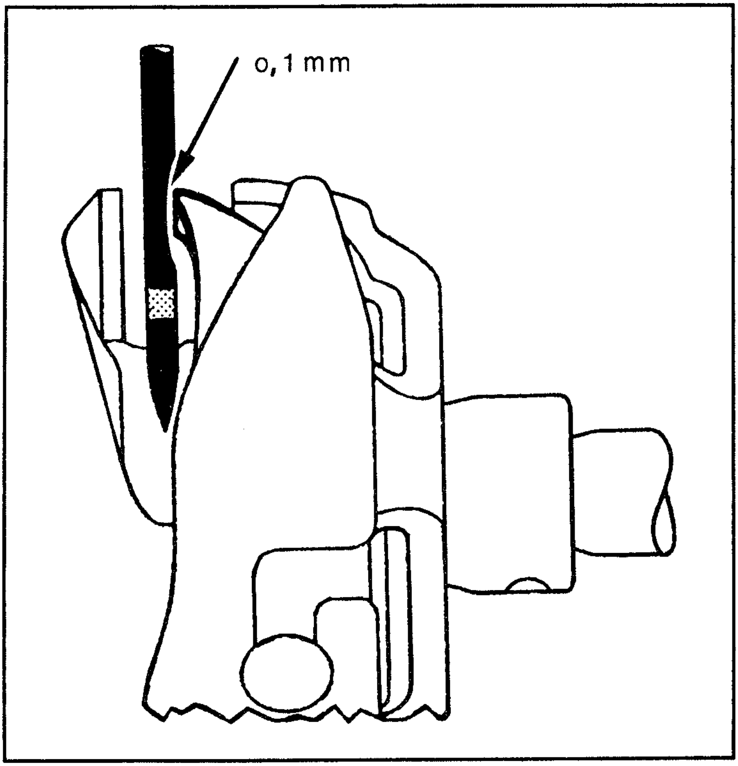


Fig. 4-22. Setting the clearance between hook and the side of the needle on the Models 360 and 362. (0.1mm is about the thickness of a hair.)

On Models 260 and 262, double check the clearance between the sewing hook and the needle since this distance may have been changed by setting the needle bar higher or lower.

HOOK-NEEDLE CLEARANCE ON MODELS 260 AND 262

The adjustment for hook-needle clearance is described as a separate procedure for Models 260 and 262. This clearance should be checked routinely when timing the hook to the needle.

To adjust the hook-needle clearance on Models 260 and 262, go through exactly the same procedure as that outlined under the heading Timing The Hook To The Needle On Models 260 And 262. Rather than adjusting the hook to the needle-bar rise, adjust the clearance between the hook and the side of the needle as follows: Loosen the two set screws on the hook and move the hook along its short shaft. Be careful not to disturb the position of the hook in relation to the centerline of the needle until the clearance between the hook and needle is .004 (0.1mm). Tighten the set screws.

HOOK-NEEDLE CLEARANCE ON MODELS 360 AND 362

The corect hook-needle clearance on the Pfaff 360 and 362 is also .004 (0.1 mm). To make this adjustment, you do not need to remove the bottom plate of the machine, as in timing the hook, but you must gain access to the hook mechanism, as follows: Remove the sewing foot, needle plate and cylinder arm top cover. Also remove the bobbin case cap and the bobbin case to afford a better view of the parts to be adjusted. Insert a new No. 80 needle, System 130/705H, and check the clearance between the needle and hook with the machine set for straight stitching, as well as for the widest zig-zag stitch (Fig. 4-22).

If it is necessary to adjust the clearance, refer to Fig. 4-23. Turn out the set screw *a*, which has a left-hand thread. Pull out the sewing hook with its short shaft, but make sure you remember its position because it must be replaced in the same position.

Depending upon the desired clearance between the hook point and the needle, replace spacing washer *d* (Fig. 4-23) on the short hook shaft by thinner or thicker washers, as required. The following spacer washers are available:

- No. 106 014 = .048″ or 1.2mm
- No. 60 232 = .015″ or 0.4mm
- No. 60 231 = .013″ or 0.35mm

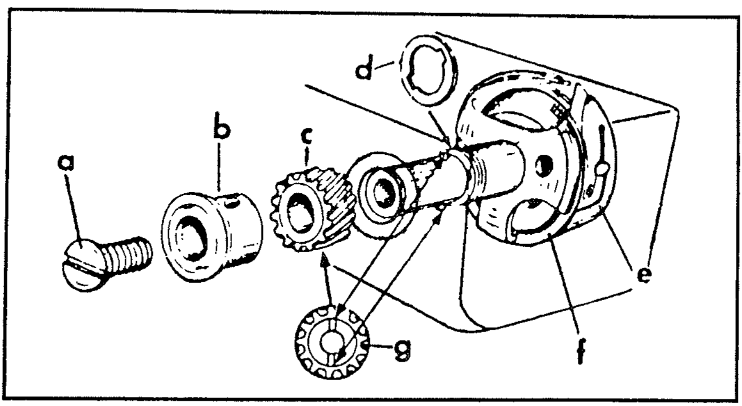


Fig. 4-23. The hook-needle clearance is changed on Models 360 and 362 (but not the 260 and 262) by the installation of thicker or thinner spacers on the short hook shaft. a. Set screw; b. Hook shaft bushing; c. Hook shaft helical gear; d. Spacing washer; e. Hook thread guard; f. Sewing hook; and g. Guide bushing.

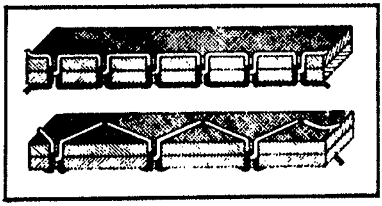


Fig. 4-24. A setting of 5 on the upper thread-tension dial should produce stitches interlocked between the fabrics, whether sewing straight or zig-zag stitches. However, you may have to make some allowances in this median setting when using synthetic threads.

- No. 60 230 = .012′ or 0.3mm
- No. 60 229 = .010″ or 0.25mm
- No. 60 156 = .008″ or 0.2mm

Replace the sewing hook in exactly the same position it had occupied in the machine previously and tighten the hook set screw *a* securely.

THREAD TENSIONS

As explained throughout this book, for normal sewing jobs, the needle thread and bobbin thread should be locked in the center of the material (Fig. 4-24). To meet this condition, the needle thread is retained and tensioned by an adjustable disc tension mechanism on the machine arm and the bobbin thread tension is maintained and adjusted by an adjustable leaf spring on the bobbin case. On Models 260, 262, 360 and 362, the sequence for adjusting the thread tension is (on all these models) to first adjust the bobbin thread tension, and then adjust the upper (needle) thread tension. The upper thread tension adjustment procedure for Models 260 and 360 differ slightly from that of Models 262 and 362, so read the following sections carefully.

BOBBIN TENSION

Make sure there are no loose thread ends under the tension spring. Check to see that the tension spring engages the bobbin case evenly from the delivery eye to its tip and that it parallels the edges of the bobbin case.

To adjust the bobbin thread tension, turn the regulating screw completely out, and then screw it in again until a noticeable resistance has to be overcome when pulling the thread (Fig. 4-25). Once you have set the bobbin tension correctly, any tension regulation should be made by adjusting the needle thread tension.

NEEDLE THREAD TENSION

With a No. 50 (cotton) thread in the needle, the tension should be 0 when the tension dial is set on 0. With the dial set on 1 there

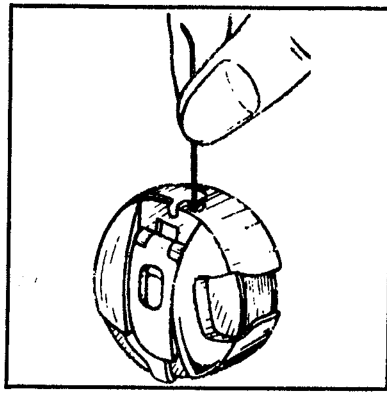


Fig. 4-25. Your local repairman may caution you against changing the bobbin tension; however, by following the instructions in the text, you can optimize this tension for different threads such as changing from cotton thread to synthetic thread.

should be a slight tension on the thread. At 2 the thread tension should be noticeably stronger than at 1. When the tension dial is set on 5, the needle and bobbin threads should be locked in the center of the material, regardless of whether the machine is set for straight or zig-zag stitching. When the dial is set at 0, loops about ¼ inch long should appear on the underside of the fabric. If your machine does not meet this criteria, follow the directions in the following sections.

Corresponding the Upper Thread Tension to the Dial Setting on Models 260 and 360

Loosen the set screw on the tension barrel and remove the entire mechanism. Turn the tension dial to 1 and place a No. 50 thread between the tension discs.

Loosen the set screw on the tension stud and turn the latter to the right or left slightly until the amount of tension which is exerted when the dial is set on 1 and 2 are correct. Tighten the tension stud

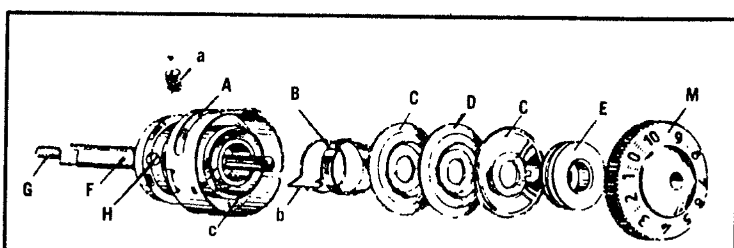


Fig. 4-26. This is the top tension mechanism on Models 260 and 360. a. Set screw; b. Thread check spring loop; c. Thread check spring regulator; A. Tension barrel; B. Thread check spring; C. Tension discs; D. Central tension disc; E. Tension spring, w/ spring assembly; F. Tension stud; G. Tension release plunger; H. Set screw; and M. Tension dial.

set screw securely. Lower the presser bar lifter and insert the entire tension mechanism in the machine arm, pushing it in as far as it will go. Make sure the red mark is at the top. Tighten the tension barrel set screw securely.

Corresponding the Upper Thread Tension to the Dial Setting on Models 262 and 362

To adjust the upper thread tension to correspond to the dial setting on Models 262 and 362, turn the small screw in the tension dial to the left a few turns. Place a No. 50 thread between the tension discs and turn the tension nut so that a slight, barely noticeable tension is obtained. Hold the tension nut in this position, turn the tension dial to 1 and tighten the screw securely. Then turn the tension dial to 5 and thread the needle. Sew a seam and check to see that both threads are locked in the center of the material. If this condition is met after the dial has been turned to some other number, loosen the small screw and turn the tension dial to 5, without disturbing the tension setting. Tighten the screw securely.

For automatic embroidery work, the needle thread tension is decreased somewhat so that the fancy stitches will look neat on the surface of the material. The material will not pucker and the bobbin thread will not be pulled to the surface of the material (Fig. 4-27).

When using synthetic threads (such as the polyesters) it may be necessary to decrease the tension of both the bobbin and needle thread somewhat. The bobbin thread should pull quite easily from the bobbin case and the needle thread should also pull easily through the tension discs. The ultimate test for thread tensions is a correctly interlocked stitch, however.

THREAD CHECK SPRING

The function of the thread check spring is as follows (Figs. 4-26B and 4-27J). The needle thread slackens as the take-up lever descends. To prevent the thread from being pierced by the descending needle, it is held taut by the thread check spring until the needle enters the material. At this precise moment, the thread check spring should hit its stop. After the thread check spring has released the needle thread, it slackens all the way down to the needle eye. The thread check spring should release the needle thread when the bottom end of the needle eye enters the goods.

Tensioning the Thread Check Spring

Set the thread check spring so it will pull a No. 30 thread taut all the way to its stop. In special cases, the thread check spring tension may be adapted to the thread size being used.

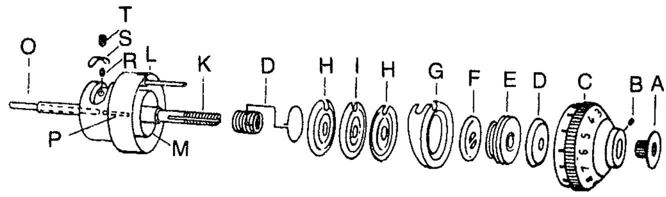


Fig. 4-27. The top tension mechanism on Pfaff Models 262 and 362. It is important when installing the assembled unit on the machine that the tension releasing pin (P) enters the hollow tension stud (K). A. Tension nut; B. Set screw; C. Tension dial; D. Thrust washer; E. Spring assembly; F. Tension release washer; G. Thread guide; H. Tension disc; I. Central tension disc; J. Thread check spring; K. Tension stud; L. Tension barrel; M. Tension bushing; O. Tension release plunger; P. Tension release pin; R. Set screw; S. Cap; and T. Set screw.

Models 260 and 360. On Pfaff Models 260 and 360 the thread check spring is tensioned by adjusting the thread check spring regulator in back of the tension discs. This regulator is held in position by a screw which can be reached through a slot. To increase the tension, loosen this screw and turn the regulator counterclockwise. To decrease the tension, turn it clockwise. When the adjustment is made, tighten the set screw. (Fig. 4-26).

Models 262 and 362. Remove the top cover and loosen the set screw on the tension barrel. Take out the tension barrel and loosen the set screw on the tension stud. Turn the tension stud counterclockwise to increase the tension, or clockwise to decrease it. After the adjustment, tighten the stud set screw securely and replace the tension barrel in the machine.

On *Pfaff* Models 262 and 363, insert the tension barrel into the machine arm just far enough so that the tension discs will open just sufficiently to release the thread when the presser bar lifter is raised. Tighten the set screw on the tension barrel securely. (Fig. 4-27).

Timing the Thread Check Spring On Models 260, 262, 360 and 362

Set the machine for its longest stitch and sew a seam. Turn the balance wheel slowly and check the setting of the thread check spring stop. The thread check spring is timed correctly if it hits the end of the slot in the tension barrel when the needle point reaches the goods.

If adjustment is required, remove the top cover and loosen the set screw on the tension barrel. On Models 260 and 360, rotate the tension barrel to the right or left until the thread check spring is set

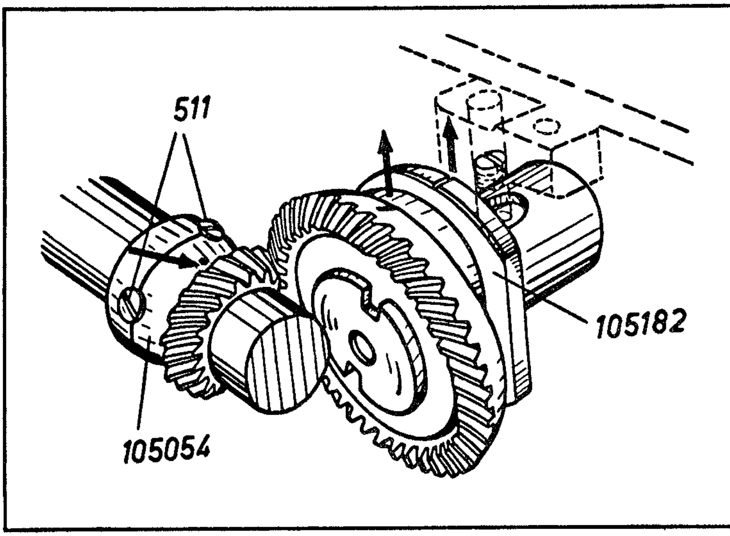


Fig. 4-28. Adjust the timing of the needle bar swing on Pfaff Models 230 and 332 by changing the positional relationship of the gears.

correctly. On Models 262 and 362, use a screwdriver to adjust the position of the tension barrel by turning the tension stud in the appropriate direction. Be sure that the tension barrel is inserted into the machine arm just far enough to meet the above conditions. After the adjustment, tighten the set screw securely. Set the machine for its longest stitch and sew a seam to see if the thread check spring is correctly set.

ADJUSTMENT PROCEDURES FOR MODELS 230/332 AUTOMATIC

The following adjustment procedures for Models 230/332 were selected as applicable to problems most commonly encountered. In cases in which the procedures for the 230 differs from that of the 332, they will be discussed separately.

Adjusting Needle Bar Swing On Models 230 And 332

To insure that the sideways motion of the needle bar on Models 230 and 332 will be completed when the point of the needle has reached a position about 5/16 inch (8mm) above the needle plate, check the next several factors (Fig. 4-28).

The meshing teeth on both the small and large bevel gears are marked by a depression (see arrow) on the pinion and a notch on the large bevel gear. Both should be opposite each other when meshed.

Turn the top shaft until the position mark for the feed eccentric points upward. Loosen set screws (511) on the bevel pinion (105054) on the top shaft and while keeping it in mesh with the large bevel gear, turn the pinion until the mark on the gear rim of the large bevel gear is at the top.

In case there is no marking on the large bevel gear, hold the top shaft with its position mark pointing upward and turn the bevel pinion until the swell of the eccentric is in the top position. Then set the pinion on the shaft so that its teeth will meet the teeth on the large bevel gear in one point. To meet this requirement, it may become necessary to adjust the flanged bushing in such a manner that the needle bar frame pitman is correctly guided sideways, without binding. Securely tighten both set screws on the bevel pinion, hold the large bevel gear in the adjusted position and secure the transverse stud by tightening the grub screw.

It is important that a light and smooth running of the gears is obtained with a minimum of play.

To check the above adjustment, turn the zig-zag button *D* from 0 to 4 and back, noting that there is no perceptible sideways motion when in its highest position. For this check, set the needle position lever in the center notch.

Correcting a Wavering Straight Stitch On Models 230 And 332

If the machine should fail to make perfectly straight stitches despite the fact the zig-zag button has been set at 0, the zig-zag

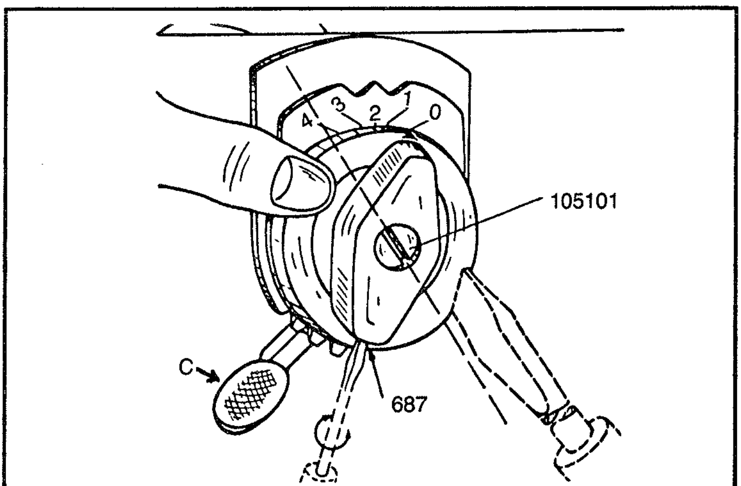


Fig. 4-29. Correcting a wavering straight stitch on Pfaff Models 230 and 332. Needle position lever C is engaged in the center notch.

regulator spindle 105101 (Fig. 4-29) may be out of adjustment. Before re-adjusting, make sure that needle position lever *C* (Fig. 4-29) is engaged in the center notch. Then insert a thin needle, attach the button sewing foot, drop the feed dog and place a piece of white cardboard between the needle plate and presser foot.

The needle is correctly zeroed if it stitches twice into the same hole when turning the balance wheel forward, then backward. Let it stitch into the cardboard just lightly. If there is a discrepancy, loosen set screw 687 of the zig-zag button, which can be reached from below. Hold the button on zero and press it against the arm. Allow the machine to run slowly. Then with a large screwdriver, slightly turn spindle 105101 to the right or left until any sideways motion of the needle has ceased. Move the cardboard under the presser foot after each check so the needle punctures may be clearly distinguished. Tighten screw 687.

Adjusting Needle Position On Models 230 And 332

Adjusting the needle position on Models 230 and 332 involves centering the needle in the needle hole for straight stitching and adjusting the needle for zig-zag stitching.

Centering Needle for Straight Stitching On Models 230 and 332

When the zig-zag button is set on 0 and the needle position lever is in the center notch, the needle should pass exactly through the center of the elongated needle hole (Fig. 4-30). To provide for this adjustment, the needle bar frame (105351) and the needle bar frame pitman (105189) are connected by means of an eccentric stud *A*. Normally, the eccentric of this stud should point downward. To center the needle in the needle hole, loosen set screw (341) which can be reached through an aperture in the bend of the arm. Cautiously turn the eccentric stud to the right or left. To get at the stud, pass the screwdriver through the large aperture of the back of the arm. Never turn the stud so that its eccentric part points upward. When this adjustment is completed, tighten the set screw securely.

Adjusting Needle for Zig-zag Stitching on Models 230 and 332

To adjust the needle for zig-zag stitching, observe the distance that the needle swings from its central position when the needle position lever is set at the center and the zig-zag width control is set at 4. To be correct, the left and right needle swing should be equidistant from the central position. If adjustment is required,

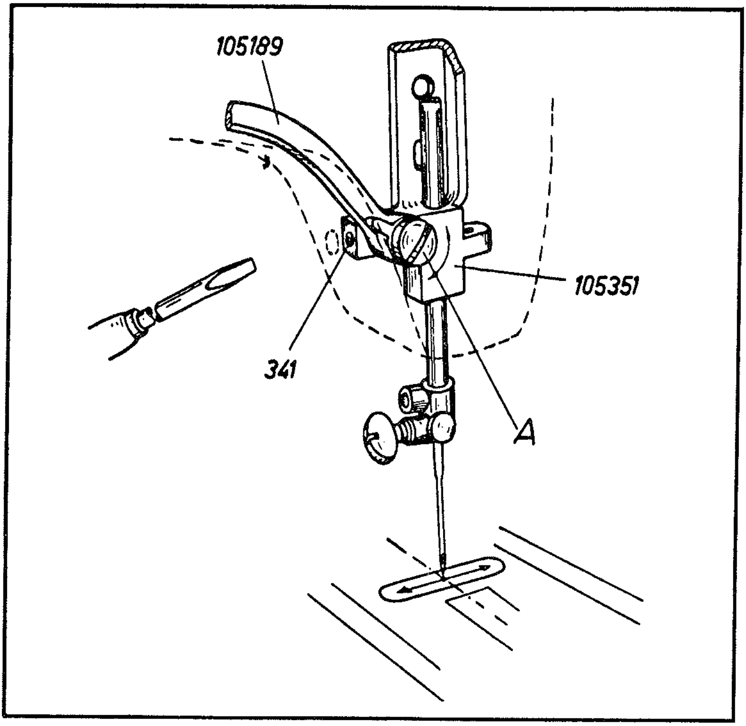


Fig. 4-30. Centering the needle in the needle hole for straight stitching on Pfaff Models 230 and 332. A. The eccentric stud.

proceed as described in the previous section, then set the needle position lever in the center notch, place a piece of cardboard under the needle, and let the needle stitch into it just lightly. Flick the zig-zag button to 4 and turn the balance wheel back and forth. Let the needle, on its right and left throws, stitch lightly into the cardboard again. In case the interspace between the needle punctures differ, adjust at the eccentric stud 8947 (Fig. 4-31) near the fork of the needle bar frame pitman. To turn the stud as may be required, loosen set screw (785) which can be reached from above and insert the screwdriver through the hole at the back of the arm. The direction in which the stud has to be turned is determined by the position of the center puncture in relation to the outer puncture. Always turn the eccentric stud in the direction in which the center puncture has to be moved in order to center it between the outer punctures R and L (Fig. 4-31). The needle hole is shown in the illustration as seen from the back of the machine. Tighten the set screw lightly—*not tightly*.

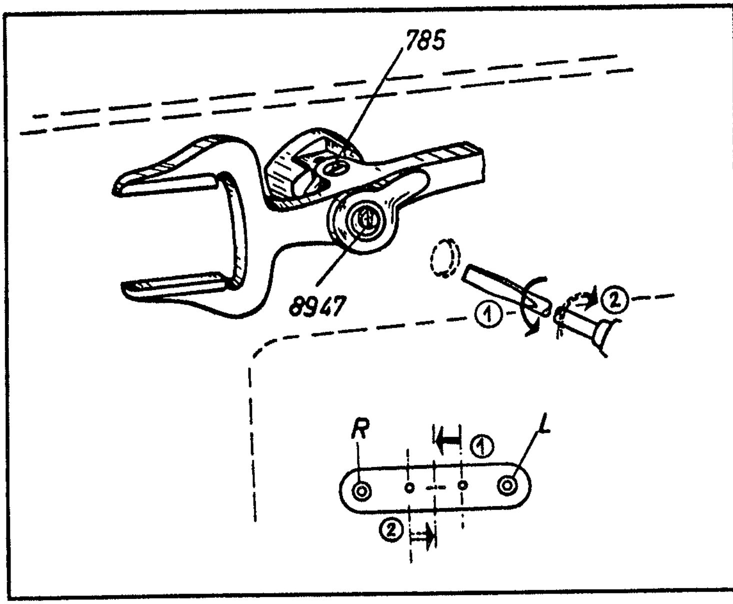


Fig. 4-31. Adjusting the needle for zig-zag stitching on Models 230 and 332.

Next, check whether the needle punctures are positioned at equal distances from the ends of the elongated needle hole. If not, the needle has to be recentered in the needle hole by adjusting eccentric A (Fig. 4-30). Adjust the zig-zag stitch again as previously instructed. This procedure has to be repeated until the zig-zag throw of the needle bar is exactly halved by the center puncture and the needle clears the ends of the needle slot at equal distances. This latter adjustment should be checked with the needle set for its maximum width, and in all three needle positions. Securely tighten the set screws on both eccentric studs.

Timing The Hook To Needle On Model 230

To prepare to adjust the hook-needle timing on the Pfaff 230, insert a regular No. 80 needle, unscrew the needle plate, engage the needle position lever in the center notch, and set the needle for straight stitching. Loosen the hook set screws just sufficiently to permit the hook to be turned on its shaft. Turn the balance wheel until the needle has descended to its lowest position.

At this point in the procedure, the Pfaff technical department recommends the use of needle bar clamp No. Z 70.68-1, and needle bar rise gauge No. Z 70.67-1. In the absence of these special tools, you must devise some way to assure yourself of a needle-bar rise of 2mm.

When you have established a 2mm needle-bar rise, turn the hook on its shaft until its point is opposite the centerline of the needle. Tighten the set screws.

Timing The Hook To Needle On Model 332

The amount of needle-bar rise on the Pfaff 332 is the same as that of the 230 (2mm). However, there is a difference in the way the adjustment is made. On the Pfaff 332, the hook is permanently mounted on the short transverse shaft (Fig. 4-32) and hence cannot be turned to set it for the correct amount of needle bar rise. For this adjustment, it is necessary to loosen the clip belt sprocket on the hook driving shaft and turn the hook until it is opposite the centerline of the needle. Never adjust the position of the upper sprocket, except under the circumstances which will be described later in this section.

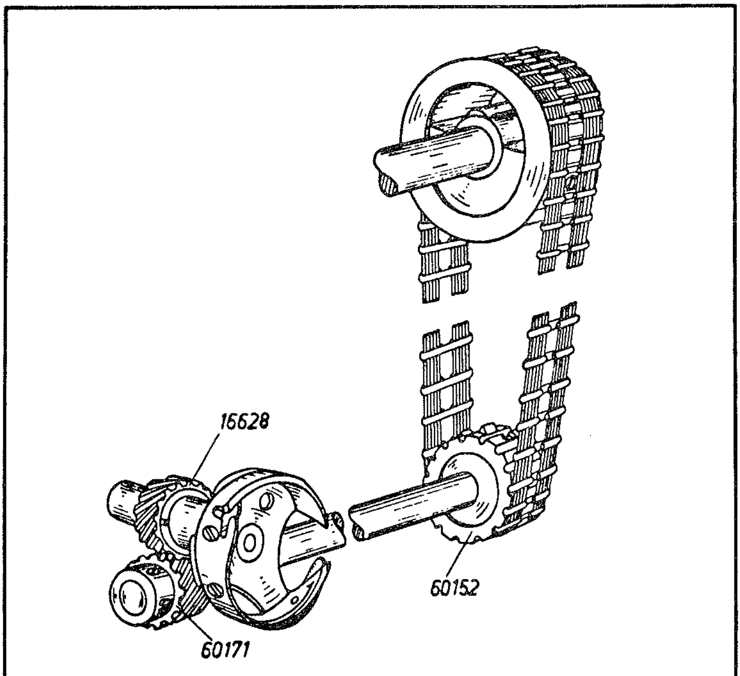


Fig. 4-32. To time the hook to the needle on the Pfaff 332, loosen the set screws in the lower timing sprocket and turn the shuttle. Be sure the sprocket does not move along the axis of the shuttle driving shaft.

To gain access to the timing sprocket in the lower mechanism, remove the grille below the balance wheel, move the idler bracket over from the belt, loosen the set screw on the rim of the motor pulley and remove the pulley. Pull it out with the clip belt mounted on it. Carefully tilt the machine back and unscrew the motor base plate, being sure not to lose the rubber washers. The plate with the motor on it can now be pulled over to the left and taken off. Next, disconnect the motor lead from the terminal and strip the cord clip inside the machine base. Then take out the four screws and remove the bottom plate. This will give you access to all the lower mechanisms.

When timing the hook, be sure that the sprocket does not move along the length of the hook driving shaft. When the timing is correct, tighten the screws on the lower timing sprocket and, after double checking the timing, reassemble all the disassembled parts.

When beginning to adjust the hook-needle timing, if you observe that the shuttle appears to have been forcibly moved, you should look at the position of the upper timing sprocket. The marking on the sprocket and the feed eccentric should be aligned. If necessary, loosen the set screws on the upper sprocket, make the alignment and then time the hook to the needle as described.

Adjusting Hook-Needle Clearance On Model 230

The procedure for adjusting the hook-needle clearance on Model 230 is the same as that for Models 260 and 262. Loosen the hook set screws and move the hook along the axis of its shaft until the clearance is 0.1mm. Then tighten the screws. When making this adjustment, be sure not to rotate the hook around its shaft because this would misadjust the timing.

Adjusting Needle-Bar Height On Models 230 and 332

Do not adjust the needle-bar height on the Pfaff 230 and 332 before the needle-hook timing has been correctly set because any previous adjustment errors cannot be traced and eliminated if the step sequence is changed.

To adjust the needle-bar height, insert a No. 80 needle, unscrew the needle plate and face cover and retain the threader bar frame in its top position with a piece of folded wrapping paper. Set the zig-zag button *D* for the widest zig-zag stitch and engage the needle position lever in the center notch. Then turn the balance wheel in the sewing direction until the point of the hook is exactly opposite the centerline of the needle when the latter descends on its left throw (Fig. 4-33). The needle-bar height is correct if the top of

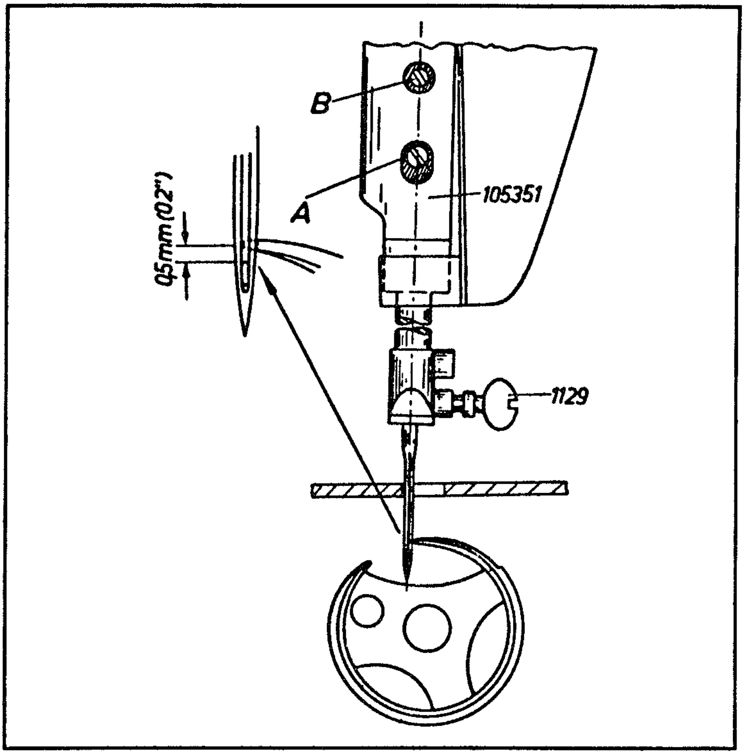


Fig. 4-33. Adjusting the needle-bar height on Pfaff Models 230 and 332.

the needle eye is .02 inch (0.5mm) below the point of the hook. To adjust, pass the screwdriver through the lower hole in the needle bar frame (105315), loosen the needle bar set screw *A* and move the needle bar up or down, as required. Then tighten the set screw *A* securely and replace the face plate.

Adjusting Hook-Needle Clearance On The Model 332

To set the hook-needle clearance on the Pfaff 332, gain access to the hook point exactly as for timing the hook to the needle-bar rise by removing the needle plate, etc. Remove screw 1019 which has a left-hand thread and add or remove spacers (60156) until the correct spacing is obtained (Fig. 4-34).

Equalizing Forward-Reverse Stitch On Models 230 And 332

Adjustment has been made at the factory to insure that the feed dog will be at a complete stand still when the stitch length lever 105251 (Fig. 4-35) is set at zero. Since the reverse stitch is chiefly used to tie off the end of a seam, a ratio of 9:10 between forward and

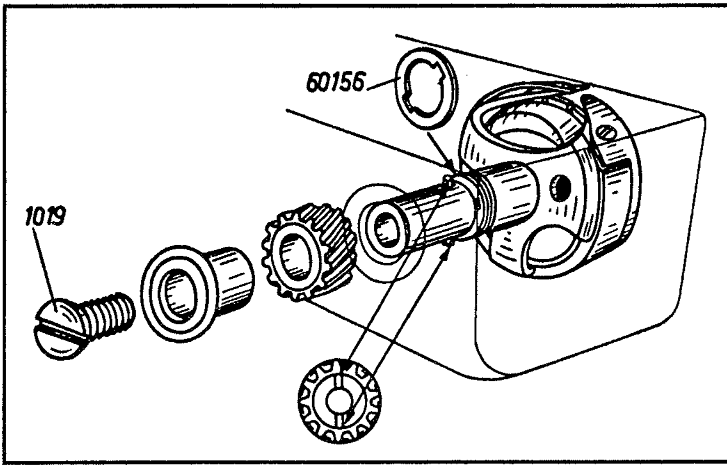


Fig. 4-34. Adjusting the hook-needle clearance on the Pfaff 332.

reverse stitches was found most practicable. If the machine were set to make stitches of the same length in either direction, the needle would most probably inure the seam when back-tacking. In those instances when it is important that forward and backward stitches are the same length (as in stitching leather), the appropriate adjustment can be made at any time. In this case, however, it is not possible to preserve the zero position of the feed dog and to set the length of the forward stitch by the scale.

Before making this adjustment, set both the stitch length lever (105251) and the stitch length limiting lever (105264) on zero, thereby locking the stitch length lever. Then remove the top cover and drop the feed dog. With a long screwdriver loosen screw *K* in member 105260, which is located in the vertical portion of the machine arm. Run the machine slowly and watch the feed dog. If adjustment is required, turn the member on the stitch regulator spindle until the feed dog moves neither forward nor backward. When this condition is met, securely tighten screw *K*.

The following procedure should be followed to achieve forward and reverse stitches of the same length. Set the stitch regulator lever for the stitch length most frequently used. Turn the stitch length limiting lever toward the stitch regulator lever as far as it will go. Then loosen screw *K* and adjust member 105260 until the machine makes forward and reverse stitches of the same length. Do not drop the feed dog for this adjustment. To check the stitch length, place a piece of thin cardboard of a slightly rough texture under the presser foot, let the machine make 10 forward stitches, flick the stitch

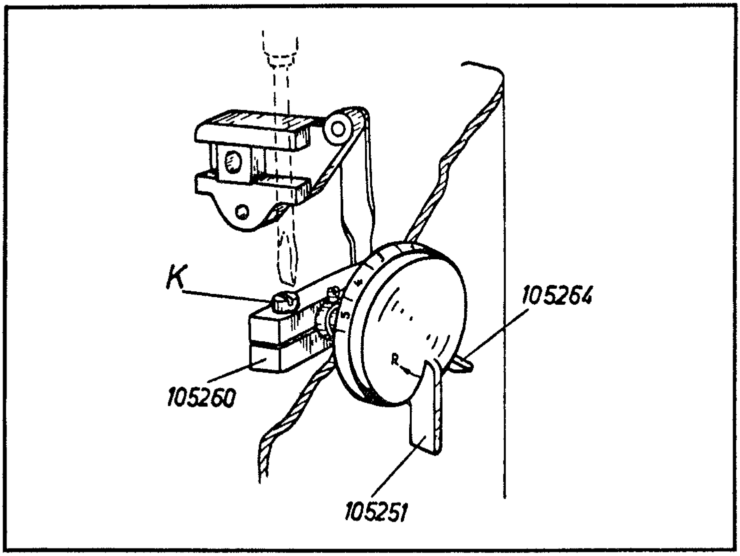


Fig. 4-35. Equalizing the forward-reverse stitches on Pfaff Models 230 and 332.

regulator lever over to the left and sew 10 stitches backward. The difference in the length between forward and reverse stitches indicates which way the member must be turned to obtain stitches of equal length.

Adjusting The Feed Dog On Models 230 And 332

Adjusting the feed dog in the feed slot involves adjusting the lateral position of the dog, and the end clearance of the dog. As

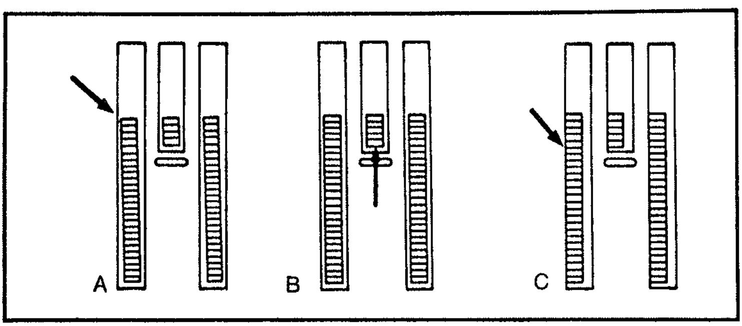


Fig. 4-36. Adjustments are incorporated in the Pfaff Models 230 and 332 to align the feed dog laterally in the feed slot (A); to center the feed dog in the slots (B); and to achieve the correct end clearance between the dog and the end of the slots (C).

some of these adjustments differ between Models 230 and 332, they will be described separately.

Adjusting for Lateral Alignment on Models 230 and 332. The feed dog should move freely and not bind against the edges of the feed slots. Refer to Fig. 4-36: If the feed dog sets obliquely in the slots, as shown in (Fig. 4-36A), loosen the set screws and align the dog so it is parallel with the edges of the slots. Tighten the set screws.

Centering in the Feed Slot On Model 230. On Model 230, if the feed dog is aligned in the slots, but rubbing against one side of the slots (Fig. 4-36C), correct as follows:

Loosen the set screws which hold the center pins in the feed driving shaft and tap on the shaft with the handle of a screwdriver until the feed dog is correctly centered in the slots. Before tightening the set screws, make sure that the flattened surfaces of the center pins point toward the screws and that the shaft has a sufficient amount of end play to insure proper lubrication. If the feed driving shaft is displaced, reset its rear crank and bring it in line with the feed driving connection so as to eliminate binding and noise.

Centering in the Feed Slot on Model 332. If the feed dog is not correctly centered on the Pfaff 332, the feed dog carrier 60221 (Fig. 4-37), rather than the feed driving shaft, has to be moved lengthwise. Remove the swing-out workplate, slacken both jam nuts (701664) and adjust the feed dog by turning both screws (700139) as required. Be sure to hold the screws steady when retightening the jam nuts. Make sure the feed dog carrier is permitted sufficient play to insure proper lubrication.

Adjusting Feed Dog End Clearance. While the adjustment for feed dog end clearance is essentially the same on both Model 230

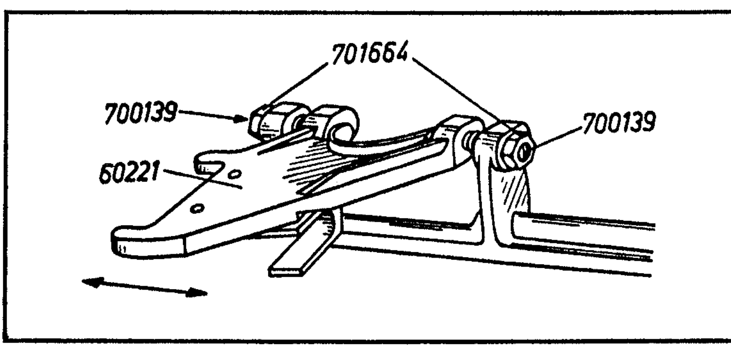


Fig. 4-37. On the Pfaff Model 332, the feed dog carrier can be moved in one direction or the other to center the feed dog in the feed dog slots.

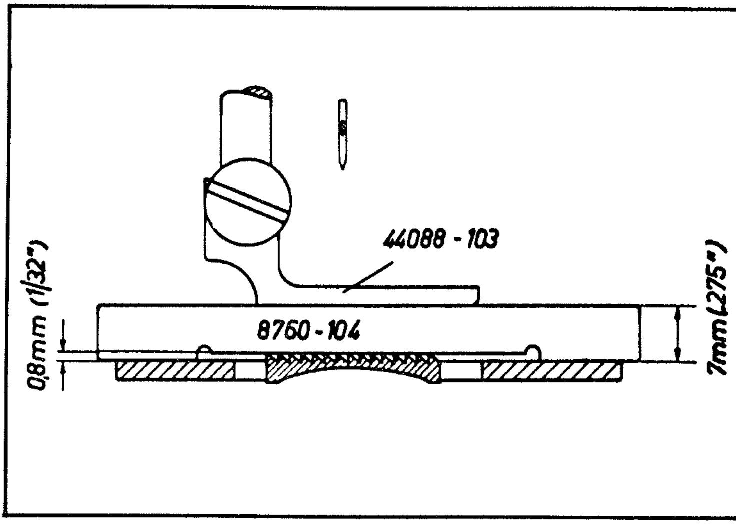


Fig. 4-38. Setting the presser bar height and feed dog height on the Pfaff Model 230. No. 8760-104 is a combination gauge used for this adjustment.

and 332, you must gain access to the adjustment point on Model 332 by removing the bottom plate.

To make the adjustment, set the machine for the longest forward stitch. Loosen the binding screw in the feed driving shaft crank and turn the crank on the shaft so that the feed dog will rise on its forward motion as close to the near edge of the feed slots as possible (Fig. 4-36B). Also make sure that the feed dog will strike neither the near nor far ends of the feed slots when set for the longest forward or reverse stitch.

Adjusting Presser Bar Height And Feed Dog Height On Model 230

In Fig. 4-38, the piece that is inserted between the presser foot and needle plate is the Pfaff gauge 106614-100-1.0 6.8. It is used for adjusting both the presser bar height and feed dog height. The thickness of the gauge is about 6.8mm which is the correct height of the presser foot above the needle plate when the presser bar is up. The gauge has a 0.8mm recess milled into its bottom side which provides the clearance to adjust the height of the feed dog teeth above the surface of the needle plate when the feed dog is at its highest position.

To adjust this, unscrew the face plate, secure the threader bar frame in the top position with a piece of cardboard, insert a new No. 80 needle, set the needle position lever in the center notch and set the zig-zag button at 0. Then raise the presser bar with the foot attached.

Loosen the set screw on the presser bar lifting collar and slightly push up on the presser bar to make room for the gauge. Place the gauge so the recess fits over the needle plate slots. Lower the presser bar until the foot touches the surface of the gauge just slightly, then retighten the set screw of the presser bar lifting collar. Lower the presser bar lifter, thus clamping the gauge into position between the foot and needle plate.

With the gauge still clamped into place between the foot and needle plate by the pressure of the presser bar, tilt the machine back and rotate the balance wheel to bring the feed dog to its highest position. When the feed dog is at its highest position, check to see that the teeth touch the underside of the gauge.

If adjustment is needed to achieve correct feed dog height, loosen the binding screw and slightly raise or lower the feed lifting shaft crank. When the adjustment is complete, tighten the binding screw, return the machine to an upright position and remove the gauge.

Adjusting Presser Bar Height and Feed Dog Height on Model 332

Using the gauge 106614-100 1.0 6.8, adjust the height of the presser bar just as instructed for the Model 230. If adjustment is needed to achieve the correct feed dog height, it must be made at the feed lifting shaft rear crank, rather than the front crank, since the set screw on the latter engages in a flat depression on the shaft. To gain access to the rear crank, remove the bottom plate.

Cleaning The Hook Race on Models 230 and 332

On Pfaff models that have only one gib screw, it is rarely necessary to remove the hook gib. If thread gets jammed in the hook race, in most cases all you need to do is loosen the hook gib screw, provided it can be easily reached, and turn the balance wheel back, or back and forth. This action should free the jammed thread.

In extreme cases, you may have to remove the gib screw and swing the hook gib out and pull it away. When replacing the gib, take care that its heel enters the small groove which is located immediately beneath the prong of the thread pull-off flange and that its bent-down round lug fits in the recess in the body of the hook. Then push its front end into position and screw it down. When inserting the gib screw it is advisible to cup your hand under the hook until the screw has taken hold.

To dismantle and clean the hook, take out the bobbin case cap with the bobbin and unthread the machine. Squirt ample cleaning fluid into the annular groove of the hook or the flange of the bobbin case base, raise the presser foot and run the machine for some time at varying speeds. Repeat this procedure until all lint and dust have been washed out of the hook. Then, re-oil the flange of the bobbin case base and sew off the excess oil on a piece of scrap fabric.

Dismantle the hook only if it is absolutely necessary. To do so, take out the needle, bobbin case cap with bobbin and the needle plate. Remove the hook gib, then rotate the hook until the first set screw in the thread pull-off flange in the sewing direction is exactly above the position slot in the rim of the bobbin case base. It is entered by the position finger.

When this position, grasp the center stud with your thumb and forefinger and tilt the base, out at the bottom. To remove pieces of thread or any other foreign matter from the base, use a pointed toothpick. Never use a metal tool.

Replace the bobbin case with the hook in position. Hold the base so that the position slots point upward, tilt it slightly, slip it in from below and push it into position without using force. If the bobbin case base should not readily slide into place, slightly turn the balance wheel back and forth.

Then screw on the hook gib as instructed in the beginning of this section. Before tightening the gib screw securely, by cautiously turning the balance wheel, check that the hook rotates easily without jamming. When the adjustment is completed, replace all the remaining parts.

Adjusting And Maintaining The Upper Tension Control On Models 230 And 332

For a view of the parts of this new type of upper tension control on Pfaff 230 and 332, refer to Fig. 4-39.

The tension bushing (105426) receives the tension stud (105435), plus the thread check spring (60009). The stud is held in position by screw 225 (Fig. 4-40). Recently a spring retainer ring (105429) has been added. It is slipped over the front edge of the bushing and held in position by a groove. This ring must be removed and screw 225 slackened before the tension stud and thread check spring can be taken off (as for replacing a broken thread check spring). There are three tension discs slipped onto the tension stud. The contact surface of the outer discs (2065) face disc (9157) in the middle. All three tension discs are enclosed in cup (105436), the finger of which should point upward and engage in the hole on the

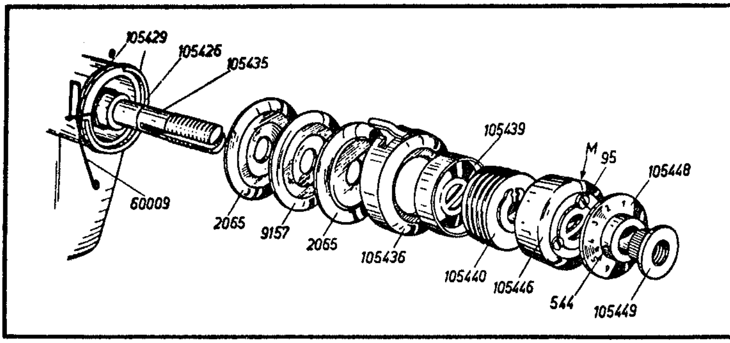


Fig. 4-39. The assembly of the new type tension control on the Pfaff Models 230 and 332. Read the instructions carefully to take advantage of all the adjustments incorporated in this mechanism.

front of the machine when the assembled tension mechanism is mounted. Next, tension release disc (105439) and spring stack (105440) are slipped on the stud with the open side of the disc and the snap ring side of the stack out. Next, place sleeve (105446) on the stud with the marking *M* up. To facilitate positioning the sleeve on this stud so that its mark will be exactly at the top, a disc with a center partition is secured to its face with three screws. While this partition enters the slit in the tension stud and holds the disc in position on the stud, the sleeve can be turned after loosening the three set screws. The high-headed screw (95) below the *M* marking serves as a stop for the small pin in the dial ring (105448). The last part to be placed on the tension nut (105449) on whose collar the dial ring is slipped and secured by screw (544).

To adjust the tension mechanism, mark *M* (Fig. 4-39) on the tension sleeve should be in the top position. This is necessary if the adjustment of the tension mechanism is to be correct. Since the sleeve can be correctly set only after the thread check spring has been adjusted *in accordance with the instructions in the section that follows*, it is recommended to set the tension at medium when checking the functioning of this spring.

The tension of the thread check spring must be adjusted before the thread tension mechanism can be adjusted. Its tension should be sufficient to return the spring to the end of the slot. The tension can be changed by turning the tension stud (105435) in the tension bushing (105426). Turn the stud to the left for more tension or turn it to the right for less tension. This adjustment not only requires dismantling the entire tension mechanism but also changes the position of the tension sleeve marking in relation to the tension stud.

When the above adjustments have been made, if the *M* marking is noticeably out of adjustment, loosen the set screw in the dial ring, unscrew the tension nut and take the dial off. Next, slacken the three screws in the tension sleeve (105446) and turn the sleeve so that its mark is at the top. Before you tighten the screws firmly, make certain that the sleeve will be correctly centered on the stud. After this adjustment, slip the dial on the collar of the tension nut and replace both on the stud.

The last adjustment which has to be made is to set the tension mechanism for the correct thread tension. Begin by lowering the presser bar lifter. Set the tension dial (105448) at 1, hold it in this position and turn the tension nut (105449) until a slight resistance has to be overcome when pulling a No. 40-50 thread through the tension discs. Lightly fasten set screw (544) in the dial, turn dial and tension nut to 0, and check whether the thread can be pulled through the tension discs without any tension. To meet both requirements, it may become necessary to repeat this adjustment several times. Then press the dial against the flange of the tension nut and tighten set screw (544) in the dial securely. By following this procedure, the turn of the dial will be limited exactly at 0 and 10.

Changing Thread Check Spring On Old Type Tension Mechanism

To change a broken thread check spring on the 230 and 332 with the old type tension mechanism, refer to Fig. 4-40.

Remove the top cover and loosen the set screw which holds the assembled tension mechanism in the machine and can be reached from above. Then the entire tension can be pulled forward out of the machine. Make certain that you do not lose the tension

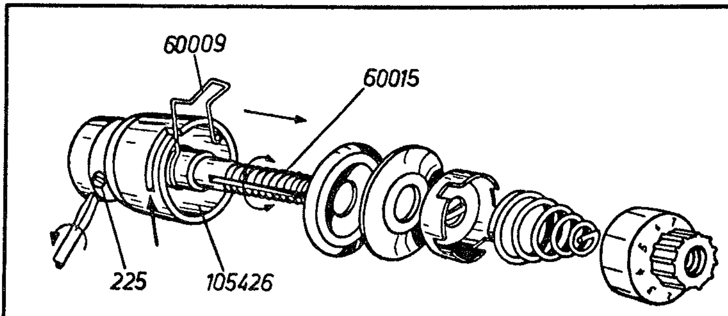
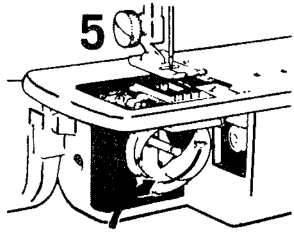


Fig. 4-40. This is the old type tension mechanism assembly of the Pfaff Models 230 and 332. Adjusting the tension of the thread check spring is important to optimum sewing results.

release plunger and pin. It is best to lower the presser bar first. Now loosen set screw (225) in the tension bushing (105426) and turn the tension stud (60015) so that the radial part of the thread check spring (60009) is opposite the slot in the tension bushing. When in this position, the tension stud, thread check spring and tension discs can be withdrawn. Now, remove the broken thread check spring from the assembly and insert a new one with its bent loop pointing toward the tension discs. Its short elbowed end is inserted into the hole which is provided for this purpose in the tension stud. From this point on, assemble the tension in the reverse sequence. However, before tightening the set screw in the tension bushing, turn the tension stud over to the left until the thread check spring rest just slightly against the end of the slot (note arrow in Fig. 4-40). When replacing the assembled tension mechanism into the machine, be sure the tension releasing pin that is activated by the presser bar lifter lever is inserted into the hollow tension stud. Lastly, tighten the set screw that secures the mechanism in the machine.

Adjustment And Repair Procedures For White Models With Oscillating Shuttles

5



All white sewing machines are manufactured in Japan, with U.S. Sales and service implemented through U.S. distributors and dealers. The U.S. address for White is White Sewing Machine Company, 1750 Berea Rd., Cleveland, Ohio 44111.

The White Models discussed in this chapter have oscillating shuttles. In addition to those models herein discussed that are designated by numbers, we will also discuss a general category of miscellaneous White Models, not herein designated by numbers. Therefore, watch the text headings carefully.

Models designated by numbers are as follows:

Models 764 and 769. For an exploded view of the Model 764 and accompanying parts list, see Fig. 5-1 and Table 5-1.

Models 782, 793, 804 and 970. For an exploded view of the Model 782, see Figs. 5-2 and 5-3. For an exploded view of the Models 804 and 793, see Figs. 5-4 and 5-5.

Model 960. For the location of the external controls of the Model 960, see Fig. 5-6. For a view of the mechanism under the top cover, see Fig. 5-7. For an exploded view of the 960 and accompanying parts list, see Fig. 5-8 and Table 5-2.

CORRECTING WAVERING STRAIGHT STITCHES

To be sure to which White Models the following procedures apply, *read the headings carefully*.

Miscellaneous White Models With The Oscillating Shuttles

Miscellaneous White oscillating shuttle machines can further be designated as either *side load* machines, or *front load* machines,

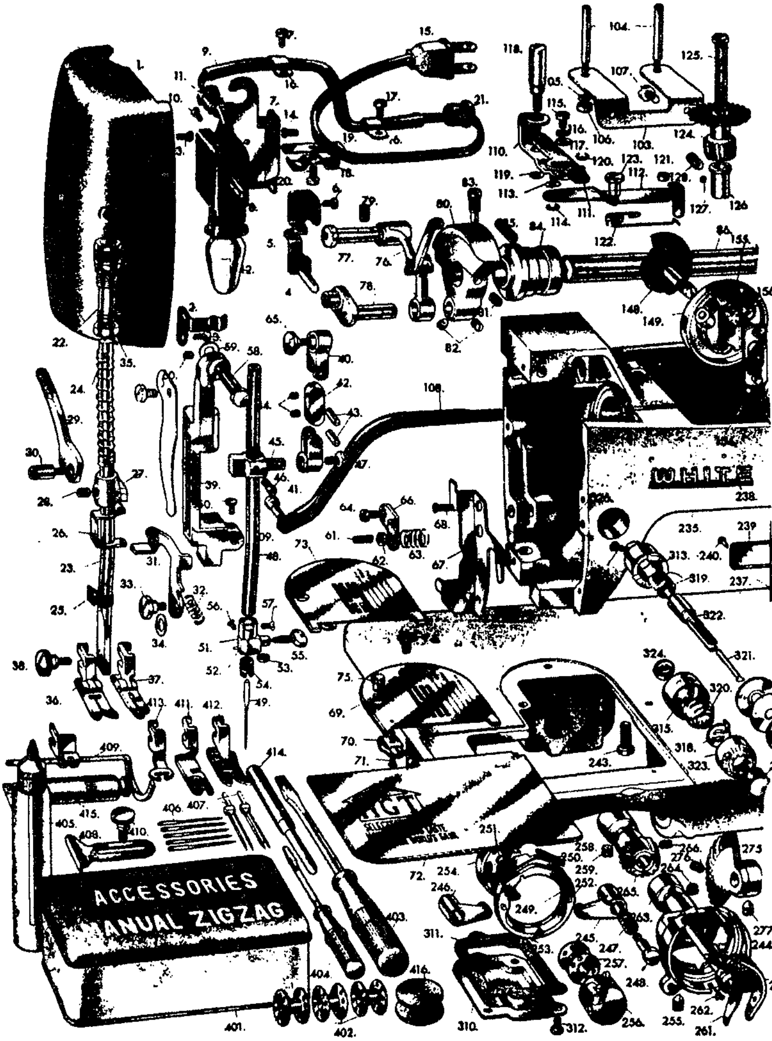


Fig. 5-1. An exploded view of White Model 764.

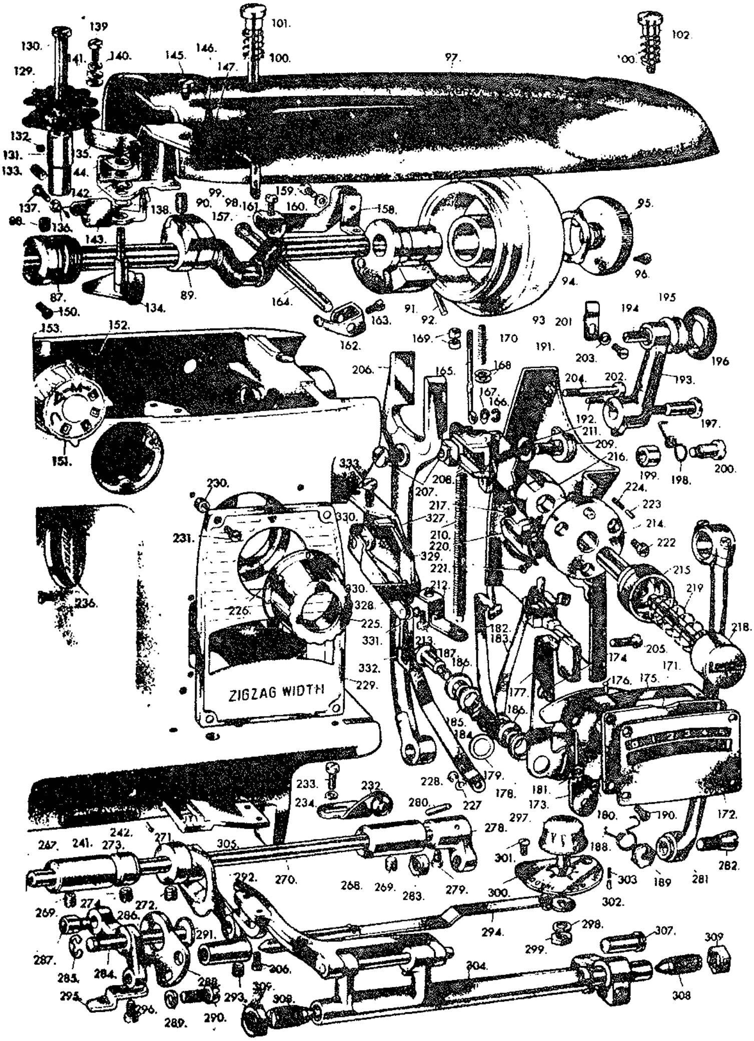

ZIGZAG WIDTH

Table 5-1. Parts List.

IDEN. NO.	PART NO.	PART NAME
1.	ZM5-102-PM	FACE PLATE ONLY
2.	ZM5-173	SET SPRING FOR FACE PLATE
3.	9540908-263	SET SCREWS (2) FOR ZM5-173 (2.)
4.	ZM5-9557	SWITCH BUTTON
5.	ZM5-9558	SPRING FOR ZM5-9557 (4.)
6.	9540908-263	SET SCREWS (2) FOR ZM5-9558 (5.)
7.	AZM5-170	FACE PLATE HINGE
8.	AH2R9501	LIGHT ASSEMBLY
9.	ZM5-9519	VINYL TUBE FOR CORD
10.	9540801-103	SET SCREWS (2) FOR LIGHT SOCKET
11.	H2R9538	CORD BUSHING FOR AZM5-170 (7.)
12.	HR9019	BULB
13.	9540908-263	SET SCREWS (2) FOR AZM5-170 (7.), FACE PLATE SIDE
14.	9560904-303	SET SCREWS (2) FOR AZM5-170 (7.), ARM SIDE
15.	AZA1-9525A	CONNECTOR
16.	ZP9523	SINGLE CORD CLAMPS (2)
17.	9530903-103	SET SCREWS (2) FOR ZP9523 (16.)
18.	HR9585	DOUBLE CORD CLAMP
19.	HR9586	INSURLATOR
20.	9531102-203	SET SCREW FOR HR9585 (18.)
21.	ZM9584A	CORD BUSHING (2)
22.	AHT161B	DARNER
23.	HC140	PRESSER BAR ONLY
24.	ZM1-141A	PRESSER BAR SPRING
25.	HA129	THREAD CUTTER
26.	ZM1-1471A	TENSION RELEASE BRACKET
27.	ZM1-143A	PRESSER BAR BRACKET
28.	9501501-256	SET SCREW FOR ZM1-143A (27.)
29.	HC1-145	PRESSER BAR LIFTER
30.	12G06	HINGED STUD FOR HC1-145 (29.)
31.	ZM1-147	TENSION RELEASE LEVER
32.	HC148	TENSION RELEASE SPRING
33.	12C05	HINGED SCREW FOR ZM1-147 (31.)
34.	HC149	ADJUSTING WASHER FOR ZM1-147 (31.)
35.	ZM1-160	COLLAR FOR AHT161B (22.)
36.	AZA1-156A	ZIGZAG SEWING FOOT
37.	AZ2A1-156	STRAIGHT SEWING FOOT
38.	09G01B	THUMB SCREW FOR SEWING FOOT
39.~47.	AZM5-150	NEEDLE BAR ARM. COMPLETE
39.	AZM5-150-①	NEEDLE BAR ARM
40.	AZM5-150-②	UPPER CRANK ROD
41.	AZM5-150-③	LOWER CRANK ROD
42.	AZM5-150-④	INTERMEDIATE CRANK ROD
43.	AZM5-150-⑤	JOINT PINS (2)
44.	AZM5-150-⑥	SET SCREWS (2) FOR AZM5-150-⑤ (43.)
45.	AZM5-150-⑦	NEEDLE BAR BRACKET
46.	AZM5-150-⑧	SET SCREW FOR AZM5-150-⑦ (45.)
47.	AZM5-150-⑨	SET SCREW FOR AZM5-150-③ (41.)
48.	ZM5-122	NEEDLE BAR ONLY
49.	HA9011	NEEDLE #14
50.	9540911-243	SET SCREW FOR ZM1-636A (109.)
51.~57.	2AZM5-127	NEEDLE CLIP, COMPLETE
51.	ZM5-127	NEEDLE CLIP BODY
52.	ZM5-128	THREAD GUIDE FOR ZM5-127 (51.)
53.	ZM5-183	STOP WASHER FOR NEEDLE
54.	ZM5-129	SET PLUG FOR NEEDLE
55.	09G24	SET SCREW FOR NEEDLE
56.	9560501-101	SET SCREW FOR ZM5-129 (54.)
57.	9560801-102	SET SCREW FOR ZM5-127 (51.)
58.	ZG747	HINGED STUD FOR ZM5-150 (39.)
59.	Z16B1	ADJUSTING WASHERS (2) FOR AZM5-150-① (39.)
60.	9501204-263	SET SCREW FOR ZG747 (58.)
61.	9500902-276	STOP SCREW FOR AZM5-150-① (39.)
62.	9440092-203	LOCK NUT FOR 9500902-275 (61.)
63.	ZM5-155A	SPRING FOR AZM5-150-① (39.)
64.	9540908-263	SET SCREW FOR ZM5-1551 (66.)
65.	09G03A	SET SCREW FOR AZM5-150-② (40.)
66.	ZM5-1551	HOLDER FOR 9500902-266 (61.)
67.	AZM5-108A	THREAD GUIDE PLATE FOR ARM FRONT END
68.	9500904-302	SET SCREW FOR AZM5-108A (67.)
69.~71.	AZA4-1351C	NEEDLE PLATE, COMPLETE (ZIGZAG SEWING)
69.	ZA4-1351C	NEEDLE PLATE ONLY
70.	HC138A	SPRING FOR ZA4-1351C (69.)
71.	9540801-103	SET SCREW FOR HC138A (70.)
72.	AZM5-137	SHUTTLE RACE COVER PLATE
73.	AZA4-1352C	NEEDLE PLATE, COMPLETE (STRAIGHT SEWING)

IDEN. NO.	PART NO.	PART NAME
74.	ZA1-134	GUIDE PIN FOR NEEDLE PLATE
75.	9561101-262	SET SCREW FOR NEEDLE PLATE (69, 73)
76.	2AHC211D	TAKE UP LEVER, COMPLETE
77.	HC217A	HINGED STUD FOR 2AHC211D (76.)
78.	ZM1-218A	NEEDLE BAR CRANK
79.	9501504-243	SET SCREW FOR HC217A (77.)
80.	ZM1-209	TAKE UP LEVER CRANK
81.	9501509-276	SET SCREW FOR ZM1-209 (80.), SMALL
82.	9501501-256	SET SCREWS (2) FOR ZM1-218A (78.)
83.	15A01A	SET SCREW FOR ZM1-209 (80.), LARGE
84.	HC202B	TOP SHAFT FRONT BUSHING
85.	9501503-276	SET SCREW FOR HC202B (84.)
86.	ZM1-201A	TOP SHAFT ONLY
87.	ZM5-601	ZIGZAG DRIVE GEAR
88.	9501501-256	SET SCREWS (2) FOR ZM5-601 (87.)
89.	HA401A	FEED CAM
90.	9501502-256	SET SCREW FOR HA401A (89.)
91.	AZA2-205	TOP SHAFT REAR BUSHING
92.	HA207	TAPERED PIN FOR AZA2-205 (91.)
93.	ZA4-2041-PM	HAND WHEEL
94.	HA206A	STOP MOTION WASHER
95.	36G01B	STOP MOTION
96.	09A04	STOP MOTION SCREW
97.	ZM5-050A-PM	ARM COVER PLATE
98.	HR018A	THREAD GUIDE WITH THREE HOLES
99.	9500901-116	SET SCREW FOR HR018A (98.)
100.	HC1-079B	CUSHION SPRINGS (2) FOR ZM5-050A-PM (97.)
101.	15C19B	SET SCREW FOR ZM5-050A-PM (97.) LONG
102.	15C16A	SET SCREW FOR ZM5-050A-PM (97.), SHORT
103.	ZM5-021-PM	SPOOL PIN HOLDER
104.	HA008	SPOOL PINS (2)
105.	BA363-1	WASHERS (2) FOR HA008 (104.)
106.	9440111-103	NUTS (2) FOR HA008 (104.)
107.	9541213-103	SET SCREWS (2) FOR ZA5-021-PM (103.)
108.	ZA5-634	ZIGZAG DRIVE ROD
109.	ZM1-636A	PIN FOR ZA5-634 (108.)
110.	AZM5-639	HOLDER FOR AZM5-652 (111.)
111.	AZM5-652	ZIGZAG DRIVE ROD RELAY NEEDLE BAR ARM
112.	AZM5-657A	ZIGZAG DRIVE ROD RELAY AZM5-639 (110.)
113.	HC422	SPRING WASHER FOR ZA5-657A (112.)
114.	ZM1-4E5	SNAP RING FOR ZA5-657A (112.)
115.	9541104-243	SET SCREW FOR AZM5-652 (111.)
116.	9140400-108	SPRING WASHER FOR 9541104-243 (115.)
117.	ZA2-019A	WASHER FOR 9541104-243 (115.)
118.	ZM5-664	ZIGZAG DRIVE RODS SHAFT
119.	HC149	ADJUSTING WASHER FOR ZM5-664 (118.)
120.	ZM1-4E5	SNAP RING FOR ZA5-634 (108.)
121.	ZM1-627	ROLLER FOR AZM5-657A (112.)
122.	ZM5-669	SPRING FOR AZM5-657A (112.)
123.	11C19	RETAINING SCREW FOR ZM5-669 (122.)
124.	AZM5-730A	ZIGZAG RELAY GEAR
125.	ZM5-732	SHAFT FOR AZM5-730A (124.)
126.	ZA609B	BUSHING FOR ZM5-732 (125.)
127.	9501205-276	SET SCREW FOR ZM5-732 (125.)
128.	9501505-376	SET SCREW FOR ZA609B (126.)
129.	AZM5-600B	DECORATIVE STITCH CAM
130.	ZM5-608	SHAFT FOR AZM5-600B (129.)
131.	ZM5-609A	BUSHING FOR ZM5-608 (130.)
132.	9501205-276	SET SCREW FOR ZM5-608 (130.)
133.	9501505-376	SET SCREW FOR ZM5-609 (131.)
134.	ZM5-613A	ZIGZAG WIDTH REGULATOR BODY
135.	ZM5-6R0A	SELECTING FINGER FOR DECORATIVE STITCH CAM
136.	ZM5-6R3	SPRING FOR ZM5-6R0A (135.)
137.	08C01	RETAINING SCREW FOR ZM5-6R3 (136.)
138.	HC149	ADJUSTING WASHERS (3) FOR ZM5-6R0A (135.)
139.	9531102-203	SET SCREW FOR ZM5-613A (134.)
140.	9140400-108	SPRING WASHER FOR 9531102-203 (139.)

IDEN. NO.	PART NO.
141.	ZA2-019A
142.	ZM1-644
143.	AZM5-6R1C
144.	ZM5-614A
145.	11C20
146.	9531102-203
147.	ZA2-019A
148.	ZM5-6E4C
149.	ZM5-6S0C
150.	9540903-243
151.	AZM5-6M1B
152.	9501203-276
153.~156.	AZM5-653
153.	ZM5-653
154.	ZM1-4E3
155.	ZM1-4E5
156.	ZM5-6S1
157.	ZM5-4E0
158.	ZM5-4E6A
159.	9541104-243
160.	ZA2-019A
161.	9541207-263
162.	ZM5-4E7
163.	9541207-263
164.	ZM5-4E8
165.	ZM5-4E1
166.	ZM1-4E5
167.	HC422
168.	ZM1-624
169.	9440062-103
170.	ZM5-4E2
171.	ZM1-680
172.	ZM5-683
173.	ZM5-6801
174.	9561101-263
175.	ZM1-681
176.	ZM1-682
177.	AZM5-638
178.	AZM1-631
179.	ZM1-656
180.	9541104-256
181.	BA363-1
182.	ZM1-6991A
183.	ZM1-6992A
184.	ZA2-404
185.	ZL770A
186.	ZM1-6D1
187.	12C25
188.	ZM5-641A
189.	12M01
190.	9560904-303
191.	ZM5-060A-PM
192.	9540902-243
193.	ZM5-503-PM
194.	AHR506
195.	HA508
196.	HC1-509
197.	11C09B
198.	HR505A
199.	HR5051A
200.	11C10C
201.	HR510C
202.	9541104-242
203.	BA363-1
204.	9541211-102
205.	9541204-102
206.	ZM1-402
207.	AHA1-451

PART NAME
WASHERS (2) FOR 9531102-203 (139.)
SNAP RING FOR ZM5-6R0A (135.)
CONTACT FINGER FOR DECORATIVE STITCH CAM
HOLDER FOR ZM5-613A (134.)
SET SCREW FOR ZM5-614A (144.) LARGE
SET SCREW FOR ZM5-614A (144.) SMALL
WASHER FOR 9531102-203 (146.)
DECORATIVE STITCH CHANGE CAM
HOUSING FOR DECORATIVE STITCH CHANGE KNOB
SET SCREWS (3) FOR ZM5-650C (149.)
DECORATIVE STITCH CHANGE KNOB
SET SCREWS (2) FOR AZM5-6M1A (151.)
CLICK STOP PLATE, COMPLETE
CLICK STOP PLATE
PINS (2) FOR ZM5-653 (153.)
SNAP RING FOR ZM5-651 (156.)
SPRING FOR ZM5-653 (153.)
AUTOMATIC FEED CONNECTING ROD "A"
AUTOMATIC FEED CONNECTING ROD "B"
SET SCREW FOR ZM5-4E6A (158.)
WASHER FOR 9541104-243 (159.)
SET SCREW FOR ZM5-4E0 (157.)
AUTOMATIC FEED CONTACT FINGER
SET SCREW FOR ZM5-4E7 (162.)
SHAFT FOR AUTOMATIC FEED CONNECTING ROD
AUTOMATIC FEED ROD
SNAP RING FOR ZM5-4E1 (165.)
SPRING WASHER FOR ZM5-4E1 (165.)
WASHERS (2) FOR ZM5-4E1 (165.)
LOCK NUTS (2) FOR ZM5-4E1 (165.)
SPRING FOR ZM5-4E1 (165.)
ZIGZAG STITCH REGULATOR PLATE
INDICATING PLATE FOR ZM1-680 (171.)
SUPPORT FOR AZM5-638 (177.)
SET SCREWS (2) FOR ZM5-6801 (173.)
LIMITER STOP PLATE
RIVETS (2) FOR ZM1-681 (175.)
ZIGZAG STITCH REGULATING LEVER
ZIGZAG STITCH REGULATING ARM
ADJUSTING WASHERS (2) FOR AZM1-631 (179.)
SET SCREW FOR AZM1-631 (178.)
WASHER FOR 9541104-256 (180.)
LIMITER ARM LEFT
LIMITER ARM RIGHT
LIMITER ARM SPRING WASHER
LIMITER ARM WASHER
BUSHINGS (2) FOR 12C25 (187.)
SHAFT FOR AZM1-631 (178.)
SPRING FOR AZM1-631 (178.)
NUT FOR 12C25 (187.)
SET SCREWS (4) FOR ZM1-680 (171.)
MOTER COVER PLATE
STOPPER SCREW FOR ZM5-503 (193.)
BOBBIN WINDER FRAME
BOBBIN WINDER SHAFT, COMPLETE
BOBBIN WINDER WHEEL
BOBBIN WINDER RUBBER RING
HINGED STUD FOR ZM5-503-PM (193.)
BOBBIN WINDER SPRING
RETAINING PIECE FOR HR505A (198.)
SET SCREW FOR HR505A (198.)
BOBBIN WINDER LIMITER
SET SCREW FOR HR510C (201.)
WASHER FOR HR510C (201.)
SET SCREW FOR ZM5-060A-PM (191.), LONG
SET SCREW FOR ZM5-060A-PM (191.), SHORT
FEED FORK ONLY
SLIDING BLOCK & SHAFT

IDEN. NO.	PART NO.	PART NAME
208.	AZM1-403	FEED REGULATOR, COMPLETE
209.	AZM5-4B3	HINGED PIN FOR AZM1-403 (208.)
210.	ZM1-4B2A	FEED REGULATOR SPRING
211.	HA407A	ADJUSTING WASHER FOR AZM1-403 (206.)
212.	HL4B1	SPRING RETAINER
213.	9541104-256	SET SCREW FOR HL4B1 (212.)
214.	AZM5-439	HOUSING FOR STITCH REGULATOR
215.	ZM5-4H2	BUSHING FOR REVERSE PLUNGER
216.	HR437	STITCH REGULATING CAM
217.	9501203-276	SET SCREW FOR HR437 (216.)
218.	AZM5-4H0	REVERSE PLUNGER
219.	HR4H3	SPRING FOR AZM5-4H0 (218.)
220.	HR4H4B	GUIDE PLATE FOR AZM5-4H0 (218.)
221.	9540801-103	SET SCREWS (2) FOR HR4H4B (220.)
222.	9540908-263	SET SCREWS (3) FOR AZM5-439 (214.)
223.	HT472A	STOP PIN FOR HR4432D (225.)
224.	HT473B	SPRING FOR HT472A (223.)
225.	HR4432D	STITCH REGULATOR KNOB
226.	9501201-243	SET SCREW FOR HR4432D (225.)
227.	HC422	SPRING WASHER FOR ZM5-665 (332.)
228.	ZM1-4E5	SNAP RING FOR ZM5-665 (332.)
229.	ZM5-684	EMBLEM FOR STITCH & ZIGZAG REGULATOR
230.	ZM5-655	SPACERS (4) FOR ZM5-684 (229.)
231.	9540909-102	SET SCREWS (4) FOR ZM5-684 (229.)
232.	AZM5-516	BOBBIN WINDER BASE THREAD GUIDE, COMPLETE
233.	9540903-242	SET SCREW FOR AZM5-516 (232.)
234.	HA520A	WASHER FOR 9540903-242 (233.)
235.	AZM5-002D-PM	ARM BED ASSEMBLY
236.	ZM5-061-PM	VENTILATION PLATE
237.	9540917-102	SET SCREWS (2) FOR ZM5-061-PM (236.)
238.	HRN003	NAME PLATE
239.	HRM001E	MEDALLION
240.	HA011	RIVETS (2) FOR MEDALLION
241.	ZM5X001	MACHINE SERIAL NUMBERS PLATE
242.	HA011	RIVETS (2) FOR ZM5X001 (241.)
243.	9531501-256	SET SCREWS (2) FOR BED HINGE
244.~253.	2AZA4-303A	RACE ASSEMBLY
244.	2AZA4-303A-①	RACE BODY
245.	2AZA4-303A-②	PUSHER LEVER, RIGHT
246.	2AZA4-303A-③	PUSHER LEVER, LEFT
247.	2AZA4-303A-④	PUSHER SPRINGS (2)
248.	2AZA4-303A-⑤	SET SCREWS (2) FOR PUSHER LEVER
249.	2AZA4-303A-⑥	RACE FRONT
250.	2AZA4-303A-⑦	TOP SPRING FOR 2AZA4-303A-⑥ (249.)
251.	2AZA4-303A-⑧	SET SCREWS (2) FOR 2AZA4-303A-⑦ (250.)
252.	2AZA4-303A-⑨	STOP PINS (2) FOR PUSHER LEVER
253.	2AZA4-303A-⑩	STOPPER FOR 2AZA4-303A-⑥ (249.)
254.	ZA1-308A	HOOK
255.	9501507-256	SET SCREW FOR 2AZA4-303A-① (244.)
256.	AZA1-313A	BOBBIN CASE, COMPLETE
257.	AHA323	BOBBIN
258.	ZM1-3A1	DRIVER SHAFT BUSHING
259.	9501504-243	SET SCREW FOR ZM1-3A1 (258.)
260.~262.	2AZM1-310	DRIVER, COMPLETE
260.	AZM1-310	DRIVER
261.	HA311	DRIVER SPRING
262.	06D01	SET SCREWS (2) FOR HA311 (261.)
263.	ZE378D	DRIVER SHAFT COLLAR
264.	9501501-256	SET SCREWS (2) FOR ZE378D (263.)
265.	ZM1-371A	DRIVER SHAFT GEAR
266.	9501204-263	SET SCREWS (2) FOR ZM1-371A (265.)
267.	ZM1-3A4	LOWER SHAFT FRONT BUSHING
268.	ZM1-3A5	LOWER SHAFT REAR BUSHING
269.	9501504-243	SET SCREWS (2) FOR LOWER SHAFT BUSHING
270.	ZM1-370A	LOWER SHAFT ONLY
271.	ZM1-459	FEED LIFTING CAM
272.	9501602-276	SET SCREWS (2) FOR ZM1-459 (271.)
273.	HC1-378B	LOWER SHAFT COLLAR
274.	9501508-276	SET SCREWS (2) FOR HC1-378B (273.)
275.	ZM1-372	LOWER SHAFT GEAR
276.	9501501-256	SET SCREW FOR ZM1-372 (275.)
277.	9501507-256	SET SCREW FOR ZM1-372 (275.)
278.	ZM1-3A2A	LOWER SHAFT CRANK
279.	9531103-243	SET SCREW FOR ZM1-3A2A (278.)
280.	HA330	TAPERED PIN FOR ZM1-3A2A (278.)

IDEN. NO.	PART NO.	PART NAME
281.	AZM5-334	CRANK ROD, COMPLETE
282.	18G01	JOINT SCREW FOR AZM5-334 (281.)
283.	9410182-204	NUT FOR 18G01 (282.)
284.	ZM1-410	FEED LIFTING SHAFT ONLY
285.	ZM1-414	SNAP RING FOR ZM1-410 (284.)
286.	ZM1-412B	FEED LIFTING ARM
287.	AHA413A	ROLLER FOR ZM1-412B (286.)
288.	ZM1-418	FEED LIFTING PLATE
289.	TA529	WASHER FOR 9541602-107 (290.)
290.	9541602-107	SET SCREW FOR ZM1-418 (288.)
291.	ZM1-424	SPRING FOR ZM1-412B (286.)
292.	ZM1-411	FEED LIFTING FORK
293.	9501506-263	SET SCREW FOR ZM1-411 (292.)
294.	AZM1-419	FEED LIFTING REGULATOR, COMPLETE
295.	ZM1-416	STOPPER FOR ZM1-418 (288.)
296.	9540916-103	SET SCREW FOR ZM1-416 (295.
297.	AZA4-427	FEED LIFTING REGULATOR KNOB
298.	HC409	WASHER FOR AZA4-427 (297.)
299.	9440111-103	NUT FOR AZA4-427 (297.)
300.	ZM5-490	INDICATING PLATE FOR AZA4-427 (297.)
301.	9560903-102	SET SCREWS (2) FOR ZM5-490 (300.
302.	HC492	STOP PIN FOR AZA4-427 (297.)
303.	HC493B	SPRING FOR HC492 (302.)
304.	AZM1-430C	FEED ROCK SHAFT, COMPLETE
305.	ZM1-450A	FEED DOG
306.	9530801-263	SET SCREWS (2) FOR FEED DOG
307.	HA4311	HINGED PIN FOR FEED ROCK ARM
308.	24G02A	SCREW CENTERS (2)
309.	9430241-104	NUTS (2) FOR 24G02A (308.)
310.	ZM1-235	GEAR CASE COVER PLATE
311.	ZM1-238	PACKING FOR ZM1-235 (310.)
312.	9540908-263	SET SCREWS (3) FOR ZM1-235 (310.)
313.~325.	2AZM5-109-PM	DIAL TENSION ASSEMBLY
313.	ZA2-109A	TENSION BARREL
314.	9540910-256	SET SCREW FOR ZA2-117 (322.)
315.	ZM5-118-PM	TENSION SUB DIAL
316.	ZA2-111	TENSION DISCS (2)
317.	ZA1-1D3	TENSION WASHER
318.	ZA2-112	STOPPER FOR ZA5-119-PM (323.)
319.	ZA2-113A	CHECK SPRING
320.	ZA2-114	BEEHIVE TENSION SPRING
321.	HC115	TENSION RELEASE PIN
322.	ZA2-117	TENSION STUD
323.	ZM5-119-PM	TENSION DIAL
324.	ZA2-121	STOPPER FOR ZM5-118-PM (315.
325.	A16M11	KNURLED KNOB FOR TENSION
326.	9501203-276	SET SCREW FOR ZA2-109A (313.)
327.~333.	AZM5-6A1A	ZIGZAG REGULATING ROD RELAY MECHANISM, COMPLETE
327.	ZM5-6A1	RELAY MECHANISM SUPPORT
328.	AZM5-6A2	RELAY FORK
329.	ZM5-6A3A	RELAY ARM
330.	ZB1-723	RELAY ARM SHAFT
331.	ZM1-4E5	SNAP RING FOR ZM5-6A3A (329.)
332.	ZM5-665	ZIGZAG REGULATING ROD
333.	9531102-203	SET SCREWS (2) FOR ZM5-6A1 (327.)
401.	ZA4-9001	ACCESSORY BOX
402.	AHA323	BOBBINS (3)
403.	HR9005A	SCREW DRIVER, LARGE
404.	HR9006A	SCREW DRIVER, SMALL
405.	2AZL9007A	TUBED OILER
406.	AZA9015	NEEDLES #11 (2), #14 (2) & #16 (1)
407.	AZA4-9015A	TWIN NEEDLES (2)
408.	HA9008	CLOTH GUIDE
409.	AZA9029	QUILTING FOOT
410.	09G01B	THUMB SCREW FOR CLOTH GUIDE
411.	AZE9017	HEMMER FOOT
412.	AZM5-9026A	BUTTONHOLE FOOT
413.	AZA9027	BUTTON SEWING FOOT
414.	AZA9032B	BUTTONHOLE CUTTER
415.	AHC1-9009B	TUBED GREESE
416.	ZL009	SPOOL PIN FELT WASHERS (2)

Table 5-2. Parts List.

REF. NO.	PART NO.	PART NAME AND/OR DESCRIPTION
1	1271101 100 C	ARM BED COMPLETE
2	9531501 256	SET SCREW FOR ARM TOP SHAFT BUSHING
3	1110101 137	SET PIN FOR SERIAL NUMBER PLATE
4	1271101 311	ARM TOP COVER COMPLETE
5	1210102 171 C	THREAD GUIDE WITH TWO HOLES, ARM TOP COVER
6	9540903 242	SET SCREW FOR THREAD GUIDE (5)
7	1230702 650 D	BOBBIN WINDER CAM COMPLETE
8	1230702 626	BOBBIN WINDER LIMITER
9	9030100 103	ADJUSTING WASHER FOR BOBBIN WINDER LIMITER (8)
10	9540901 103	SET SCREW FOR BOBBIN WINDER LIMITER
11	1230702 645 B	BOBBIN WINDER PUSHING LEVER
12	1271002 620 A	BOBBIN WINDER SHAFT WITH ARM
12A	1271002 630	BOBBIN WINDER WHEEL COMPLETE
12B	1230702 632 B	BOBBIN WINDER RING
13	1230702 646 B	SPRING FOR BOBBIN WINDER ARM (12)
14	9015500 008 C	HINGED SET SCREW FOR BOBBIN WINDER ARM (12)
15	9030100 028	ADJUSTING WASHER FOR BOBBIN WINDER ARM SET SCREW (14)
16	1230702 648	BOBBIN WINDER PUSHING LEVER KNOB
17	1230702 649	BOBBIN WINDER CAM SPRING RETAINER
18	9030100 024	WASHER FOR SPRING RETAINER SET SCREW (19)
19	9540908 279	SET SCREW FOR SPRING RETAINER (17)
20	1230702 647	BOBBIN WINDER CAM SPRING
21	1271002 611	BOBBIN WINDER COVER COMPLETE
22	1230702 612 A	BOBBIN WINDER COVER HINGE
23	1230702 613 A	BOBBIN WINDER COVER HINGE PIN
24	9540916 119	SET SCREW FOR BOBBIN WINDER COVER
25	1271002 680	BOBBIN WINDER COVER THREAD GUIDE COMPLETE
26	9030300 004	WAVE WASHER FOR BOBBIN WINDER THREAD GUIDE (25)
27	9015500 061	SET SCREW FOR THREAD GUIDE
28	1230702 614 B	BOBBIN WINDER COVER HINGE SPRING
29	9440093 119	NUT FOR BOBBIN WINDER COVER HINGE SPRING (28)
30	9531202 119	SET SCREW FOR ARM TOP COVER
31	1271001 321	FACE PLATE COMPLETE
32	1271008 172	SPRING FOR SWITCH BUTTON
33	1230708 173 A	LIGHT SWITCH BUTTON
34	1230701 325 B	SET SPRING FOR FACE PLATE (31)
35	1271002 120 B	THREAD TENSION COMPLETE
36	9501204 279	SET SCREW FOR THREAD TENSION (35)
37	1260902 180 A	SPOOL PIN AND BASE
38	9541213 119	SET SCREW FOR SPOOL PIN AND BASE (37)
39	1230702 171	THREAD GUIDE
40	1230702 172 A	THREAD GUIDE
41	1270302 330 J	NEEDLE BAR ARM COMPLETE
42	9540911 259	SET SCREW FOR JOINT PIN (171)
43	1260202 340 A	NEEDLE CLAMP
44	1230702 316	NEEDLE BAR THREAD GUIDE
45	9013400 002	SET SCREW FOR NEEDLE BAR THREAD GUIDE
46	1110102 442	NEEDLE # 14
47	1230702 332 A	HINGED STUD FOR NEEDLE BAR ARM (41)
48	9030100 002	ADJUSTING WASHER FOR NEEDLE BAR ARM HINGED STUD (47)
49	9080200 002	STOP RING FOR CRANK PIN
50	1220602 335	SPRING FOR NEEDLE BAR BRACKET
51	9011300 003 B	SCREW FOR CRANK PIN
52	1260301 051 A	NEEDLE PLATE COMPLETE
53	1260301 520	SLIDE PLATE COMPLETE
53A	1260201 522	SPRING FOR SLIDE PLATE
53B	9540601 119	SET SCREW FOR SLIDE PLATE SPRING
54	9541103 102	SET SCREW FOR NEEDLE PLATE
55	9531107 242	SET SCREW (3) FOR NEEDLE PLATE
56	1260301 503 A	NEEDLE PLATE FOR STRAIGHT SEWING COMPLETE
57	1120202 361	PRESSER BAR
58	1260202 306 B	NEEDLE BAR BRACKET COMPLETE
59	1260202 396 B	TENSION RELEASE BRACKET
60	1110102 362 B	PRESSER BAR SPRING
61	1110102 360 C	DARNER COMPLETE
62	1120202 366	PRESSER BAR LIFTER
63	1260202 367	PIN FOR PRESSER BAR LIFTER
64	1260202 391 C	TENSION RELEASE BRACKET
66	9015500 021	HINGED STUD FOR PRESSER BAR LIFTER
67	1110102 365	THREAD CUTTER
68	1110101 142 A	SET SCREW FOR PRESSER FOOT
69	1210602 370 D	FOOT FOR ZIGZAG SEWING
70	1230703 111	ARM TOP SHAFT
71	1110104 150 B	FEED CAM
72	1271105 103	ZIGZAG DRIVE GEAR
72A	9501501 256	SET SCREW FOR ZIGZAG DRIVE GEAR (72)
73	1271105 236 A	ZIGZAG DRIVE GEAR COLLAR
74	1270303 105 B	ARM TOP SHAFT COLLAR COMPLETE
75	1230703 112	ARM SHAFT BUSHING
76	1230703 130 E	TAKE UP LEVER CRANK COMPLETE
76A	9501509 276	SET SCREW FOR CRANK (76)
77	1270303 113 A	SPRING PIN FOR THREAD TAKE UP LEVER CRANK
78	9531501 256	SET SCREW FOR ARM TOP SHAFT BUSHING
79	1230703 160 A	BALANCE WHEEL BUSHING COMPLETE
80	1261203 113	SPRING PIN (LARGE) FOR BALANCE WHEEL BUSHING (79)
81	1270605 147	HOLE COVER
82	1271003 151 B	BALANCE WHEEL
83	1110103 155 A	STOP MOTION WASHER
84	1110100 106 B	STOP MOTION COMPLETE
84A	9013400 003	SET SCREW FOR STOP MOTION (84)
85	1230702 041 J	THREAD TAKE UP LEVER COMPLETE
86	9080200 001	SNAP RING FOR THREAD TAKE UP LEVER SUPPORT (85)
87	9531501 256	SET SCREW FOR TAKE UP LEVER SUPPORT HINGED STUD (85)
88	1210603 051 F	SHUTTLE RACE COMPLETE
89	1210603 532 B	SHUTTLE HOOK
90	9026900 023	SET SCREW FOR SHUTTLE RACE (88)
91	1210603 560 D	BOBBIN CASE COMPLETE
92	1110103 501	BOBBIN COMPLETE
93	1230703 587 A	DRIVER SHAFT BUSHING
94	1260203 053 A	SHUTTLE DRIVER COMPLETE
95	1210103 504 F	DRIVER SHAFT COLLAR COMPLETE
96	1260203 505 A	DRIVER SHAFT GEAR COMPLETE
97	1230703 542 B	LOWER SHAFT FRONT BUSHING
98	1230703 543 B	LOWER SHAFT REAR BUSHING
99	1230703 541 A	LOWER SHAFT ONLY
100	1271304 705 B	FEED LIFTING CAM COMPLETE
100A	9501508 276	SET SCREW FOR FEED LIFTING CAM COMPLETE
101	1210603 504 B	LOWER SHAFT COLLAR
101A	9501508 278	SET SCREW FOR LOWER SHAFT COLLAR (101)
102	1270303 055 G	LOWER SHAFT GEAR COMPLETE
102A	9501203-276	SET SCREW FOR LOWER SHAFT COLLAR (102)
103	1260403-506 C	LOWER SHAFT CRANK COMPLETE
103A	9531103 259	SET SCREW FOR LOWER SHAFT CRANK (103)
104	1270303 330	CRANK ROD COMPLETE
105	1110103 335	TAPERED SCREW FOR CRANK (104)
106	9410182 204	NUT FOR TAPERED SCREW (105)
107	1230704 702 A	DROP FEED SHAFT BUSHING WITH ARM
107A	1230704 726	DROP FEED PLATE STOPPER
108	1260204 711	DROP FEED SHAFT
109	1230704 072	DROP FEED SHAFT ARM COMPLETE
109A	1230704 720	DROP FEED SHAFT ARM ASSEMBLY
109B	1260204 724	DROP FEED PLATE
109C	9030100 040	WASHER FOR DROP FEED PLATE SET SCREW (109D)
109D	9541602 107	SET SCREW FOR DROP FEED PLATE
110	1260204 746	SPRING FOR DROP FEED ARM (107)
111	1260204 730 A	FEED LIFTING FORK COMPLETE
111A	9501506 279	SET SCREW FOR FEED LIFTING FORK COMPLETE (111)
112	1230704 740 A	DROP FEED METAL AND LEVER COMPLETE
113	1271104 760	DROP FEED REGULATING KNOB COMPLETE
114	1230704 767	CLICK STOP PLATE
115	1230704 768	SPRING FOR DROP FEED REGULATING KNOB (113)
116	9440111 119	NUT FOR DROP FEED REGULATING KNOB (113)
117	1271004 765	DROP FEED INDICATING PLATE
118	1230704 510 E	FEED ROCK SHAFT COMPLETE
118A	1270304 511 A	FEED ROCK SHAFT ONLY
118B	1230704 512 C	FEED ARM
118C	1270304 514	FEED ARM SHAFT
118D	9080200 004	SNAP RING FOR FEED ARM SHAFT (118C)
118E	1270304 520	FEED ROCK ARM COMPLETE
119	9030100 059	ADJUSTING WASHER FOR FEED DOG SET SCREW
120	1260204 513 B	FEED DOG
121	9530801 279	SET SCREW FOR FEED DOG (120)
122	1210604 515	HINGED PIN FOR FEED ROCK ARM (118E)
123	1110103 301	SCREW CENTER WITH NUT
124	1270303 515	GEAR CASE COVER PLATE
125	1270303 516	GEAR CASE COVER PACKING
126A	1230704 317 A	SPRING FOR FEED REGULATOR PLUNGER (126B)
126B	1230704 318	FEED REGULATOR PLUNGER
126C	1230704 343 B	STITCH REGULATOR CAM
126D	9030100 112	ADJUSTING WASHER FOR STITCH REGULATOR CAM
126E	9080100 009 A	SNAP RING FOR STITCH REGULATING CAM (126C)
126F	1271004 011 B	FEED REGULATOR CAM COMPLETE
126G	1271004 125	SPRING PIN FOR FEED REGULATOR BODY (126H)
126H	1271004 311	FEED REGULATOR BODY
127	9561103 259	SET SCREW FOR FEED REGULATOR BODY (126H)
128	9040400 002	CLICK STOP PIN
129	1250104 754	SPRING FOR CLICK PIN (128)
130	1271004 316 A	STITCH LENGTH REGULATOR DIAL KNOB
131	9540601 119	SET SCREW FOR STITCH REGULATOR DIAL KNOB (130)
132	9120200 404	WASHER FOR STITCH REGULATOR DIAL KNOB SET SCREW (131)

REF. NO.	PART NO.	PART NAME AND OR DESCRIPTION
133	1271104 341	REVERSE PUSH BUTTON
134	1230704 369 B	STOP RING FOR REVERSE PUSH BUTTON (133)
135	1271104 341 A	FEED REGULATOR PANNEL
136	1271007 113 A	ZIGZAG WIDTH INDICATING PANNEL COMPLETE
137	1271007 503 A	ZIGZAG WIDTH LIMITER STOPPER
138	9540910 258	SET SCREW FOR ZIGZAG WIDTH LIMITER STOPPER (137)
141	1230704 345 C	SET COLLAR FOR FEED REGULATON PANNEL (135)
142	9012500 001 B	SET SCREW FOR FEED REGULATOR PANNEL (135)
143	1270304 141	FEED FORK
144	1110104 102	SLIDING BLOCK AND SHAFT COMPLETE
145	1271105 147	HOLE COVER
146	1230705 022 B	ZIGZAG WIDTH REGULATOR SUPPORTING STUD COMPLETE
147	1271106 120 A	ZIGZAG WIDTH REGULATOR SUPPORT COMPLETE
147 A	9531102 219	SET SCREW FOR ZIGZAG WIDTH REGULATOR SHAFT (147 A)
148	1271006 113 A	SPRING FOR ZIGZAG WIDTH REGULATOR BODY (147)
149	9030100-068	STOP WASHER FOR SPRING (148)
150	1271007 532	ZIGZAG REGULATOR SHAFT
151	1271007-507-C	NEEDLE POSITION REGULATING LEVER COMPLETE
152	1230707-540	NEEDLE POSITION REGULATING ARM COMPLETE
153	9541104-259	SET SCREW FOR NEEDLE POSITION REGULATING ARM (152)
154	9030100-007	WASHER FOR NEEDLE POSITION REGULATING ARM SET SCREW (153)
155	1271007-506-D	ZIGZAG WIDTH LIMITER (RIGHT)
156	1271007-509-D	ZIGZAG WIDTH LIMITER (LEFT)
157	1271007-523-B	ZIGZAG WIDTH LEVER
158	1230705-118	ZIGZAG WIDTH REGULATOR ARM
160	1270106-139-A	STOPPER SCREW
161	9030100-014	WASHER FOR NEEDLE POSITION ARM SET SCREW
162	1260205-115	ZIGZAG REGULATOR SHAFT BUSHING
163	1271005-115	ZIGZAG REGULATOR SHAFT BUSHING
164	1230707-578-A	STOPPER FOR ZIGZAG WIDTH LEVER DISPLACEMENT SPRING
165	1230707-586-A	DISPLACEMENT SPRING FOR ZIGZAG WIDTH LEVER
166	1260107 596	NUT FOR ZIGZAG WIDTH REGULATOR SHAFT
167	1271007-519 B	LEVER KNOB
168	1271107 605-A	LIMITER KNOB
169	1271005-510 A	ZIGZAG VIBRATOR CONNECTING ROD COMPLETE
170	1230706 181	ZIGZAG REGULATOR ROD
170A	9030200-001	SPRING WASHER FOR ZIGZAG REGULATOR ROD (170)
171	1260906-513-B	JOINT PIN FOR ZIGZAG VIBRATOR CONNECTING ROD (169)
172	1230706 171 C	SOCKET HOLDER
173	1260906 110 B	LIGHT ASSEMBLY
174	9242300 206	SET SCREW FOR SOCKET
175	1110106 116 B	BULB
176	1230706 141	CORD CLAMP
177	1230706-142-A	CORD CLAMP
178	1110106 163	CORD BUSHING
179	0131061 103 A	PLUG (MALE)
180	1271116 100 E	ZIGZAG PATTERN CAM AMOUNTING BASE COMPLETE
180 1	1271106-100	ZIGZAG PATTERN CAM AMOUNTING BASE ASSEMBLY
180 2	1271106 200	SIGZAG GEAR SUPPORTING ARM COMPLETE
180 2A	1271106 221	ZIGZAG GEAR SUPPORTING ARM ONLY
180 2B	9541200 259	SET SCREW FOR SUPPORTING ARM (180 2A)
180 2C	1271106 232	AUTOMATIC ZIGZAG WIDTH GEAR SHAFT
180 2D	9030100 033	WASHER FOR ZIGZAG WIDTH GEAR SHAFT (180 2C)
180 2E	9060200 001	SNAP RING
180 2F	1271105 140	ZIGZAG WORM WHEEL COMPLETE
180 3	9541210 119	SET SCREW FOR ZIGZAG GEAR SUPPORTING ARM (180 2)
180 4	9030100 009 A	WASHER FOR ZIGZAG GEAR SUPPORTING ARM SET SCREW (180 3)
180 5	1271106 233	SIGZAG WIDTH GEAR SUPPORT
180 6	9540916 119	SET SCREW FOR ZIGZAG WIDTH GEAR SUPPORT
180 7	1271106 310	ZIGZAG PATTERN GENERATING CAM COMPLETE
180 8	1271106 112	PATTERN CAM SHAFT
180 9	9030100 039	WASHER FOR PATTERN CAM SHAFT
180 10	9541209 259	SET SCREW FOR PATTERN CAM HAFT
180 11	1271106 260	CONTACTING FINGER BODY COMPLETE
180 11A	1271106 261	CONTACTING FINGER BODY ONLY
180 11B	1271106 124	CONTACTING FINGER
180 11C	1271106 180	STOPPER FOR CONTACTING FINGER
180 11D	9500901 116	SET SCREW FOR CONTACTING FINGER STOPPER (180 11C)
180 11E	1271106 246	DRIVING SCREW FOR CONTACTING FINGER (180 11B)
180 12	1271106 117	STUD FOR CONTACTING FINGER (180 11B)
180 13	1271106 204	DRIVING GEAR FOR CONTACTING FINGER (180 11A)
180 13A	9500801 276	SET SCREW FOR CONTACTING FINGER DRIVING GEAR (180 13)
180 14	1271106 236	CONTACTING FINGER MOVING GEAR COMPLETE
180 15	9060100 004 A	SNAP RING FOR MOVING GEAR
180 16	1271106 227	CONTACTING FINGER MOVING MEDIARY GEAR
180 17	1271106 205 B	CONTACTING FINGER MOVING GEAR COMPLETE
180 18	1271106 141 A	PATTERN SELECTING DIAL SHAFT
180 19	1271107 208	INDEX DRIVING GEAR COMPLETE
180 19A	9501102 256	SET SCREW FOR INDEX DRIVING GEAR (180 19)
180 20	1271106 203 B	CONTACTING FINGER LIFTING CAM COMPLETE
180 20A	1271106 263 A	CONTACTING FINGER LIFTING CAM
180 20B	9501201 250	SET SCREW FOR CONTACTING FINGER LIFTING CAM
180 20C	1271106 225	STOPPER CAM
180 20D	1271106 226	STOPPER CAM PIN
180 20E	9540813 119	STOPPER CAM BOLT
180 21	1271106 621	REVERSE FEED CAM
180 22	1271106 616	SPRING FOR REVERSE FEED CAM (180 21)
180 23	1271106 126	CLICK STOP SPRING FOR PATTERN SELECTING DIAL
180-24	1270507 856	PATTERN CAM CLICK STOPPING BALL
180 25	9630903-119	SET SCREW FOR CLICK STOP SPRING (180 23)
180-26	1271106-622	DRIVING ARM FOR REVERSE FEED CAM (180-21)
180 27	1271106-270	ZIGZAG DRIVING ARM COMPLETE
180 27A	1271106-271	ZIGZAG DRIVING ARM ASSEMBLY
180 27B	1270106-139-A	STOPPER SCREW
180 27C	9440093-110	NUT FOR STOPPER SCREW (180 27B)
180 28	1271106-051	CONTACTING FINGER GUIDE COMPLETE
180-28A	1271106-150	CONTACTING FINGER GUIDE ASSEMBLY
180 28B	1271106-281	RELEASING ARM FOR CONTACTING FINGER ARM
180 28C	1271106-119	PIN FOR CONTACTING FINGER ARM RELEASING ARM
180 28D	9500901-116	SET SCREW FOR RELEASING ARM PIN
180 28E	9130500-308	SPRING WASHER FOR RELEASING ARM PIN SCT SCREW (180-28D)
180 29	1271106-173	INTERMEDIARY RING
180 30	1271107 600	INDEX DRIVING STUD COMPLETE
180 30A	1271107-640	INDEX DRIVING STUD ASSEMBLY
180 30B	1271107 559	INDEX FIXING BASE
180 30C	1271107-546	INDEX
180 31	9030100 020	WASHER FOR INDEX SHAFT RETAINER SET SCREW
180-32	1271107-549	INDEX STOPPER
180 33	1271105 129	SPRING PIN
180 34	1271106-600	CONTACTING FINGER FOR REVERSE FEED COMPLETE
180 34A	1271106 613	CONTACTING FINGER FOR REVERSE FEED
180-34B	1270106 139 4	ADJUSTING WASHER
180 34C	9030100 105	WASHER FOR REVERSE FEED ARM
180 34D	1271106 611	REVERSE FEED ARM COMPLETE
180 34E	1271106 632	SPRING FOR REVERSE FEED ARM
180 34F	1271106-223	FRAME SUPPORTING STUD COMPLETE
180 34G	1271106 224	ROLLER FOR FRAME SUPPORTING STUD (180 34F)
180 34H	9080200 004	SNAP RING
180 35	1271106 222	FRAME SUPPORTING STUD (FRONT)
180 36	1271117 103 B	PATTERN INDICATING EMBLEM COMPLETE
180 37	954008-278	SET SCREW FOR PATTERN INDICATING PLATE
180 38	1271107 520	PATTERN SELECTING DIAL COMPLETE
181	9030200 006	SPRING WASHER FOR REVERSE FEED ARM
182	1271119-100	INSTRUCTION BOOK
183	010268	ACCESSORY COMPLETE
183 A	0102681 111-A	ACCESSORY BOX
183 B	0101033 111 D	DRIVER (LARGE)
183 C	0101023 112 C	DRIVER (SMALL)
183 D	0101072 100 A	TUBED OILER COMPLETE
183 E	0102245 111	CLOTH GUIDE
183 F	1110101 142 C	SET SCREW FOR CLOTH GUIDE
183 G	1230102 480 B	NEEDLE COMPLETE
183 H	1260402 490 A	TWIN NEEDLE COMPLETE
183 I	0102684 123	EMBROIDERY FOOT
183 K	0102124 143 A	CORDING FOOT
183 L	1110103 370	FOOT FOR STRAIGHT SEWING
183 M	0102064 121 A	BUTTON SEWING FOOT
183 N	0102165 141 B	BUTTON HOLE CUTTER
183 O	0102124 144 C	BLIND SEWING FOOT
183 P	0102224 102 A	BUTTON HOLE FOOT
183 Q	1210102 187 A	SPOOL PIN FELT
183 R	0102434 145	ZIPPER FOOT
183 S	1110100 116	BULB
183 T	1110103 501	BOBBINS (3)

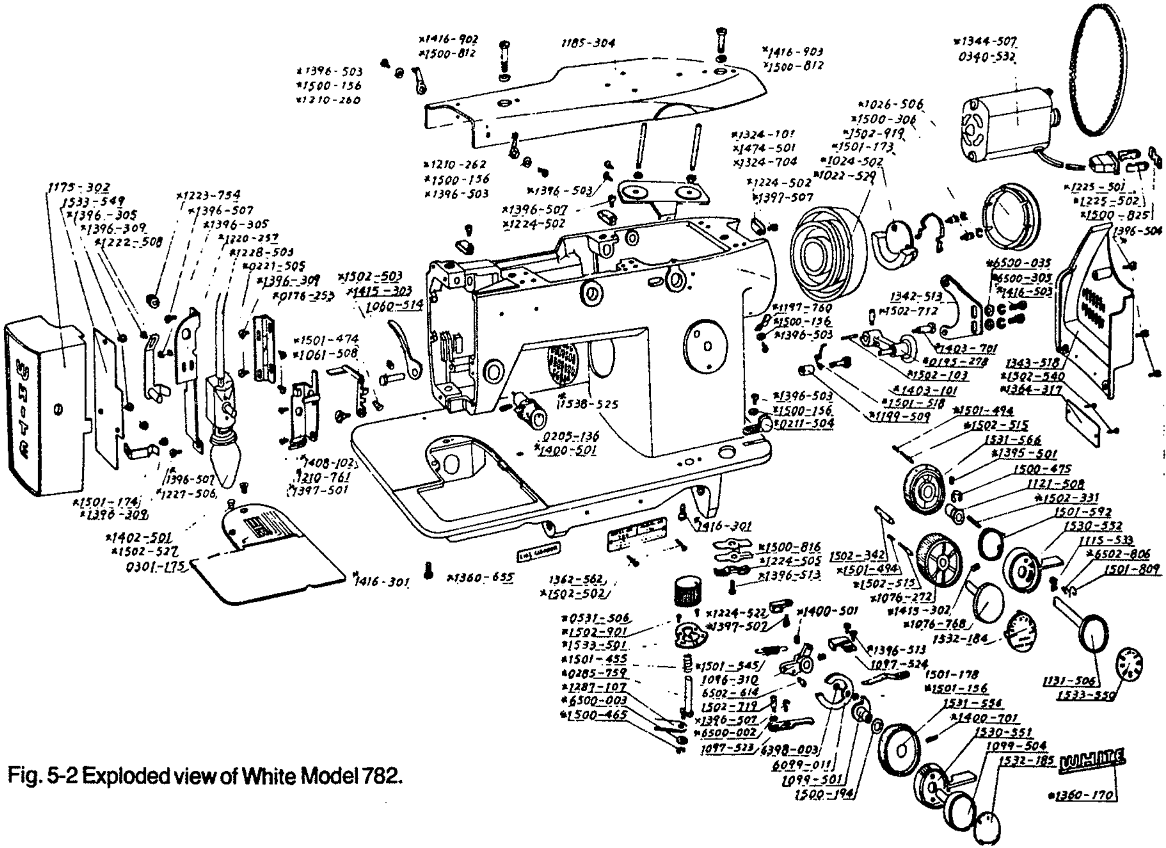


Fig. 5-2 Exploded view of White Model 782.

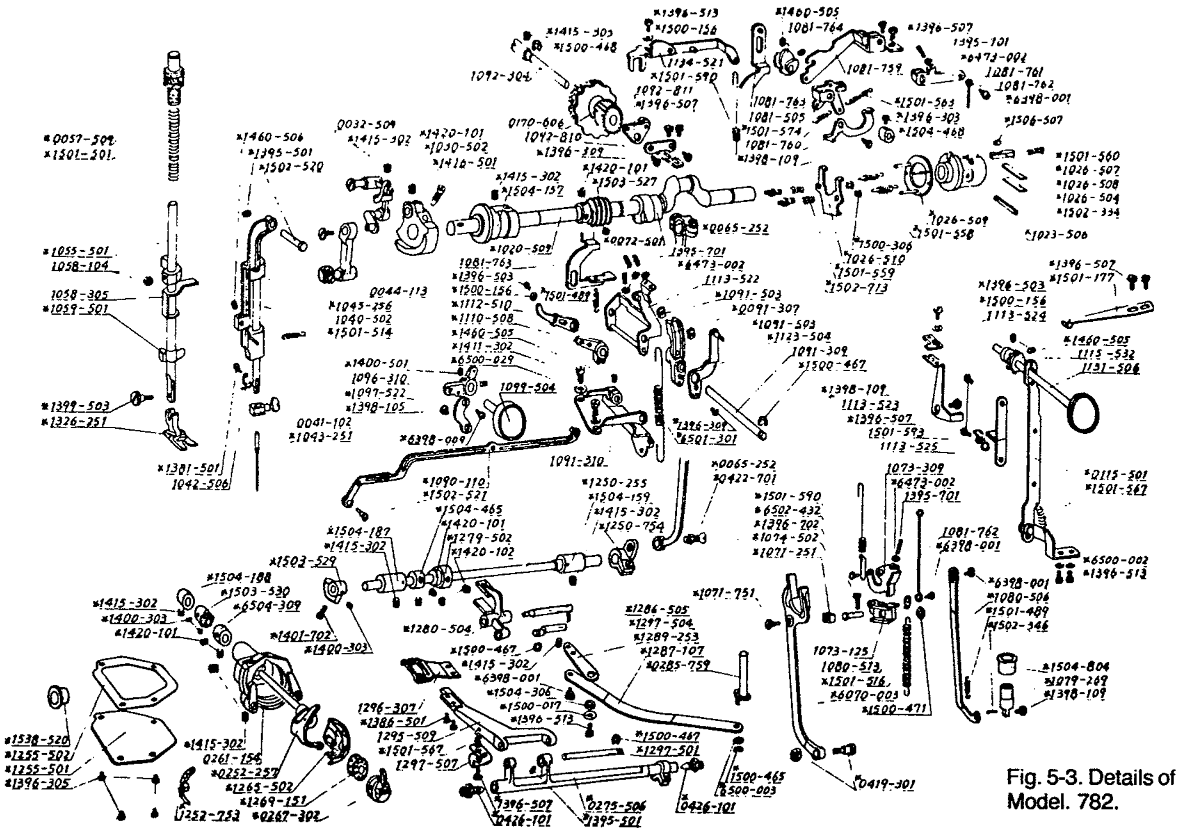


Fig. 5-3. Details of the parts of White Model. 782.

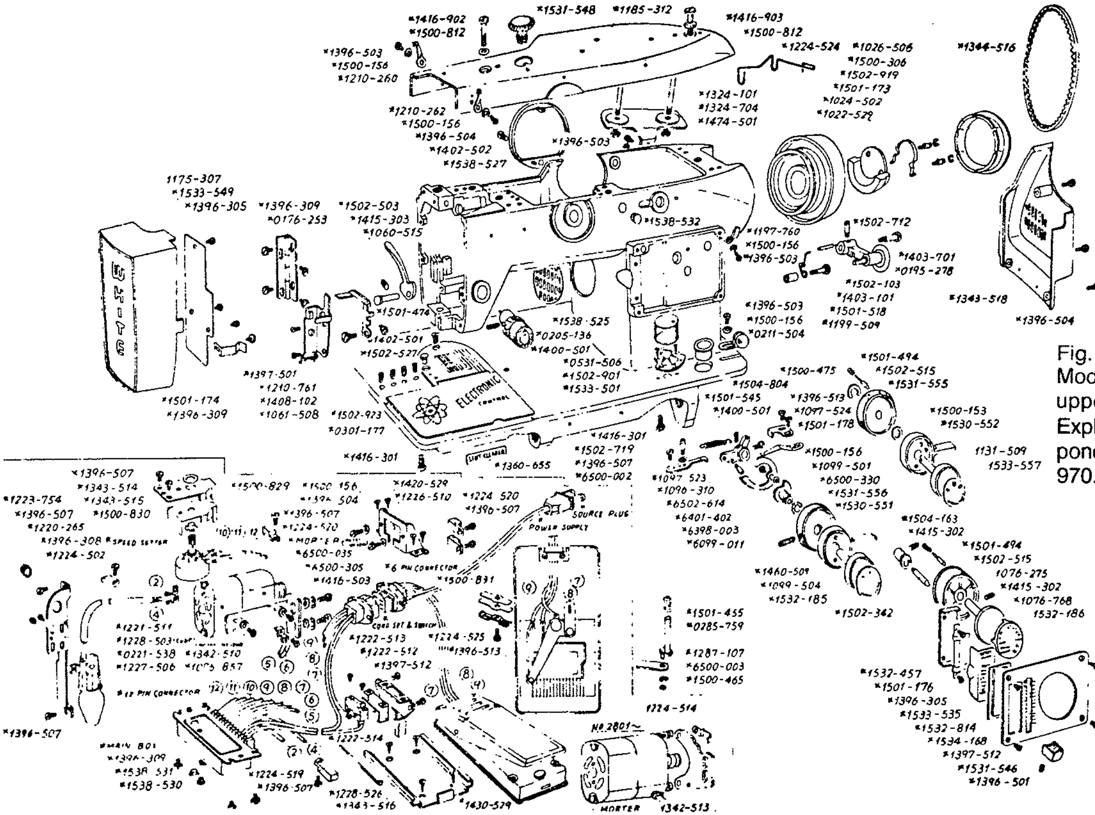


Fig. 5-4. Exploded view of White Models 804 and 793, without the upper and lower mechanisms; B Exploded view of the electrical components of White Models 804 and 970.

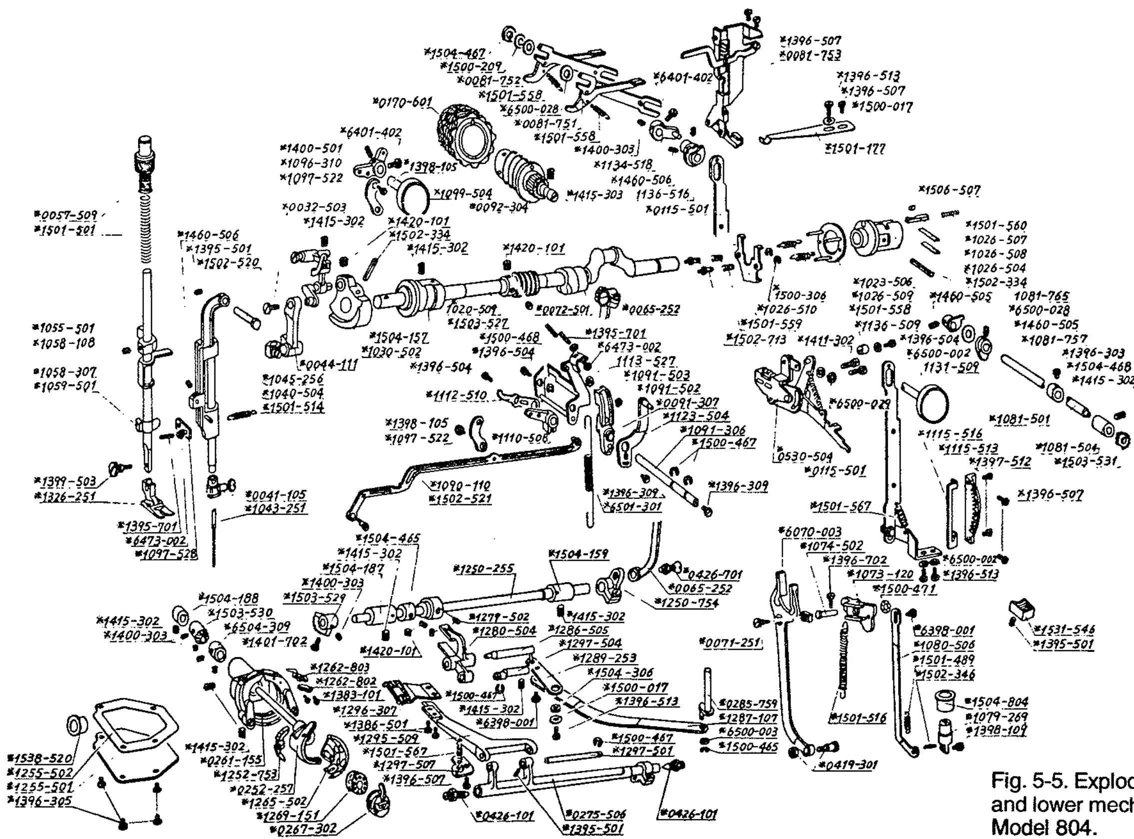


Fig. 5-5. Exploded view of the upper and lower mechanisms of the White Model 804.

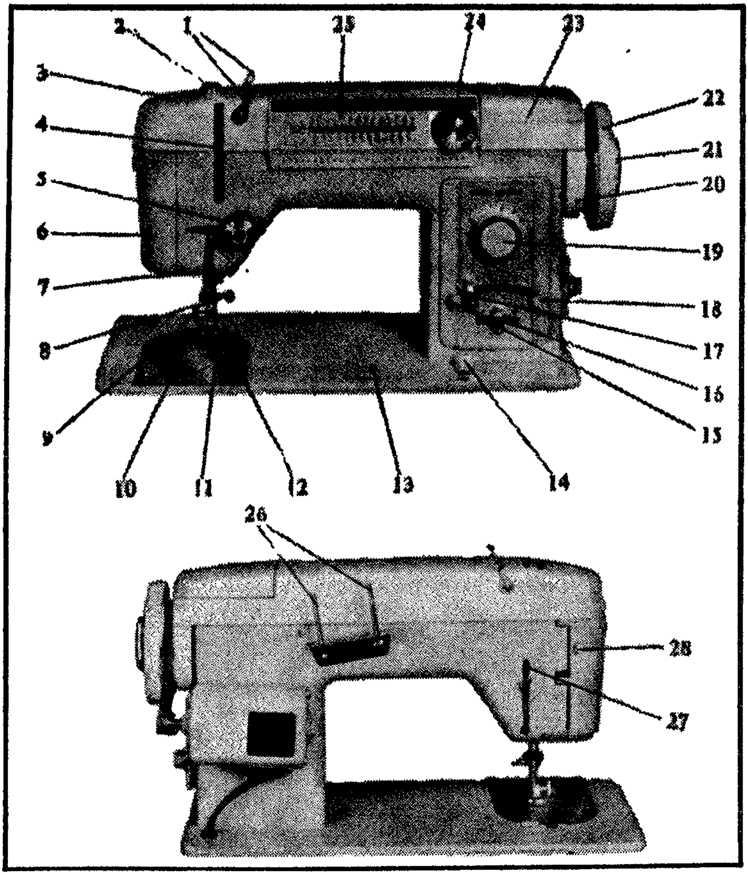


Fig. 5-6. View of external front and rear controls of White Model 960. 1. Arm Thread Guide; 2. Presser Release Darner; 3. Arm Top Cover; 4. Thread Take Up Lever; 5. Thread Tension Dial; 6. Face Plate; 7. Bulb; 8. Needle Clamp Screw; 9. Presser Foot Thumb Screw; 10. Needle Plate; 11. Presser Foot; 12. Slide Plate; 13. Bed; 14. Drop Feed Regulating Knob; 15. Zigzag Width Limiter (Left); 16. Needle Position Regulating Lever; 17. Zigzag Width Lever; 18. Zigzag Width Limiter (Right); 19. Reverse Push Button; 20. Stitch Length Regulating Dial; 21. Stop Motion; 22. Balance Wheel; 23. Bobbin Winder Cover; 24. Pattern Selecting Dial; 25. Pattern Indicating Emblem; 26. Spool Pin and Base; 27. Presser Bar Lifter; and 28. Switch Button.

depending upon whether the bobbin is inserted from the side or front of the machine.

On the side load machine, before adjusting the straighteness of the stitch, check the basic needle position for zig-zag sewing.

Now refer to Fig. 5-9. Remove the top cover and observe the position of the zig-zag channel casting 1A. The slide block should not move when the hand wheel is turned. If movement does occur, loosen the screw 1 and readjust the stopper 4. Recheck the motion and tighten the screw. Direct contact between the zig-zag origin 6 and zig-zag control lever or knob must be maintained. Any gap may be removed by adjusting screw 2.

The eccentric collar stop 9 should be aligned after making the adjustment.

To make the adjustment on the front load machine, refer to Fig. 5-10A and 5-10B. The alternate procedures for making the adjustment are designated as Example A and Example B.

Example A. Remove the top cover and observe the position of the roller 1 (Fig. 5-10A). This roller should accurately align to the fulcrum stud *2* of the zig-zag oscillator, and should not move when the hand wheel is turned. If movement does occur, loosen the stitch width control knob set screw, readjust the position of the roller in

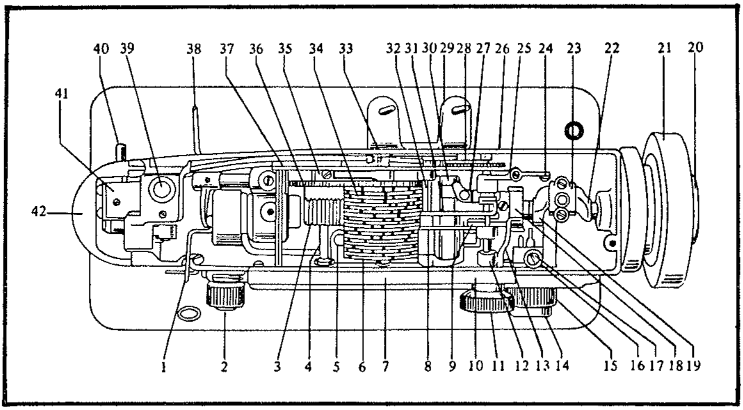


Fig. 5-7. View of the upper mechanism, including the cam stack, of White Model 960. 1. Take Up Lever; 2. Thread Dial Tension; 3. Zigzag Worm Wheel; 4. Zigzag Width Gear Shaft; 5. Nut for Zigzag Pattern Cam Amounting Base; 6. Zigzag Pattern Cam; 7. Pattern Indicating Emblem; 8. Zigzag Driving Arm; 9. Contacting Finger Lifting Cam; 10. Pattern Selecting Dial Shaft; 11. Pattern Selecting Dial; 12. Index Driving Gear; 13. Click Stop Spring for Pattern Selecting Dial; 14. Reverse Push Button; 15. Stitch Length Regulating Dial; 16. Set Collar for Feed Regulating Panel; 17. Set screw for Feed Regulating Panel; 18. Feed Cam; 19. Feed Regulating Body; 20. Stop Motion; 21. Balance Wheel; 22. Arm Top Shaft; 23. Crank Rod; 24. Automatic Feed Rod; 25. Contacting Finger for Reverse Feed; 26. Contacting Finger Moving Gear; 27. Driving Arm for Reverse Feed Cam; 28. Contacting Finger Moving Medialy Gear; 29. Contacting Finger Moving Gear; 30. Contacting Finger Body; 31. Releasing Arm for Contacting Finger Arm; 32. Zigzag Driving Arm Shaft; 33. Zigzag Pattern Cam Shaft; 34. Cam Gear; 35. Zigzag Gear Supporting Arm; 36. Automatic Zigzag Width Gear; 37. Zigzag Pattern Cam Amounting Base; 38. Presser Bar Lifter; 39. Darner; 40. Switch Button; 41; Light Assembly; and 42. Face Plate.

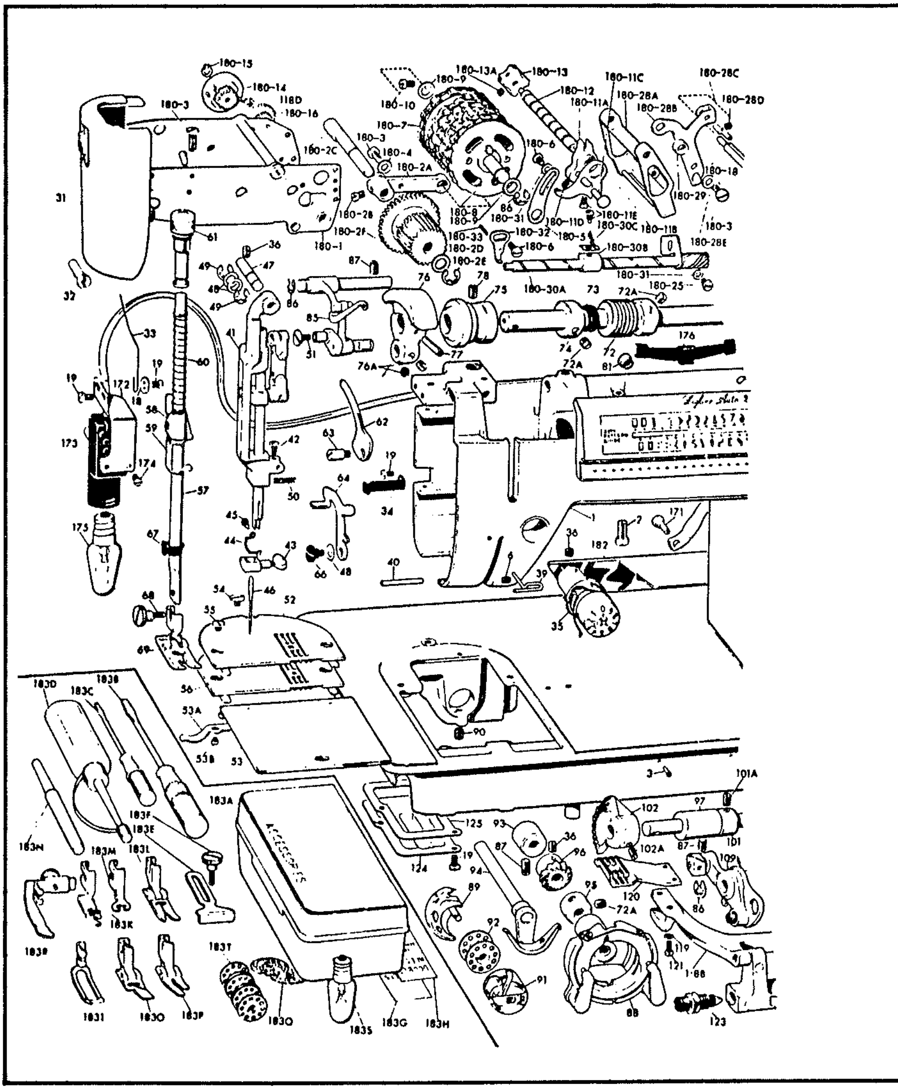
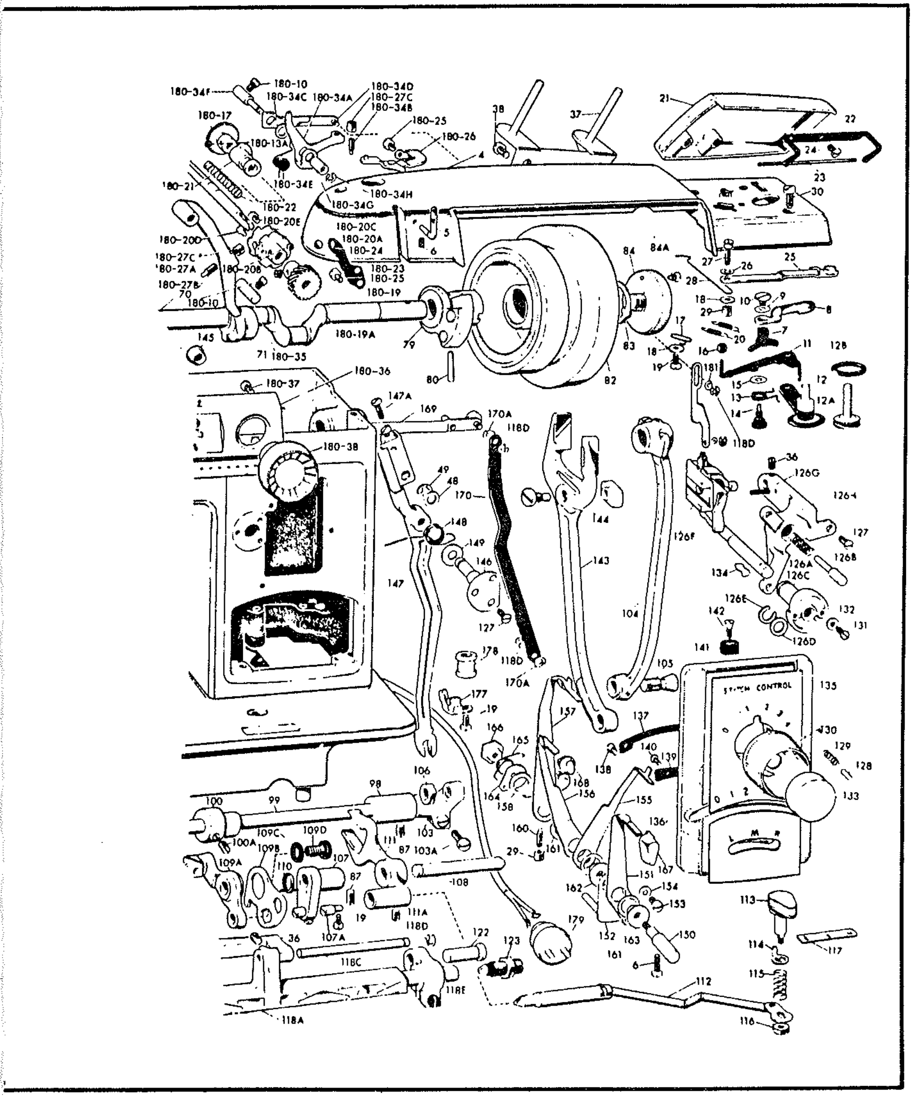


Fig. 5-8. Exploded view of the White Model 960.

the zig-zag oscillator, then, contacting pin 4 directly to 0 width position stopper 3 and without any gap, tighten the stitch width control knob set screw firmly.

Example B. Remove the top cover, and observe the position of the roller 1 (Fig. 5-10B). This roller should accurately align to the



flucrum stud 2 of the zig-zag oscillator, and should not move when the hand wheel is turned. If movement does occur, remove the stitch width control and loosen set screw 5. Readjust the position of the roller 1, checking the motion; then, readjust the stopper 3 to directly contact to the pin 4 without a gap, maintaining the roller at the corrected position. Tighten the screw 5 firmly and reset the stitch width control knob.

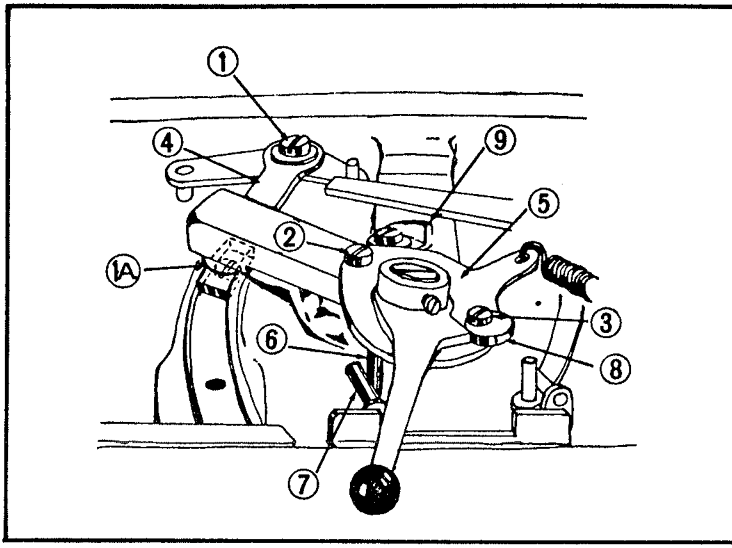


Fig. 5-9. On White side load machines with oscillating shuttles, a wavering straight stitch may be corrected.

White Models 782, 793 and 804

On White Models 782, 793, 804 and 970, if the needle makes a slight zig-zag motion when straight stitching with the zig-zag width set at 0, correct as follows (Fig. 5-11):

- Set the needle position at C and the zig-zag width at 0.
- Set the pattern selector control at M.
- Loosen screws C and B.
- Move the stop plate A slightly to the right and tighten screws C and B.
- Check your results, and if the adjustment has worsened the stitch wavering, repeat the procedure, but move plate A in the opposite direction.

White Model 970

To correct a wavering straight stitch on the White Model 970, proceed as follows (Fig. 5-12):

- Set the needle position at C, and the zig-zag width at 0.
- Set the pattern selector lever at the straight stitch position. This position is designated by pictorial representation of a straight stitch.
- Push lever A to the left with a screwdriver. Watch the movement of the needle.

- If the needle moves from *right to left,* loosen set screws B and C and turn lever D *clockwise.*
- If the needle moves from *left to right,* turn lever D *counterclockwise.*
- Repeat the above procedure until the needle comes to a standstill.
- When the adjustment is complete, tighten the set screws B and C securely.

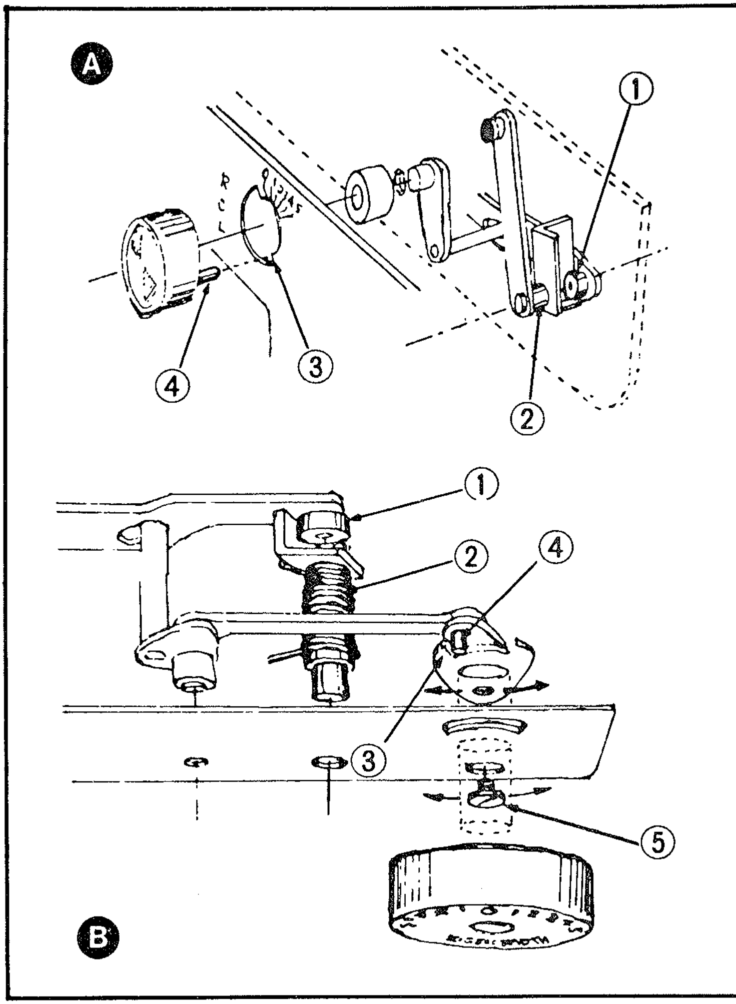


Fig. 5-10. On White front load machines with the oscillating shuttles, A and B are alternate methods of correcting a wavering straight stitch.

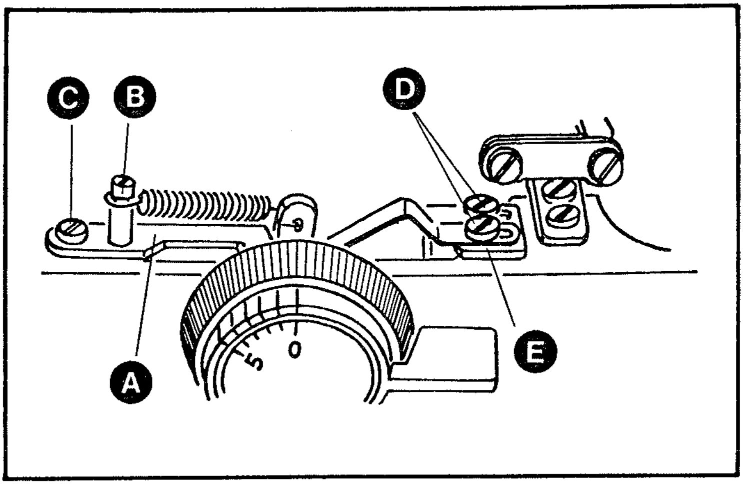


Fig. 5-11. On White Models 782, 793, 804 and 970, a wavering straight stitch can be corrected by slightly moving plate A. Be sure to observe the correct setting of the external dials when making this adjustment.

ADJUSTING THE FEED DOG HEIGHT

To be sure to which White Models the following procedures apply, *read the headings carefully.*

Miscellaneous White Models With Oscillating Shuttles

The correct height of the top surface of the feed dog teeth above the needle plate surface is .8mm to 1mm. Check this height with the feed in the high position, and note that the feed dog is below the surface of the needle plate when in the DARN or OFF position. Before making any adjustments, clean out any accumulation of lint from between the feed dog teeth.

Adjust the feed dog height on side load machines as follows Fig. 5-13):

- Turn the hand wheel counterclockwise to raise the feed dog into its highest position.
- Loosen screw 1 of the drop feed unit and turn the unit clockwise in the case of insufficient height or counterclockwise in the case of excessive height, until the correct height is obtained.
- Tighten set screw 1 after the adjustment is made.

On the front load machine, incorrect up-and-down motion timing may appear to be incorrect feed dog height. Check this timing before adjusting the feed dog height, as follows (Fig. 5-14):

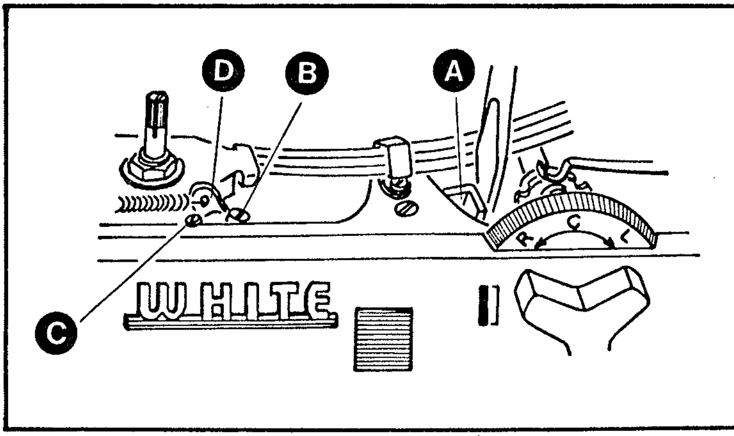


Fig. 5-12. On the White 970 a wavering straight stitch may be corrected by moving lever D, either clockwise or counterclockwise.

- With the needle bar at its highest position, check if the cam on the feed lift shaft touches the bar of the feed lifting device, and that the gauge line 2 makes a right angle against the bar 1.
- If the above conditions are not met, loosen the set screw 3 and correct the cam angle against the bar. After the adjustment, tighten the set screw firmly.

After making the adjustment of the up-and-down feed motion timing, adjust the feeddog height as follows (Fig. 5-15):

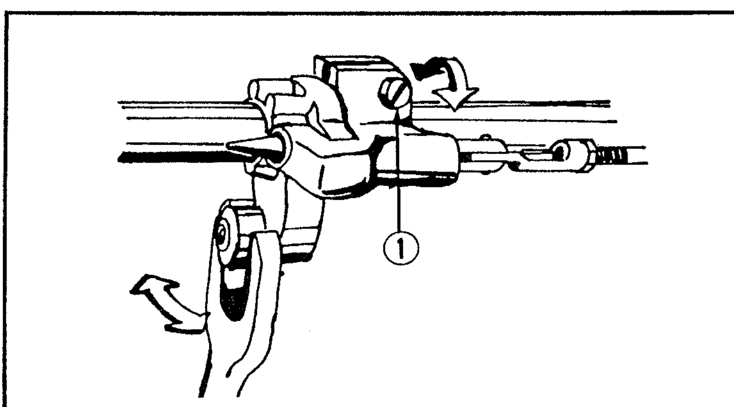


Fig. 5-13. On White side load machines with ocsillating shuttles, a feed dog height of .8mm to 1mm can be achieved by moving the drop feed unit either clockwise or counterclockwise.

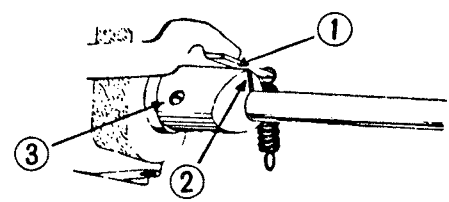


Fig. 5-14. On White front load machines with oscillating shuttles, incorrect timing on the up-and-down motion of the feed dog can appear to be incorrect feed dog height.

- Turn the hand wheel to raise the feed dog to its highest position.
- Loosen set screw 1 of the drop feed unit and rotate the eccentric holder 2 as needed for correct height.
- After the adjustment is made, tighten the screw 1.

Still another cause of improper feeding may be uneven height of the feed dog. It can also be corrected.

Remove the needle plate and loosen both feed dog screws. Use either paper, fiber or metal as shim material on the corner needing more height. Use a flat piece of steel about 4 inches long, laid across the feed dog, the check for even height. Tighten the screws securely.

To correct the horizontal motion timing of the feed dog, proceed as follows (Fig. 5-16):

- Remove the top cover plate and check to see that the gauge line 1 on the right side of the feed cam is aligned with the gauge line 2 on the arm shaft, within the tolerance of about 1mm.
- Loosen the feed cam set screw 3 and adjust the alignment of the two gauge lines 1 and 2, then tighten the set screw 3 securely.

Do *not* make the above adjustment unless feeding starts while the needle is still into the fabric or the needle pierces the fabric before the feeding is finished, or irregular reverse stitch feed motion in stretch stitching is observed.

To make the above adjustment when no timing line is present, proceed as follows:

- Turn the hand wheel counterclockwise until the needle point is exactly even with the top of the needle plate.

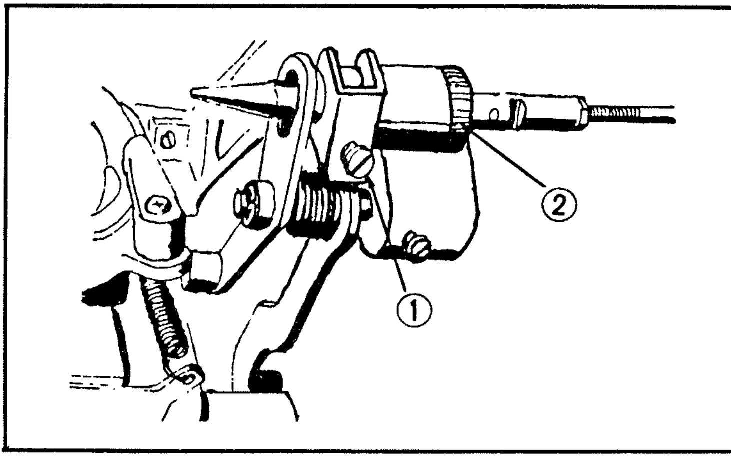


Fig. 5-15. After checking and adjusting the timing of the up-and-down feed dog motion on White front load machines with the oscillating shuttles, the feed dog height can be set to .8mm or 1mm by loosening set screw 1 and rotating the eccentric holder 2.

- The feed dog should be slightly below the surface of the needle plate.
- If the above condition is not met, turn the hand wheel until the heaviest portion of the take-up counterbalance (Fig. 5-16) is at the 12:00 o'clock position. Screw 3 (Fig. 5-16) should be at the 1:00 o'clock position.

Fig. 5-16. On White Models with oscillating shuttles, the timing of the horizontal motion of the feed dogs may be checked, and if necessary, corrected by aligning the two gauge marks 1 and 2.

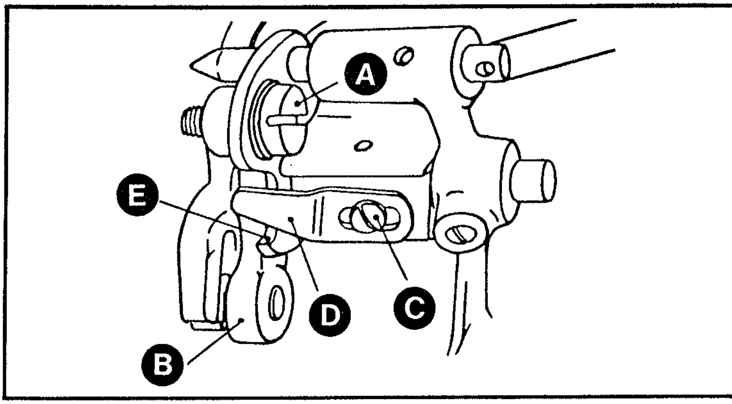


Fig. 5-17. On White Models 764 and 769, the feed dog height can be set to .8mm by moving the feed lifting arm B up or down.

- A very slight adjustment may be needed either way for the position.

White Models 764 and 769.

On White Models 764 and 769, the feed dog should be 1/32 inch (.8mm) above the needle plate when the dog is at its highest point, with the drop feed knob in the HIGH position. To adjust the height, proceed as follows (Fig. 5-17):

- Set the drop feed knob at HIGH, raising the feed dog to the highest point.
- Loosen screw *A* and adjust the height of the feed dog, by moving the feed lifting arm *B* up or down.
- Tighten screw *A* securely.

The feed dog should be at the proper level at its DOWN position as well. Check it in case of improper motion and noisy operation. To correct, set the drop feed at the LOW position, dropping the feed dog to the lowest position. Loosen screw C. Adjust the clearance between feed dog and the top of the race housing by means of the stopper D, making certain the feed does not strike the housing. Tighten screw C securely.

White Models 782, 793, 804 and 970.

On White Models 782, 793, 804 and 970, the feed dog should be 1/32 inch (.8mm) above the needle plate when the feed dog is raised to its highest point, with the drop feed knob set at the HIGH position. To make the adjustment, proceed as follows (Fig. 5-18):

- Set the drop feed knob at HIGH, raising the feed dog to the highest point.
- Tighten set screw A securely.
- Loosen set screw A and adjust the height of the feed dog by turning eccentric B.

The settings LOW and DOWN will automatically be set when the high position is correct.

White Model 960

The feed dog height on the White Model 960 should be checked on three positions of the feed: N position; S position; and E position. Proceed as follows:

N Position. To make the adjustment on N position, set the drop feed knob at N position, raising the feed dog to the highest position. Loosen set screw A and adjust the feed dog by hand, moving the drop feed shaft away from or toward you until the feed dog comes to the height of 1/32 inch (.8mm) above the needle plate. Tighten the screw A securely.

S Position. To make the adjustment on S position, set the feed at the highest position. Set the drop feed knob at S position. The feed now should be about one-half its original height (about 1/64 inch or .4mm). To correct, loosen screw E and move the drop feed assembly to the right or left. Tighten screw E.

E Position. To make the adjustment on E position, set the drop feed knob at E position. If the feed hits the top of the raceway

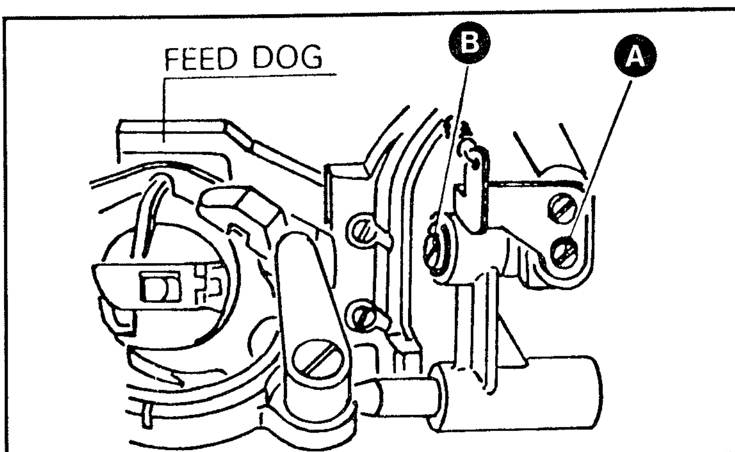


Fig. 5-18. On White Models 782, 793, 804 and 970, the feed dog height can be set to .8mm by loosening set screw A and turning eccentric B.

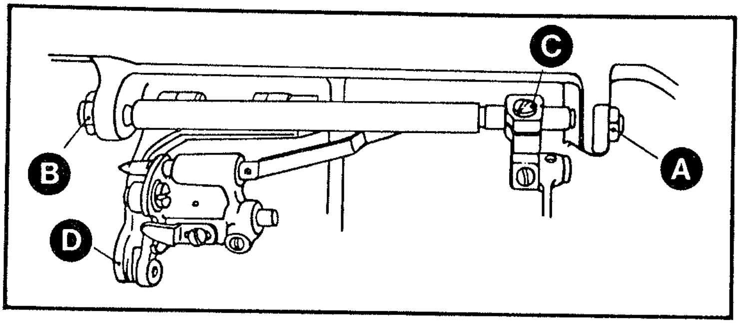


Fig. 5-19. On White Models 764 and 769, the feed dogs can be adjusted laterally in the feed dog slots by moving the feed rock shaft laterally, in the appropriate direction, with the center bearing screws after loosening the locking nuts A and B. When tightening the locking nuts, be sure excessive pressure is not transmitted to the feed rock shaft through the center screws.

when the machine is in operation, it will create a noise. If a correction is needed, loosen screw E and adjust eccentric D until the feed is just below the needle plate. When the knob is in E position, the material will not be fed. This condition is necessary for darning, etc.

ADJUSTING LATERAL POSITION OF FEED DOG

To be sure to which White Models the following procedures apply, *read the headings carefully.*

White Models 764 and 769

The White Models 764 and 769 differ slightly from other Models, inasmuch as they are especially designed so that the left edges of the feed dog are in contact with the left sides of the needle plate slots when the feed dog is in motion. To make this adjustment, proceed as follows (Fig. 5-19):

- Loosen the locking nuts for screw center A and B.
- Adjust the feed dog position in the slots of the needle plate by moving the shaft bearing screws sidewise, so that the feed dog will contact the left sides of the slots.
- Tighten the locking nuts A and B to lock the shaft bearing screws, leaving only minimum side clearance in the feed rock shaft.
- Tighten screw C after making certain the feed rock arm and feed fork move smoothly together.

White Models 782, 793, 804 and 970

On White Models 782, 793, 804 and 970, the feed dog should move up and down without touching the sides of the slots in the needle plate. To make the adjustment proceed as follows (Fig. 5-20):

- Loosen locking nuts A and B.
- Loosen the screw for the feed rock arm C, slightly.
- Adjust the feed dog position in the slots of the needle plate by moving the shaft bearing screws sidewise so that the feed dog does not contact the sides of the slots.
- Tighten locking nuts A and B to lock the shaft bearing screws, leaving only a minimum side clearance in the feed rock shaft.
- Tighten screw C after making certain the feed rock arm and feed fork move smoothly together.

The White Model 960

On the White Model 960, improper positioning of the feed dog in the needle plate slot may be indicated by noise or improper feeding. If so, correct it by loosening the set screw on both of the side nuts of the feed rock shaft. Adjust the feed dog position in the slots of the needle plate by moving the shaft bearings sidewise as needed. Tighten the nut fixing the shaft bearing by a driver. Tighten the set screw after adjusting the end clearance of the feed dog.

ADJUSTING FEED DOG END CLEARANCE

To be sure to which White Models the following procedures apply, *read the headings carefully.*

White Models 764 and 769

On White Models 764 and 769, the front and rear clearance between the feed dog and the end of of the needle plate slot must be

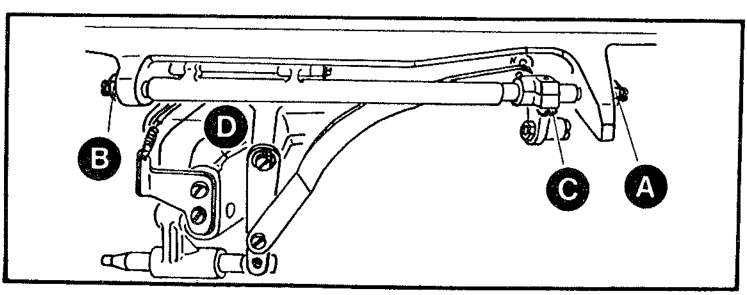


Fig. 5-20. On White Models 782, 793, 804 and 970, the lateral position of the feed dogs in the feed dog slots can be adjusted by moving the feed rock shaft laterally in the appropriate direction. While this procedure is essentially the same as for Models 764 and 769, the positioning of the feed dogs is different.

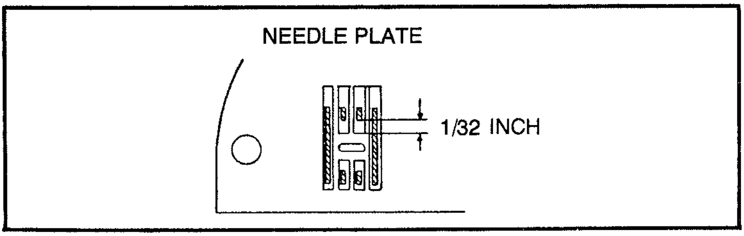


Fig. 5-21. On White Model 960, the clearance between the end of the feed dog and the feed dog slots should be about 1/32 inch.

the same at all stitch lengths when you set the stitch length dial at maximum length and operate the machine. To make this adjustment, set the stitch length dial at position 6. Loosen the set screw C for the feed rock arm. Move the feed lifting arm D back and forth for positioning the feed dog. Tighten set screw C securely.

White Model 960

On the White Model 960, with the stitch regulating dial set at 4, there should be an equal amount of clearance between the feed dog and the ends of the needle slots, when the balance wheel is turned. Make this adjustment as follows (Fig. 5-21):

- Set the stitch regulating dial to 4.
- Loosen screw A.
- Adjust the feed arm E until there is an equal amount of clearance at each end of the slots in the needle plate.
- Tighten screw A.

Referring now to Fig. 5-21, note that the equalized distance between the ends of the feed dog and the ends of the needle plate slots (in the center slots) is 1/32 inch.

ADJUSTING PRESSER BAR HEIGHT

To be sure to which White Models the following procedures apply, *read the headings carefully*.

Miscellaneous White Models with the Oscillating Shuttles

The correct height of the sole of the presser foot above the surface of the needle plate is about ¼ inch (6mm) with the presser bar raised. Make this adjustment as follows (Fig. 5-22).

- Open the face plate, release the pressure regulator and lift the presser bar to the up position.

- Loosen set screw 2 and lower or lift the presser bar to the proper height.

White Models 764 and 769.

On Models 764 and 769, the correct height of the sole of the presser foot above the surface of the needle plate, when the presser bar is in the up position, is 7/32 inch (5.5mm), Make this adjustment as follows (Fig. 5-23):

- Lift up the presser bar and open the face plate.

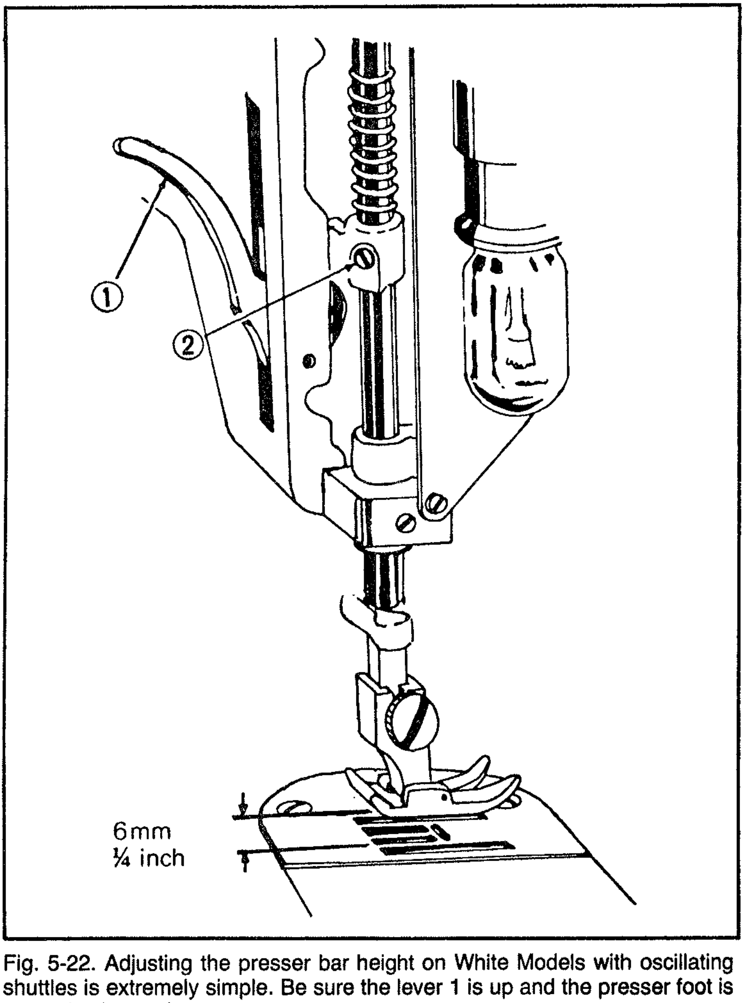


Fig. 5-22. Adjusting the presser bar height on White Models with oscillating shuttles is extremely simple. Be sure the lever 1 is up and the presser foot is securely clamped.

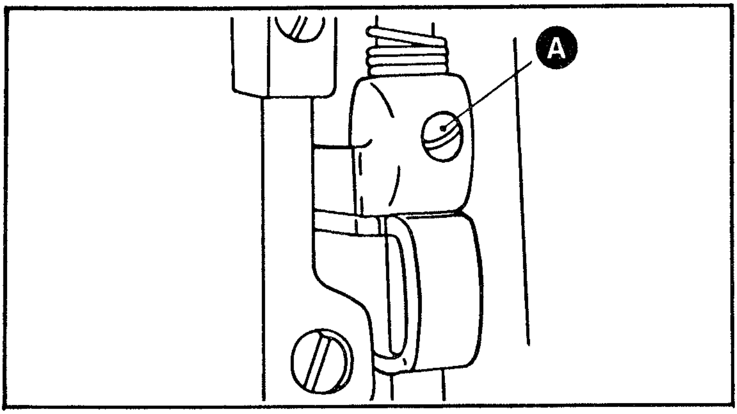


Fig. 5-23. On White Models 764 and 769, the presser foot height above needle plate is set by loosening the screw, moving the presser bar up or down until a height of 7/32 is attained and tightening screw A.

- Loosen screw A.
- Adjust the height of the presser foot to 7/32 inch from the surface of the needle plate to the bottom edge of the presser foot, by raising or lowering as needed, making sure the needle clamp, at the lowest stroke of the needle, just clears the foot in the lift position.
- Tighten screw A securely.

White Models 782, 793, 804 and 970

On Models 782, 793, 804 and 970, the correct height of the sole of the presser foot above the top surface of the needle plate when the presser bar is in the up position is 7/32 inches (5.5mm). Make this adjustment (Fig. 5-24) by: lifting the presser bar and opening the face plate. Remove the lamp holder plate by loosening screw A. Loosen screw B and adjust the height of the presser foot to 7/32 inches from the surface of the needle plate, by raising or lowering the presser bar as appropriate. Make sure the needle clamp, at the lowest stroke of the needle, just clears the foot in the lifted position. Tighten screw B securely and then replace the lamp holder plate. Tighten screw A.

The White Model 960

On White Model 960, the correct height of the sole of the presser foot above the top surface of the needle plate when the presser bar is in the up position is 7/32 inch (5.5mm). Make this adjustment as follows (Fig. 5-25):

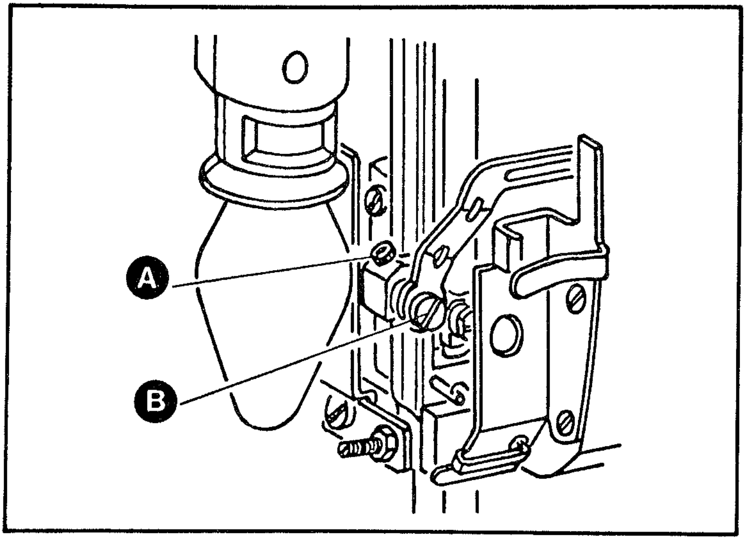


Fig. 5-24. On White Models 782, 793, 804 and 970, the presser bar height can be set to 7/32 by removing the lamp holder, loosening screw B and moving the presser bar up or down as appropriate. Retighten screw B without rotating the bar to cause misalignment to the foot to the edge of the needle plate.

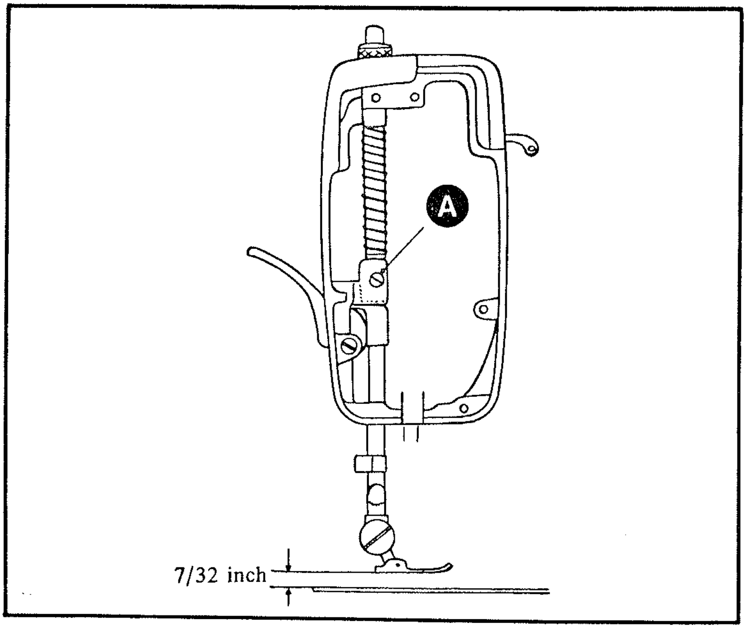


Fig. 5-25. On White Model 960, the sole of the presser foot should be 7/32 inch above the needle plate when the presser bar is raised to the up position.

- Lift up the presser bar and open the face plate.
- Loosen screw A.
- Adjust the height of the presser foot to 7/32 inch from the surface of the needle plate.
- Tighten screw A securely.

ADJUSTING PRESSER FOOT ALIGNMENT

On all White Models, the presser foot should be aligned parallel with the feed dog slots. This adjustment should be made as a routine procedure when adjusting the presser bar height by simply turning the presser bar after the clamping screw has been loosened with an attached presser foot (be sure the foot is securely clamped), until the alignment is correct.

If the presser foot is aligned as a separate procedure, follow the instructions for gaining access to the presser bar clamping screw for your particular model (as described under the immediately foregoing headings), and, without disturbing the presser bar height, align the presser foot. Tighten the presser bar clamping screw securely after making the adjustment.

TIMING THE SHUTTLE TO THE NEEDLE

To be sure to which White Models for the following procedures apply, *read the headings carefully.*

Miscellaneous White Models With Oscillating Shuttles

On miscellaneous White Models with oscillating shuttles, the needle bar height is adjusted as part of the sequence of timing the shuttle to the needle.

On the side load machine the needle bar height is checked as the distance of the top of the needle eye from the shuttle hook point when the shuttle hook point comes to the centerline of the needle when the needle is on its upward stroke, regardless of the needle position (Fig. 5-26A).

On the front load machines, the needle bar height is checked as the distance from the top of the needle eye to the shuttle point when the needle is on its upward stroke, with the needle position set on maximum zig-zag width, and the needle ascending on the left of its stroke.

Therefore, the preliminary step to adjusting the shuttle needle timing on the front load machine is to set the stitch width to its maximum setting on zig-zag stitching; whereas, on the side load machine, the adjustment can be made with the needle at any position.

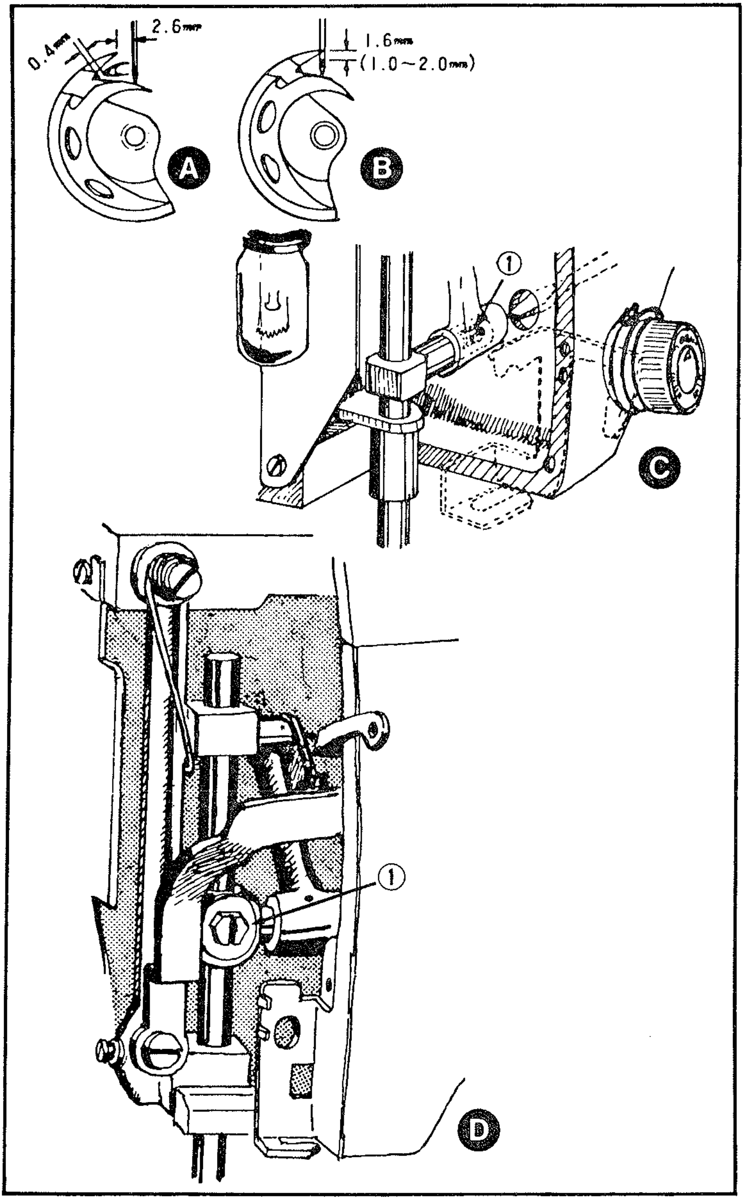


Fig. 5-26. On any machine, if the correct thread is used, the primary cause of missed stitches is incorrect timing of the shuttle point to the centerline of the needle. On White Models with the oscillating shuttles, this timing is achieved by adjusting the needle bar height. However, there are several steps to this procedure, and they will vary in accordance with whether the machine is a side load or front load machine.

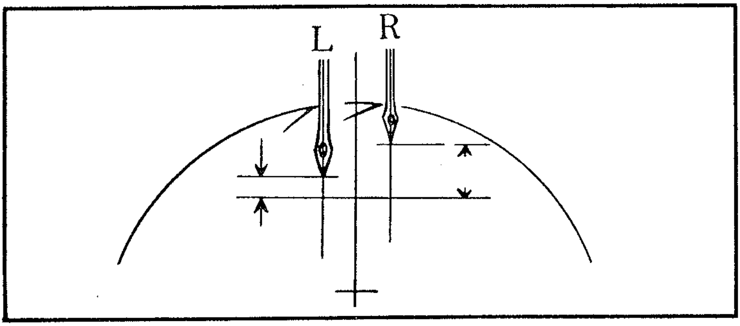


Fig. 5-27. The White Models 764 and 769 have fully rotating shuttles. To fully understand why the shuttle-needle timing should be checked on both the left and right swing of the needle, thread the machne, set a zig-zag stitch width of 5 and watch the up and down motion of the needle as you turn the hand wheel toward you under the bed of the machine. The basic requirement of correct timing is that the shuttle hook should be at the centerline of the needle, close enough to the needle eye that it will engage a thread loop on either the left or right needle swing. Don't forget that poor threads especially 100% polyesters, can also cause missed stitches.

To make the adjustment (Fig. 5-26) on the front load machine, turn the hand wheel slowly to turn the shuttle hook to its leftward oscillating end with the needle bar in its lowest position—on the left side of the needle stroke. Check to see if the distance between the shuttle hook point and centerline of the needle is about 2.6mm.

Turn the hand wheel farther, until the shuttle point comes to the centerline of the needle, and check the vertical distance between the shuttle hook point and the top of the needle eye. This distance should be between 1mm and 2mm, or, more accurately, 1.6mm as shown in Fig. 5-26B.

If the needle bar height is incorrect, turn the hand wheel to lower the needle bar to its lowest position, and, in the case of the side load machine, refer to Fig. 5-26C and loosen set screw 1. In the case of the front load machine, refer to Fig. 5-26D and loosen set screw 1.

On either the side load or front load machine, after loosening set screw 1, raise or lower the needle bar to the correct height, then tighten set screw 1.

To adjust the clearance between the shuttle driver spring and the shuttle hook, rotate the handwheel until the shuttle driver is at the low end of the raceway, place a screwdriver blade between the shuttle driver and race, and bend the driver slightly upward for less clearance. To increase the clearance, use a pair of snub-nosed pliers and grasp the shuttle driver and raceway and apply pressure, taking care not to scar the raceway surface.

White Models 764 and 769

On White Models 764 and 769, the timing of the shuttle hook and centerline of the needle should be checked on both the left and right upward strokes of the needle (Fig. 5-27).

To make the adjustment (Fig. 5-28), remove the bobbin case and race cover. Set the stitch width lever at position 5. If the timing is correct, the needle, on its left upward stroke, must rise slightly before the point of the hook passes the centerline of the needle. On the right upward stroke of the needle, the shuttle hook will be opposite the centerline of the needle when the hook is just slightly above the top of the needle eye (Fig. 5-27).

If adjustment is needed, loosen screw C (Fig. 5-28) and turn the driver shaft A until the conditions in Fig. 5-27 are met. After the adjustment tighten screw C securely.

White Models 782, 793, 804 and 970

On White Models 782, 793, 804 and 970, the timing of the shuttle hook to the centerline of the needle should be checked on both the left and right upward stroke of the needle (Fig. 5-29).

Make the adjustment as follows (Fig. 5-30):

- Remove the bobbin case and race cover
- Set the stitch width at position 5. When the timing is correct, the needle, in its left upward stroke, must rise just slightly before the point of the hook passes the centerline of the needle. On the right upward stroke, the needle rise will

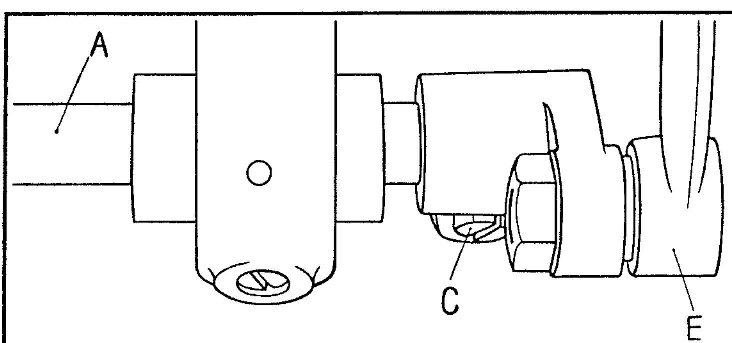


Fig. 5-28. On any rotating shuttle machine, the shuttle timing is achieved by finding some way of rotating the shuttle to the centerline of the needle when the needle has risen to form a thread loop, without moving any other mechanisms of the machine. On White Models 764 and 769, this is accomplished by loosening screw C and rotating the shuttle driving shaft A. Be sure nothing else moves but the driving shaft and shuttle.

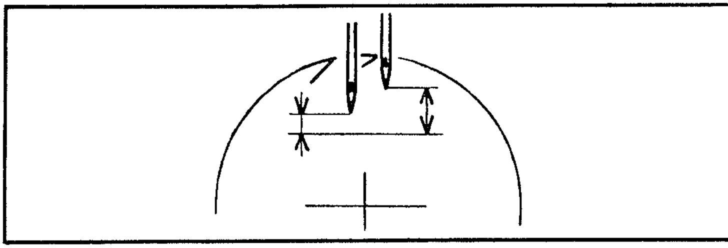


Fig. 5-29. Models 782, 793, 804 and 970 have the oscillating shuttles, and shuttle-needle timing is accomplished by rotating the shuttle driving shaft (and shuttle) without changing the positional relationship of any other mechanisms. As with any other oscillating shuttle zig-zag machine, best results will be obtained if the timing is checked on both the left and right needle swing.

be greater, and the distance of the hook above the top of the needle eye will be correspondingly smaller (Fig. 5-29).

- If the conditions of Fig. 5-29 are not met (or skipped stitches indicate faulty timing), refer to Fig. 5-30, loosen screw C and turn the driver shaft A until the timing is correct. After the adjustment, tighten screw C securely.

The White Model 960

On the White Model 960, the timing of the shuttle hook to the centerline of the needle should be checked on both the left and right upward strokes of the needle (Fig. 5-31). If the conditions of Fig. 5-31 are not met (or skipped stitches indicate faulty timing), refer to Fig. 5-32, loosen screw C and turn the driver shaft A until the timing is correct. After the adjustment, tighten screw C.

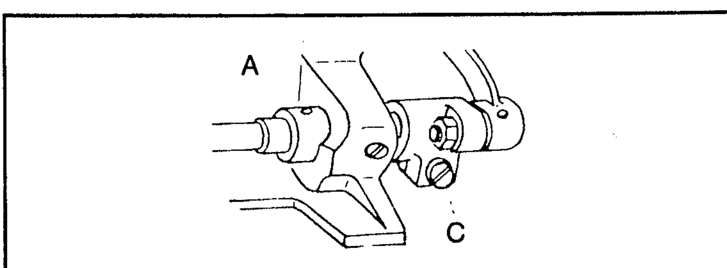


Fig. 5-30. To adjust the timing of Models 782, 793, 804 and 970, simply rotate the hand wheel toward you with the presser foot up until the very bottom of the stroke is reached and the needle has risen to form a thread loop, loosen screw C, rotate shaft A to turn the shuttle until the hook point is opposite the center line of the needle and engages the thread loop and tighten screw C. With this done, the timing is technically correct, and missed stitches will be caused by other factors.

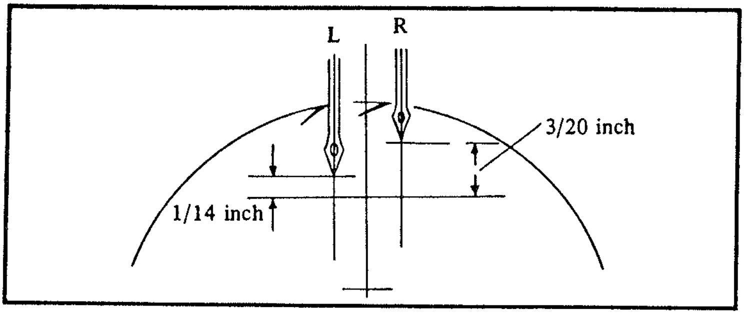


Fig. 5-31. In reference to White Model 960 measurements are important; however, results are equally important. It is never advisable to adjust the timing of the machine if it is not missing stitches. If you use metric measurements, use a calculator to convert 1/14 inches to millimeters by multiplying it by 25.4, thus: 1 divided by 14 = X 25.4 = 1.8mm; and 3/20 inches is likewise converted to 3.8mm. Note that these measurements are the distances the needle moves upward after having reached the bottom of its stroke or the needle-bar rise.

ADJUSTING NEEDLE SHUTTLE CLEARANCE

It is important to understand that the needle shuttle clearance is the clearance between the shuttle and the side of the needle, and although an incorrect clearance may cause missed stitches, this is not a *per see* timing problem

To be sure to which White Models the following procedures apply, *read the headings carefully.*

Miscellaneous White Models With Oscillating Shuttles

On miscellaneous White Models with oscillating shuttles, the needle shuttle clearance, with a new needle installed, is .03mm or

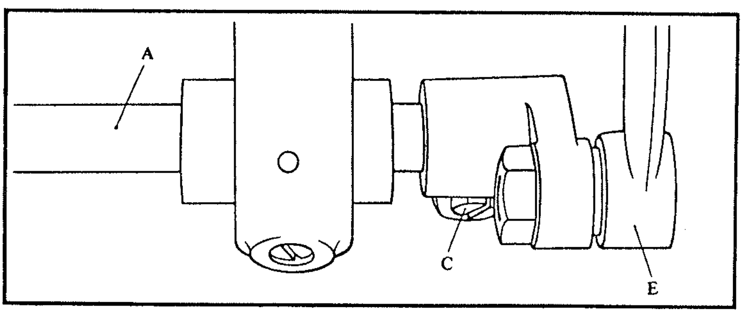


Fig. 5-32. On Model 960, once the needle-bar rise is established on the left needle swing, loosen screw C and turn the shuttle driver shaft A until the shuttle hook point is opposite the centerline of the needle. The timing should then be correct on the right swing of the needle, but if the hook is too high above the needle eye, you will still have timing problems.

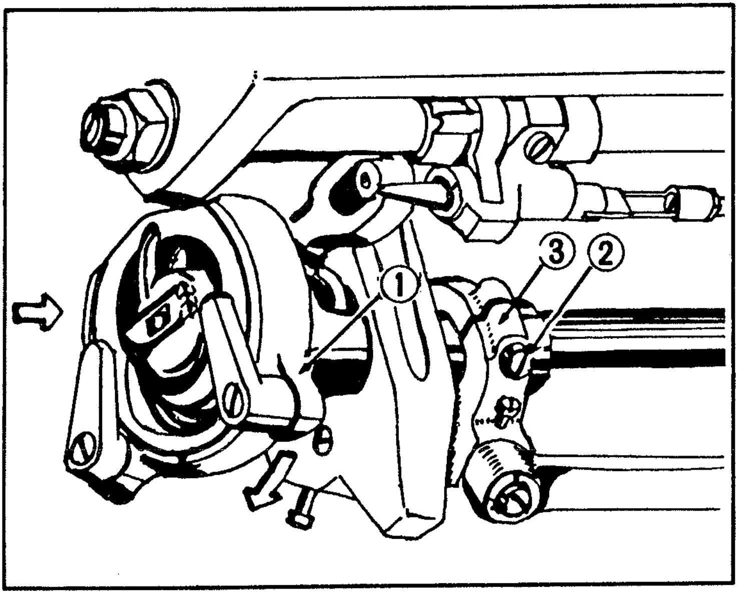


Fig. 5-33. Incorrect clearance between the shuttle and side of the needle can also cause missed stitches. To adjust this clearance on White side load machines with oscillating shuttles, read the text carefully.

about the thickness of a hair. The procedure for adjusting the clearance depends upon whether the machine is a side load or a front load machine.

Side Load Machines. To adjust the needle shuttle clearance on side load machines, install a new, perfect, needle and check the correct needle position for zig-zag sewing. Check the correct needle position for straight stitch sewing and check the needle bar height.

Set the stitch width at maximum and, referring to Fig. 5-33, check the race body 1 for looseness. If necessary, tighten the body with screw 2 or the vertical shaft set screw (Fig. 5-34). Adjust the needle and shuttle cap clearance (Fig. 5-35) by loosening set screw 2 (Fig. 5-33). Without changing the needle and shuttle hook clearance, turn the shuttle body so that the needle is centered in the slot opening (Fig. 5-35) when rotated in the left and right side of the cap spring. Tighten screw 2 (Fig. 5-33). Then check to see that the needle shuttle clearance is about .03mm.

If adjustment is required, loosen screw 4 (Fig. 5-34) and move the shuttle body 1 (Fig. 5-33) either in or out, as appropriate. Hold the race firmly and tighten screw 4.

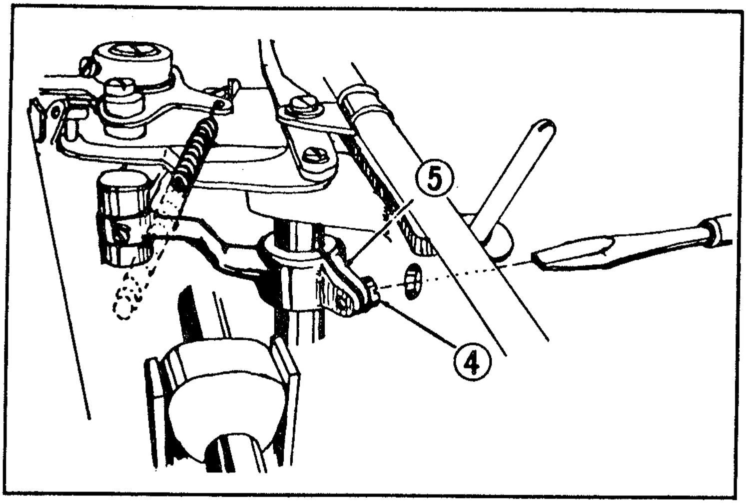


Fig. 5-34. To correct the clearance between the shuttle and side of the needle on side load machines with the oscillating shuttles, study the text carefully.

Front Load Machines. To adjust the needle shuttle clearance on front load machines, proceed as follows (Fig. 5-36).

- Set the stitch width at maximum and stitch pattern at regular zig-zag sewing. Turn the hand wheel by hand to raise the needle in its left upward stroke until the shuttle hook point reaches just behind the needle. Then check the needle shuttle clearance (Fig. 5-36).

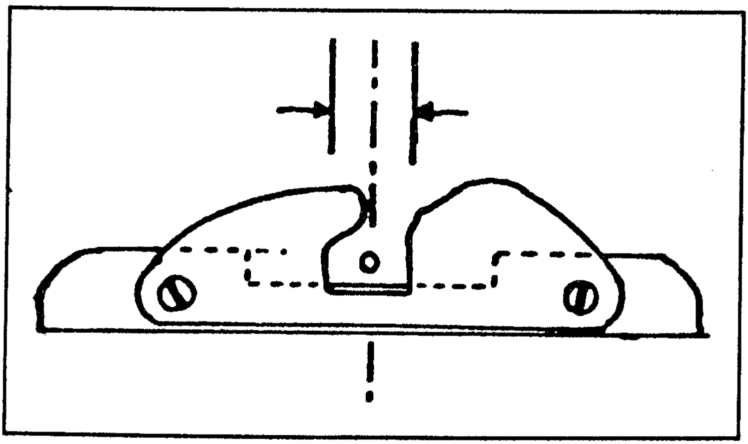


Fig. 5-35. As part of the shuttle-needle clearance adjustment sequence, the needle must be centered in the slot of the shuttle body.

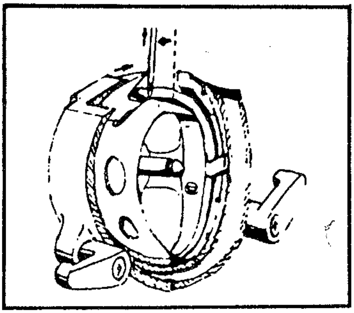


Fig. 5-36. On White front load machines with oscillating shuttles, set the shuttle-needle clearance by referring to this figure and Fig. 5-37 as well as proceeding as explained in the text.

- If the clearance is incorrect, open the face cover. Press the needle bar supporter 1 (Fig. 5-37) to the right by finger to check, and remember the torque of its sideward movement.
- Unhook the spring 2 (Fig. 5-37) from the needle bar supporter and very slightly loosen the set screw 3.
- Carefully shift, in or out, the needle bar supporter shaft 4, together with the needle bar supporter, by lightly knocking on the end of the supporter shaft or slightly enlarging the

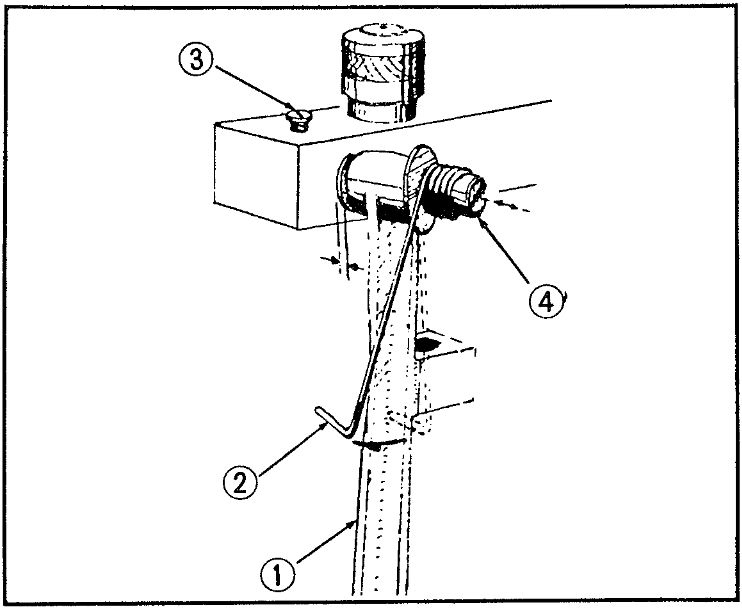


Fig. 5-37. On White front load machines with oscillating shuttles, set the shuttle-needle clearance by following the directions in the text. Note that when you make this adjustment, you are changing the needle bar position in relation to the shuttle, just slightly.

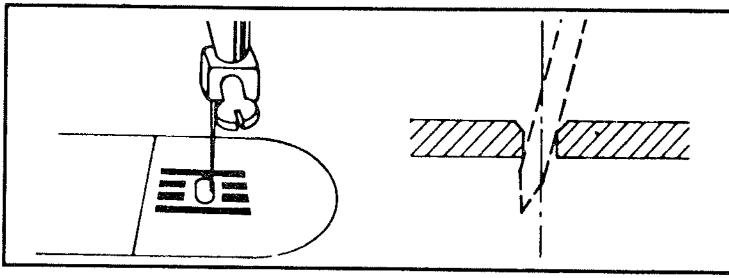


Fig. 5-38. If the slight movement of the needle bar when making the shuttle-needle clearance adjustment on front load, oscillating shuttle machines caused the needle to strike the needle plate or enter the needle slot on an angle, you will have to re-adjust the needle bar position and move the shuttle body.

distance of the supporter shaft from the machine casting by inserting a screwdriver to correct the needle shuttle clearance. Do not turn the angle of the slot on the shaft end for insertion of the spring in this step.

- Check the torque of the sideward movement of the needle bar supporter, tighten the set screw 3, hook the spring 2 and check the pressure of the spring to spring the supporter back to the left.

If there was considerable discrepancy in the needle shuttle clearance, the above adjustment may cause the needle to strike the needle plate, or, alternatively, the needle may go through the needle hole in such a manner as to cock the needle bar (Fig. 5-38). In this case, rather than moving the needle in relation to the hook, you must leave the needle stationary, and move the shuttle body in relation to the hook.

White Models 764 and 769.

The correct needle shuttle clearance on White Models 764 and 769 is *as close as possible without touching.* Adjust the clearance as follows (Fig. 5-39):

- Remove the bobbin case and race cover.
- Turn the hand wheel to bring the needle point directly over the point of the hook.
- Holding the hook in the race by hand, check the clearance by pressing the needle toward the hook with a screwdriver. The movement of the needle before touching the hook should be barely perceptible.
- If adjustment is needed, remove the gear box and loosen screws A and B.

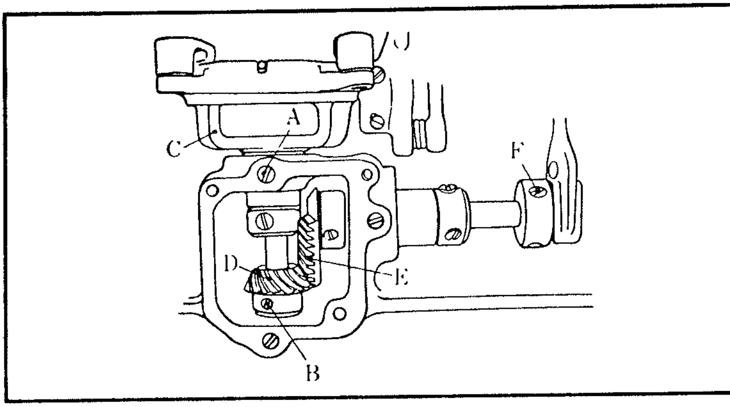


Fig. 5-39. On White Models 764 and 769, the shuttle-needle clearance is set by moving the shuttle body shaft laterally along the shaft's axis. When this adjustment is complete, make the sure the gears D and E mesh properly.

- Adjust the clearance by moving the race body C in the appropriate direction. When the clearance is correct, tighten screw A securely.
- Check the meshing of the driver shaft gear D and the lower shaft gear E so as to eliminate either back-lash or noisy running. Finally, tighten screw B securely.

White Models 782, 793, 804 and 970

The correct needle shuttle clearance on the White Models 782, 793, 804 and 970 is *as close as possible without touching.* Adjust this clearance as follows (Fig. 5-40):

- Remove the bobbin case and race cover.
- Turn the handwheel to bring the needle point directly over the point of the hook.
- Holding the hook in race by hand, check the clearance by pressing the needle toward the hook with a screwdriver. The movement of the needle before touching the hook should be barely perceptible.
- If adjustment is required, remove the gear box cover and loosen screws A and B.
- Adjust the clearance by moving the race body C in the appropriate direction. When correct, tighten screw A securely.
- Check the meshing of the driver shaft gear D and the lower shaft gear E to eliminate back-lash or noisy running. Finally, tighten screw B securely.

The White Model 960

The correct needle shuttle clearance on the White Models 960 is *as close as possible without touching.* Adjust this clearance on the Model 960 by referring *again* to Fig. 5-39, and going through the same procedure for Models 764 and 769.

ADJUSTING NEEDLE BAR HEIGHT

To be sure to which White Models the following procedures apply, *read the headings carefully.*

White Models 764 and 769

If the height of the needle bar is incorrect, the machine may skip stitches even though the timing of the shuttle hook point to the centerline of the needle is correct. To adjust this height on Models 764 and 769, insert a standard W.S.M. (15X1) needle and proceed as follows (Fig. 5-41):

- Remove the bobbin case.
- Turn the hand wheel toward you until the needle reaches its lowest point. The tip of the needle should just protrude through the U-shaped slot in the hook (Fig. 5-41B).
- If the above condition is not met, loosen screw A of Fig. 5-41B slightly, and move the needle bar upward or downward as required.
- When the adjustment is correct, tighten screw A securely.

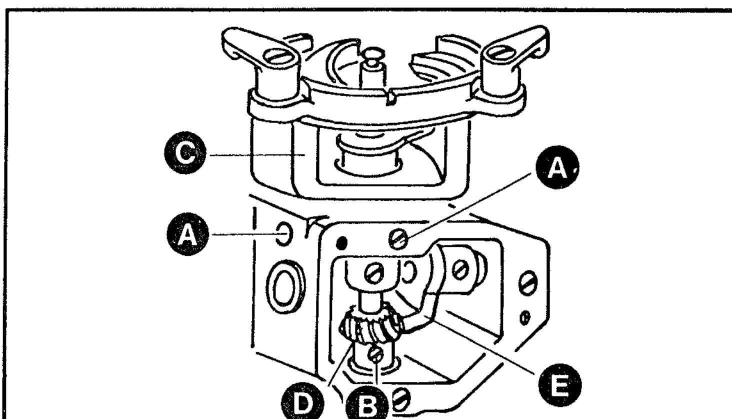


Fig. 5-40. On White Models 782, 793, 804 and 940, the shuttle-needle clearance is set by moving the shuttle body shaft laterally along its axis, making sure that gears D and E are correctly in mesh when you are through.

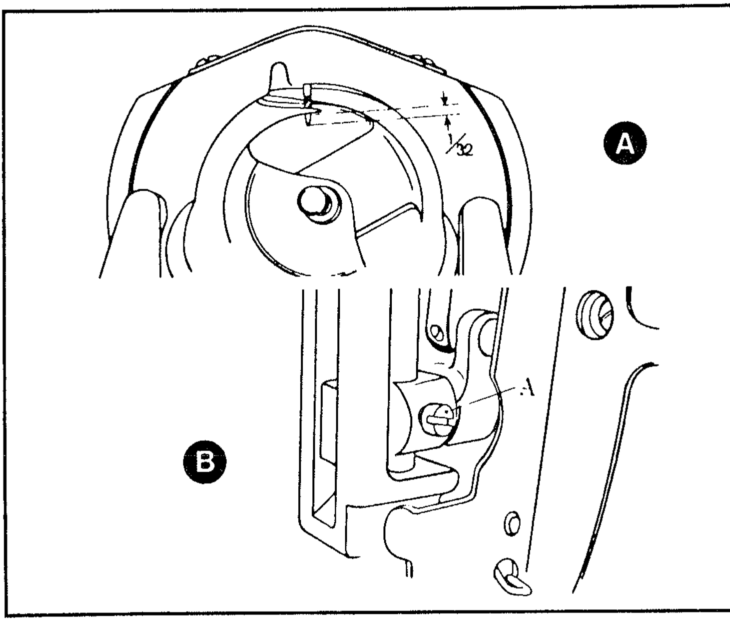


Fig. 5-41. To adjust the needle bar height on White Models 764 and 769, study A and B and proceed according to the instructions in the text. Remember that incorrect needle bar height may be a cause of missed stitches.

White Models 782, 793, 804 and 970.

To adjust the needle bar height on White Models 782, 793, 804 and 970, insert a standard needle, and proceed as follows (Fig. 5-42):

- Remove the bobbin case.
- Set the needle position at C and the zig-zag width at 0.
- Turn the hand wheel toward you until the needle reaches its lowest position. The point of the needle then should just protrude through the U-shaped slot in the hook (Fig. 4-42A).
- If adjustment is required, loosen screw A (Fig. 5-42B), and move the needle bar up or down, as required.
- Tighten screw A securely.

The White Model 960

To adjust the needle bar height on White Model 960, use a standard needle, and proceed as follows (Fig. 5-43):

- Remove the bobbin case.

- Turn the balance wheel toward you until the needle reaches its lowest point. The tip of the needle should just protrude through the U-shaped slot in the hook (Fig. 5-43A).
- If adjustment is required, loosen screw A (Fig. 5-43B) slightly, and move the needle bar up or down as required.
- Tighten screw A securely.

ADJUSTING NEEDLE POSITION

To be sure to which White Models the following procedures apply, *read the headings carefully.*

Miscellaneous White Models with Oscillating Shuttles

On miscellaneous White Models with the oscillating shuttles, the needle position should be checked for both zig-zag sewing and straight stitch sewing. Further, the adjustment for the needle position for zig-zag sewing will depend upon whether the machine is a side load or front load machine.

Needle Position for Zig-zag Sewing. The basic straight stitch position is in the left position on side load machines. Erratic

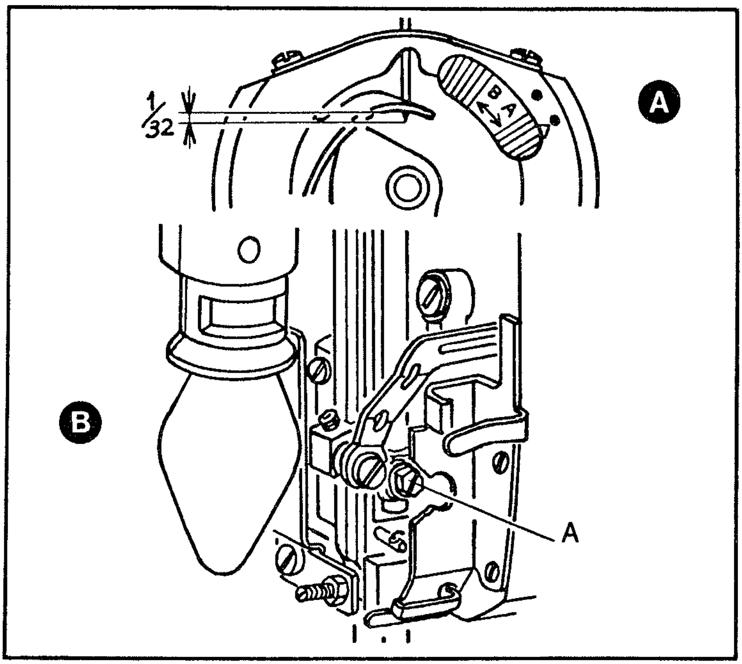


Fig. 5-42. To adjust the needle bar height on Models 782, 793, 804 and 970, study A and B and proceed according to the instructions in the text.

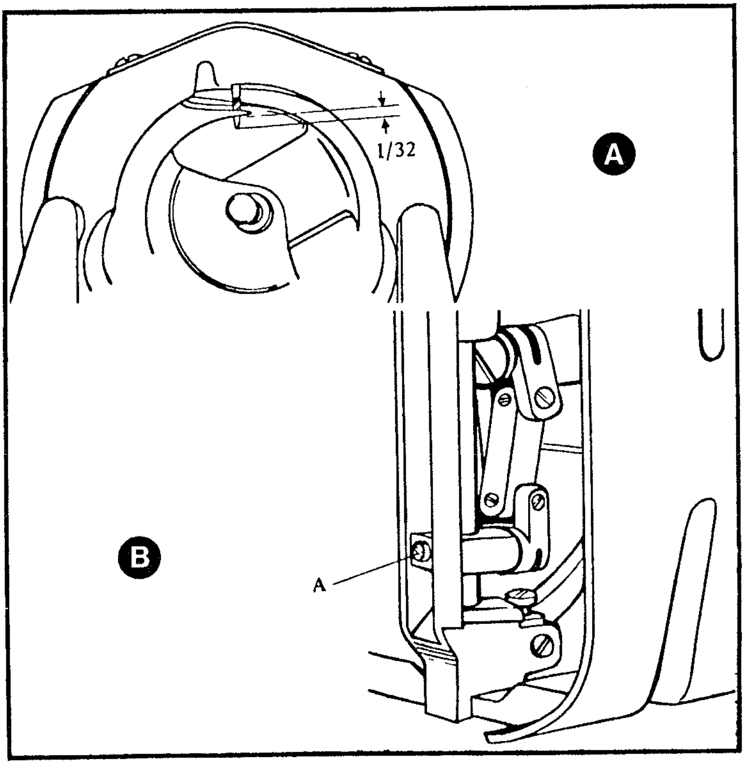


Fig. 5-43. To adjust the needle bar height on Model 960, study A and B and proceed according to the instructions in the text.

sewing in zig-zag and straight stitch may occur if the needle is incorrectly set.

Adjusting Needle Position for Zig-zag on Side Load Machines. On side load machines, adjusting the needle position for zig-zag sewing setting the stitch width to maximum, turning the hand wheel until the needle bar is at the bottom of its down stroke in its left swing, and leave it in this position. Reset the stitch width to 0, grasp the zig-zag lever or knob and move it from 0 to 5. If the needle moves from its original setting the needle position is correct.

If adjustment is needed, remove the top cover, loosen set screw 1 and rotate the collar 2 slightly. Move the knob or lever several times during this adjustment until the needle remains stationary. Then, tighten screw 1 securely.

The needle clearance to the hook may be affected by this adjustment, in which case it will be necessary to reset the needle shuttle clearance.

Adjusting Needle Position for Zig-zag on Front Load Machines. The basic straight stitch position is in the center on front load machines. To adjust the needle position on front load machines, proceed as follows (Fig. 5-45):

- Set the needle position change control at C. Set the stitch width to 0. Turn the hand wheel to lower the needle.
- If the needle is not exactly at the center of the needle hole, open the face cover, remove the light bulb and loosen screw 1 (Fig. 5-45A) so that the needle is positioned exactly at the center of the needle hole. Tighten set screw 1 securely.
- Machines with the needle position change device do not require any additional adjustment since the correction of the center needle position will straighten both the left and right needle positions. However, on machines without the needle position change device, remove the top cover and readjust the needle swing allotment toward the right and left from the center. By loosening the locking nut 2 (Fig. 5-45B), turn the adjusting screw 1 so that the needle swings the same distance to the right and left from the center in zig-zag sewing. When the adjustment is made, tighten the locking nut 2 securely.

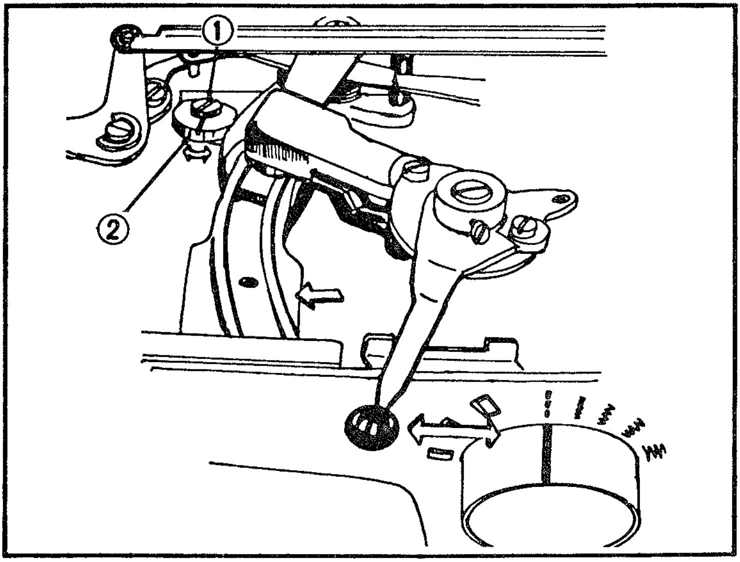


Fig. 5-44. To adjust the various needle positions on side load and front load machines with oscillating shuttles, read the text carefully. This mechanism is under the top cover.

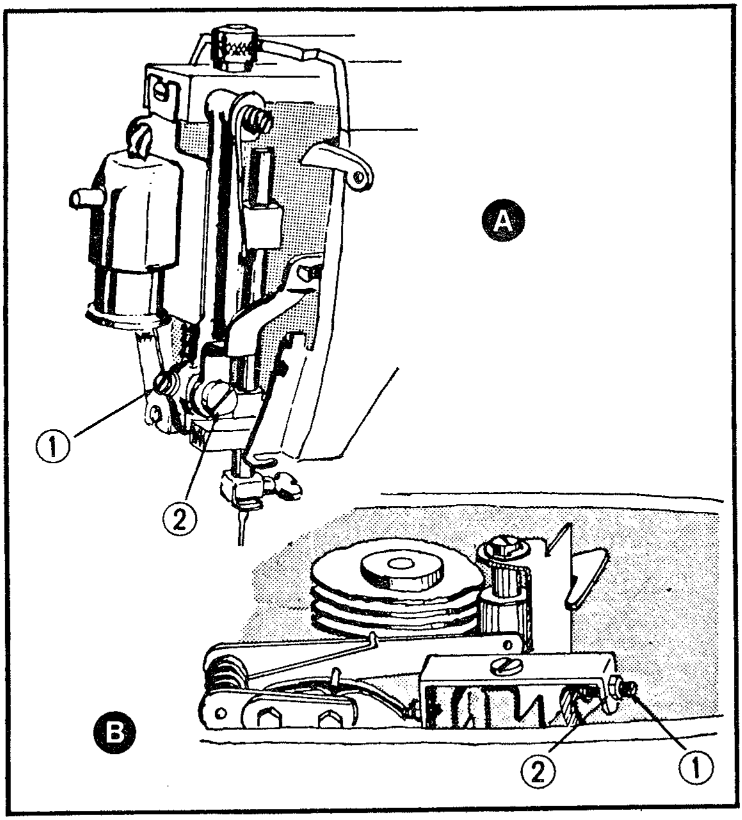


Fig. 5-45. When studying these illustrations relating to White Models with oscillating shuttles, be sure to read the text, as some illustrations apply to side load machines and some to front load machines.

Needle Position in Straight Stitch Sewing. On side load machines, the correct needle position in straight stitch sewing is .8mm to 1mm clearance between the needle and the edge of the needle slot. To make this adjustment first check the basic needle position for zig-zag sewing, then proceed as follows (Fig. 5-46):

- If adjustment is required, remove the top cover and loosen set screw 1 (Fig. 5-46B) of the needle bar connecting rod.
- With the stitch width control at straight stitch position, adjust the needle bar connecting rod that the needle falls in the correct position (Fig. 5-46A). When correct, tighten the set screw 1.
- Readjust the needle shuttle clearance as described previously in this chapter.

White Models 764 and 769.

The needle positions should be adjusted for both zig-zag and straight stitching on White Models 764 and 769.

Zig-Zag on Models 764 and 769. The needle point should always fall in the same position when it is in the left position of the zig-zag throw. If not, the appearance of the decorative and buttonhole stitches will be poor. Make the adjustment as follows (Fig. 5-47):

- Set the decorative stitch change knob to M and turn the hand wheel to lower the needle to its lowest position on the left swing.

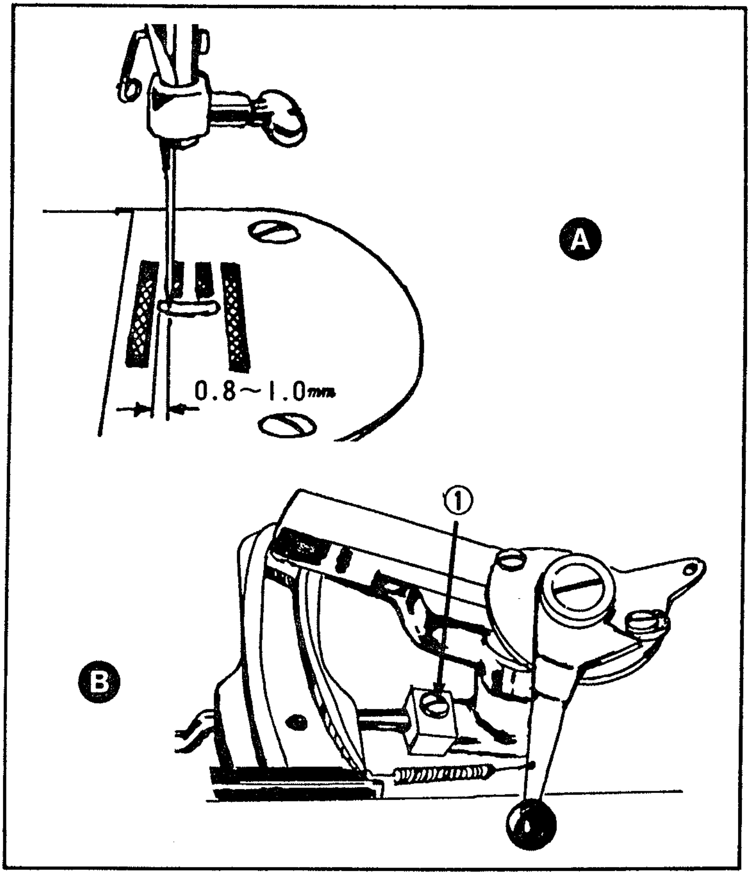


Fig. 5-46. The needle position for straight stitch sewing on side load oscillating shuttle machines is .8mm to 1mm from the edge of the needle slot.

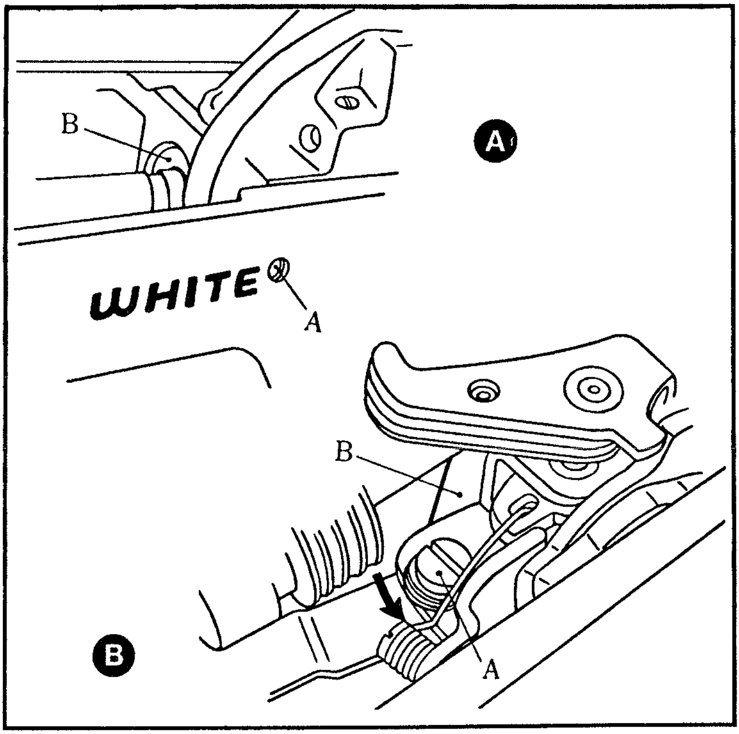


Fig. 5-47. On White Models 764 and 769, the correct needle position for zig-zag sewing is explained in the text.

- Move the zig-zag stitch regulating lever from 0 to 5. If the needle makes any movement toward the right, loosen screw A (Fig. 5-47A) and move the zig-zag regulator body B to the arrow-indicated direction (Fig. 5-47B) to stop any sidewise movement of the needle. If the needle makes a movement to the left, move the regulator body B in the opposite direction.
- Tighten screw A securely.

The left position should be checked for proper zig-zag stitching even if the proper needle position in straight stitching has already been obtained.

Straight Stitching On Models 764 and 769. The needle position adjustment for the straight stitch on Models 764 and 769 should be made with the needle going up and down through the center of the needle hole in the straight stitch needle plate. It consists of two adjustments: a rough adjustment, which we will call

Adjustment No. 1, and a micro-adjustment, which we will call Adjustment No. 2. For best results, you should make both adjustments.

Adjustment No. 1. Refer to Fig. 5-48A and replace the zig-zag stitch needle plate with the straight stitch needle plate. Set the decorative stitch change knob to M and the zig-zag regulating lever to 0. Turn the hand wheel to bring the needle to its lowest position. Loosen screw A, Fig. 5-48A. Adjust the needle bar position by moving it to the right or left so that the needle is in the center of the needle hole. Tighten screw A securely.

Adjustment No. 2. To make the micro-adjustment (Fig. 5-48B) replace the zig-zag needle plate with the straight stitch needle plate. Set the decorative stitch change knob to M and the zig-zag regulating lever to 0. Open the face plate and remove the thread guide plate. Turn the hand wheel to bring the needle to its

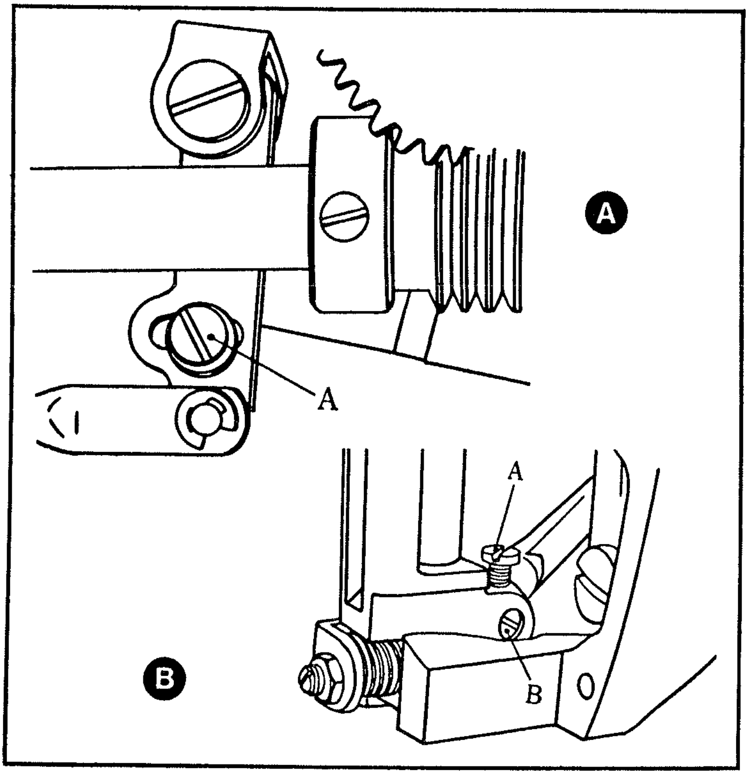


Fig. 5-48. On White Models 764 and 769, the adjustment of the needle position for straight stitching is done in two procedures.

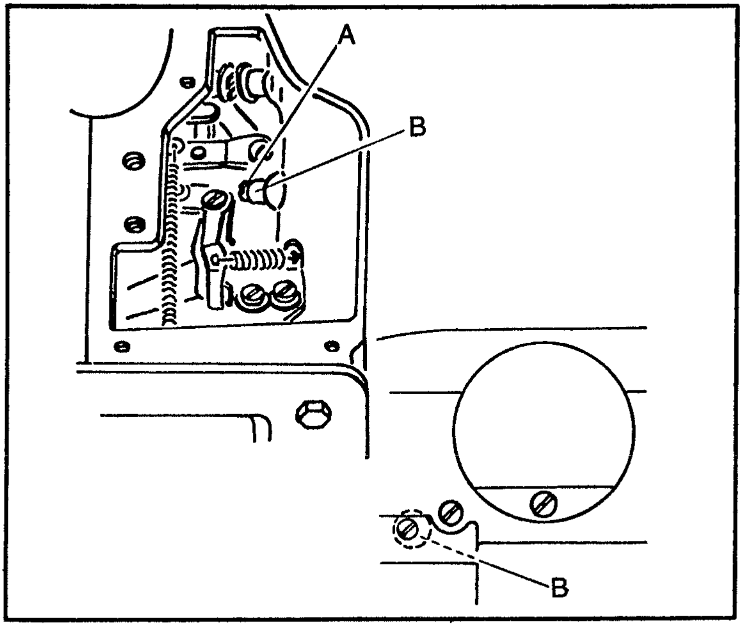


Fig. 5-49. On White Models 782, 793, 804 and 970, the needle position should be adjusted for both zig-zag and straight stitching, with the zig-zag adjustment being made on both the left and right needle positions.

lowest position. Loosen screw A (Fig. 5-48B). Turn screw B to shift the position of the needle bar until the needle aligns with the center of the needle hole. Tighten screw A securely and replace the thread guide plate.

White Models 782, 793, 804 and 970.

On Models 782, 793, 804 and 970, the needle position should be adjusted for both zig-zag sewing and straight stitching, with the zig-zag adjustment being made on both the right and left needle positions. To be sure to which of these models the following procedures apply, *read the headings carefully.*

Right Needle Position for Zig-zag on Models 782, 793, 804 and 970. On Models 782, 793, 804 and 970, when the needle position control is set at R (right), and the cam follower is on the low point of the cam (zig-zag stitching), the needle should remain stationary when the zig-zag width control is moved from 0 to 5. If not, the machine will make poor buttonholes and decorative stitches. Make this adjustment as follows (Figs. 5-49 *or* 5-50, whichever is appropriate on your machine):

- Set the pattern selector lever at manual zig-zag position, and the needle position at R.
- Turn the hand wheel, watching the movement of the cam follower until the follower reaches the lowest spot of the cam tooth.
- Loosen locking nut A slightly.
- Swing the zig-zag width lever between 0 and 5, watching the movement of the needle.
- Turn the eccentric B either clockwise or counterclockwise until the needle does not move while the zig-zag width control is operated between 0 and 5.
- When there is no needle movement, tighten the locking nut A securely.

Left Needle Position for Zig-zag on Models 782, 793, 804 and 970. On models 782, 793, 804 and 970, when the needle position control is set at the L (left) position and the cam follower is on the high lobe on the cam (zig-zag stitching) the needle should remain stationary when the zig-zag width control is moved from 0 to 5. Make this adjustment as follows (Figs. 5-51 *or* 5-52, whichever is appropriate on your machine):

- Set the machine for zig-zag stitching
- Set the needle position control at the left position.
- Turn the hand wheel until the cam follower finger is on the high lobe of the cam.
- Loosen screw A slightly.

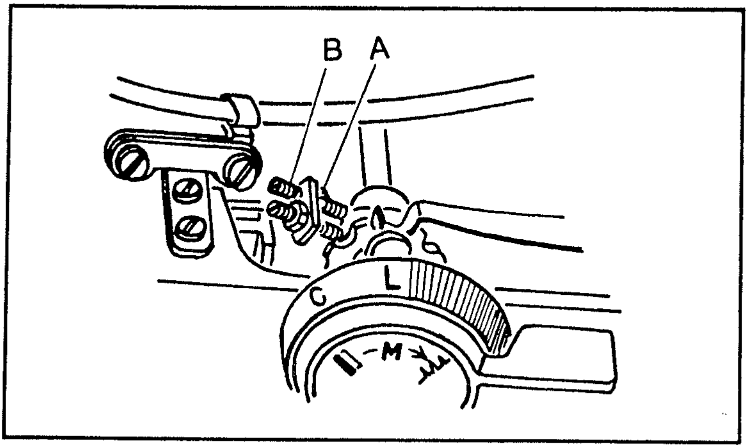


Fig. 5-50. Needle position adjustments on White Models 783, 793, 804 and 970.

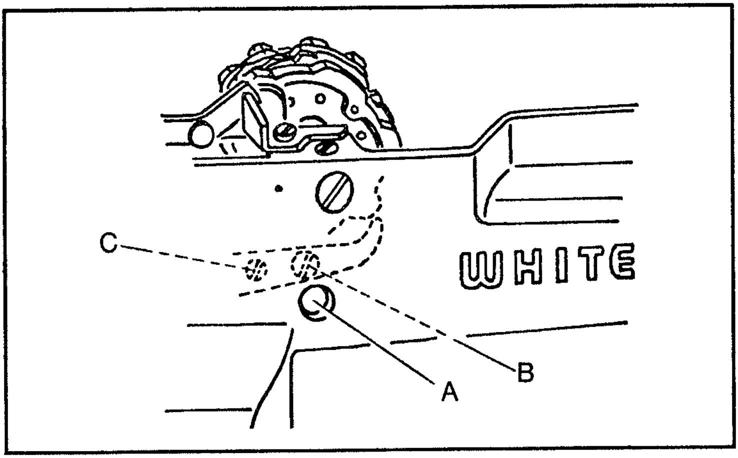


Fig. 5-51. Adjusting the left needle position on White Models 782, 793, 804 and 970.

- Move the zig-zag width control knob between 0 and 5, watching the movement of the needle.
- Turn eccentric B clockwise or counterclockwise until the needle does not move while the zig-zag width control is operated between 0 and 5.
- When the needle movement is stopped, tighten screw A securely.

Straight Stitching on Models 782, 793, 804 and 970. When straight stitching on Models 783, 793, 804, and 970, the needle should travel up and down through the center of the needle hole in the straight stitch needle plate. Make this adjustment (Fig. 5-53) by installing a straight stitch needle plate, set the pattern selector lever for straight stitching and the zig-zag width at 0. Turn the hand wheel to bring the needle to its lowest point. Loosen screw A. Turn eccentric B until the needle enters the center of the needle hole. When the adjustment is made, tighten screw A securely.

ADJUSTING THE ZIG-ZAG WIDTH

To be sure to which White Models the following procedures apply, *read the headings carefully.*

White Models 764 and 769

On White Models 764 and 769, the maximum zig-zag stitch width should be 3/16 inch. To adjust this width, proceed as follows (Fig. 5-54):

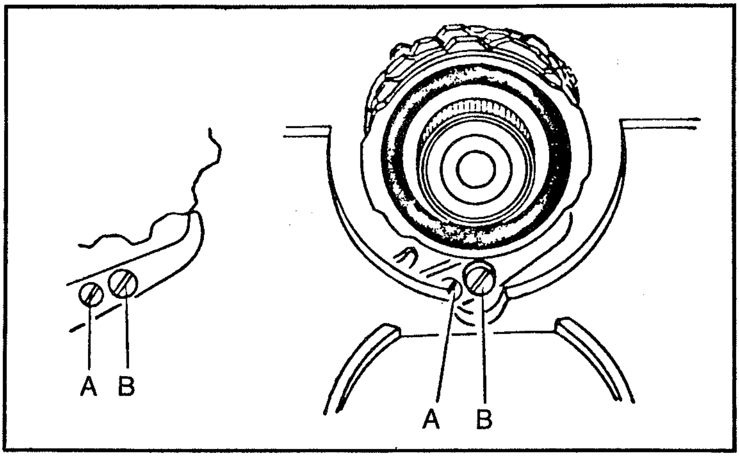


Fig. 5-52. Left needle position adjustments on Models 782, 793, 804 and 970.

- Set the decorative stitch change knob to position M.
- Set the zig-zag stitch regulating lever to 5.
- Loosen screw F slightly.
- Loosen lock nut G.
- Holding stopper L firmly to the direction indicated by the arrow, turn screw J to the right (to decrease the stitch width) or left (to increase the stitch width) until the width is 3/16 inch.

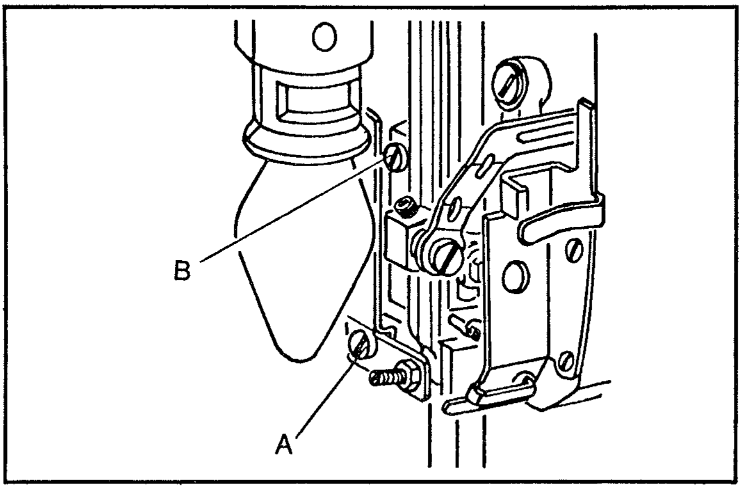


Fig. 5-53.Adjusting the straight stitch needle position on Models 782, 793, 804 and 970.

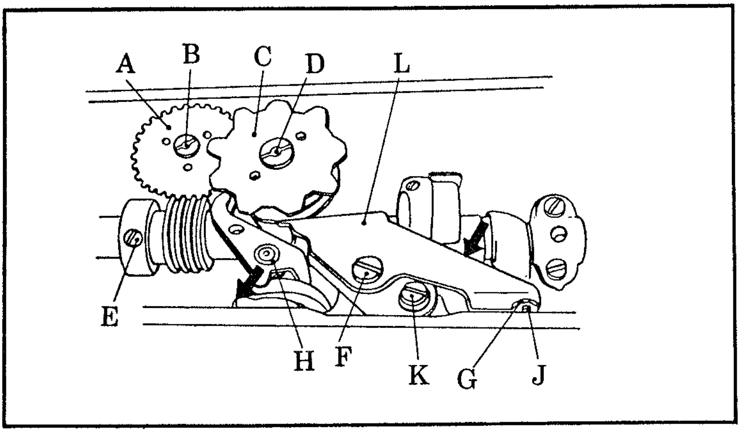


Fig. 5-54. On White Models 764 and 769, the maximum zig-zag stitch width should be 3/16 inch. The mechanism is easily accessible under the top cover, and the adjustment is a simple, five-step procedure.

White Models 782, 793, 804 and 970

On Models 782, 793, 804 and 970, the maximum zig-zag width should be 3/16 inch. To adjust this width (Fig. 5-51 *or* 5-52, whichever is appropriate on your machine), set the pattern selector lever at zig-zag. Set the zig-zag width at 5. Turn the hand wheel until the needle reaches its lowest point in the left-hand position. Loosen screw A slightly. Adjust the zig-zag width by turning eccentric B until the maximum stitch width is 3/16 inch. When the stitch width is correct, tighten screw A securely.

EQUALIZING THE FORWARD REVERSE STITCH

To be sure to which of the White Models the following procedures apply, *read the headings carefully.*

Miscellaneous White Models With Oscillating Shuttles

The two factors to conside on equalizing the forward reverse stitches of miscellaneous White Models with oscillating shuttles are equal lengths of the forward and reverse stitch when the stitch length is set at maximum, and the assurance of 0 feeding when the stitch length is set at 0. Of the two considerations, the latter is the most important.

Three different White mechanisms for reversing the stitch will be discussed with the different mechanisms being shown in Fig. 5-55A, 5-55B and 5-55C.

Example A. Refer to Fig. 5-55A and take of the top cover, set the stitch length control at 0, place a piece of paper under the presser foot and run the machine. If the paper moves backward, turn the feed regulating screw 1 clockwise. If the paper moves forward, turn the screw counterclockwise until the paper stops moving.

Example B. Refer to Fig. 5-55B and take off the top cover. Test for movement as explained in Example A. This type of reverse mechanism is at 0 feeding when rod C is centered exactly in the bottom of the V portion of B.

To achieve the correct position, the body A of the assembly must be rotated, allowing rod C to fall exactly into the V slot, and then locking in into position with the set screw.

Example C. Refer to Fig. 5-55C and take off the top cover. Test for movement as explained in Example A. This type of reverse mechanism is activated by a push rod with an activating finger held on the rod with two set screws. This finger pushes the linkage reverse mechanism if the machine is feeding at 0 setting.

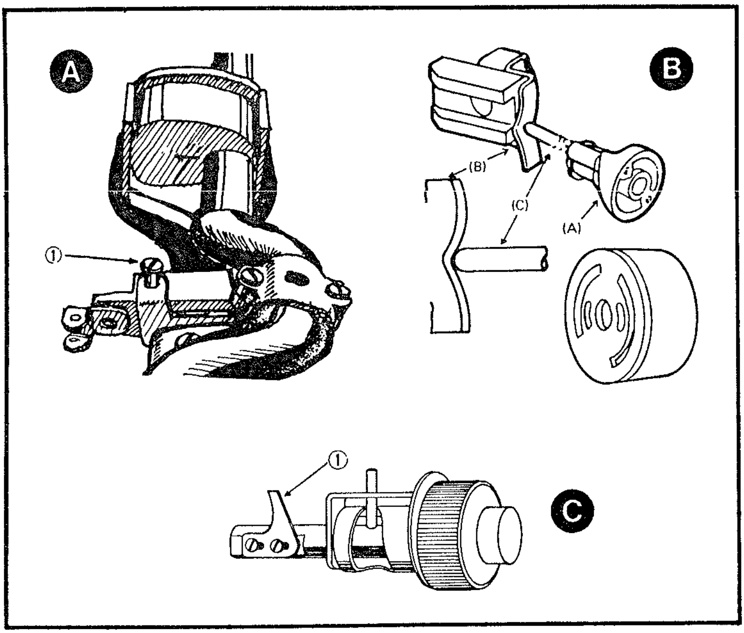


Fig. 5-55. Various White Models with oscillating shuttles have various mechanisms for reversing the stitch. A, B and C show three different mechanisms, with detailed instruction on achieving 0 stitch length when the stitch length regulator is set at 0.

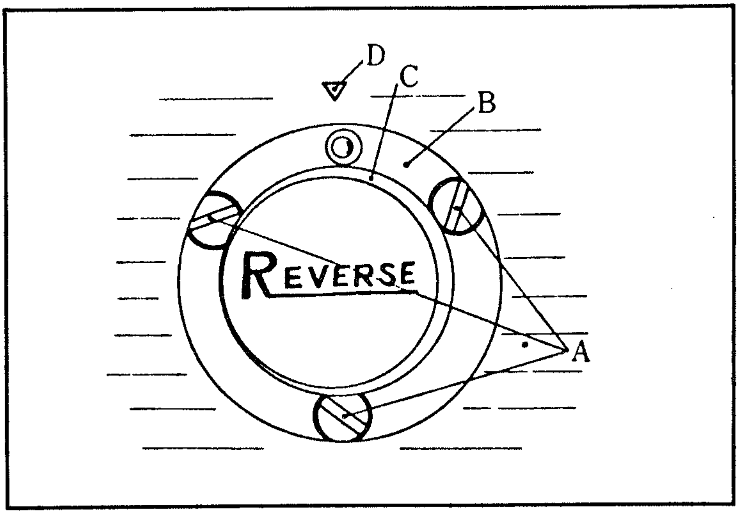


Fig. 5-56. On White Models 764 and 769, the stitch density can be equalized on both sides of a buttonhole by referring to this figure and proceeding according to instructions in the text.

Loosen the screws and move finger 1 either forward or back, as required. When 0 feeding is attained, tighten the screws securely.

White Models 764 and 769.

On Models 764 and 769, the stitch length should be uniform on both the forward and reverse stitches when you make a buttonhole. To equalize the stitches (Fig. 5-56), set the stitch length regulating dial at position 1, loosen the screws in the dial and remove the dial. Loosen screw A. If the spacing is too much on the forward stitches and too little on the reverse stitches, tap knob C down to lower the stitch regulating assembly B. After the adjustment, tighten screw A securely.

If the spacing is too much on the reverse stitches and too little on the forward stitches, lift the assembly B slightly by tapping knob C from the bottom. After the adjustment, tighten screw A securely.

Check the results of the above steps by sewing forward and reverse with the zig-zag width lever 2 and 3. Repeat the first four steps until you get uniform stitching in both directions.

Turn the knob C to the right until it stops. Mount the dial with 0 in line with the indicator RED DOT on the top. Tighten the screw in the dial.

White Model 970 (Only)

On the White Model 970, the stitch length should be uniform on both the forward and reverse stitches when making a buttonhole. To make this adjustment, proceed as follows (Fig. 5-57):

- Set the stitch length control at position 3.
- Loosen set screw A.
- Remove stitch length control B (pull straight out).
- Mark the position of the slot in eccentric C.
- Loosen set screw D, holding eccentric C.
- Turn slotted eccentric C slightly, either clockwise or counterclockwise. It may be necessary to remove push rod E to fit the screwdriver into the slot.
- Tighten set screw D.
- Replace push rod E and check for smooth movement. The back and forth movement must be free.

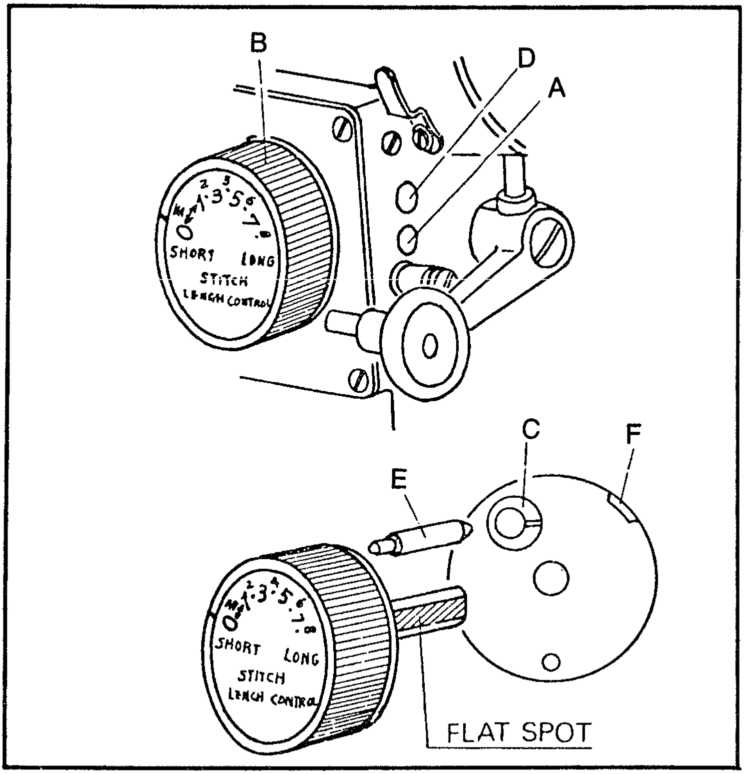


Fig. 5-57. Equalizing the density of the buttonhole stitch on both sides of the buttonhole on the Model 970.

Replace the stitch length control knob B, being sure that the drive for the reverse patterns F do not move. The gear teeth must not show and the flat spot on the shaft lines up with screw A.

- Tighten screw A.
- Sew a test buttonhole. If the condition is improved, but still not perfect, repeat and turn the eccentric in the same direction. If the condition becomes worse, repeat as stated above, except turn the eccentric in the opposite direction.

White Model 960

On the White Model 960, the forward reverse density of the buttonhole stitch can be equalized by loosening nut A and turning screw B counterclockwise to increase the stitch density on the reverse stitch. Or turn it clockwise to decrease the density on the reverse stitch. Tighten the locking nut A without disturbing the setting of screw B.

TIMING THE NEEDLE BAR SWING

To be sure to which of the White Models the following procedures apply, *read the headings carefully.*

Miscellaneous White Models With Oscillating Shuttles

On miscellaneous White Models with the oscillating shuttle, the needle should descend vertically from the level of .04 inch (1mm) above the needle plate, and should not swing more than a maximum of .014 inch (.35mm) until the needle is again 1mm above the needle plate on its upward stroke, with the machine set at a maximum zig-zag width. To adjust the timing of the swing, proceed as follows (Fig. 5-58):

Side Load Machines. On side load machines, set the stitch width at maximum, take off the arm cover and turn the hand wheel to bring the gear set screws 1 (Fig. 5-58) to the top in the right side, down-stroke of the needle.

Loosen set screws 1, and holding the gear stationary (with a screwdriver), turn the hand wheel back in case of excessive side movement of the needle in its down stroke; or forward in case of excessive side movement of the needle in its upward stroke. Repeat the adjustment until the down and up movement of the needle becomes equal in the check range. When the adjustment is made tighten the set screws 1 securely.

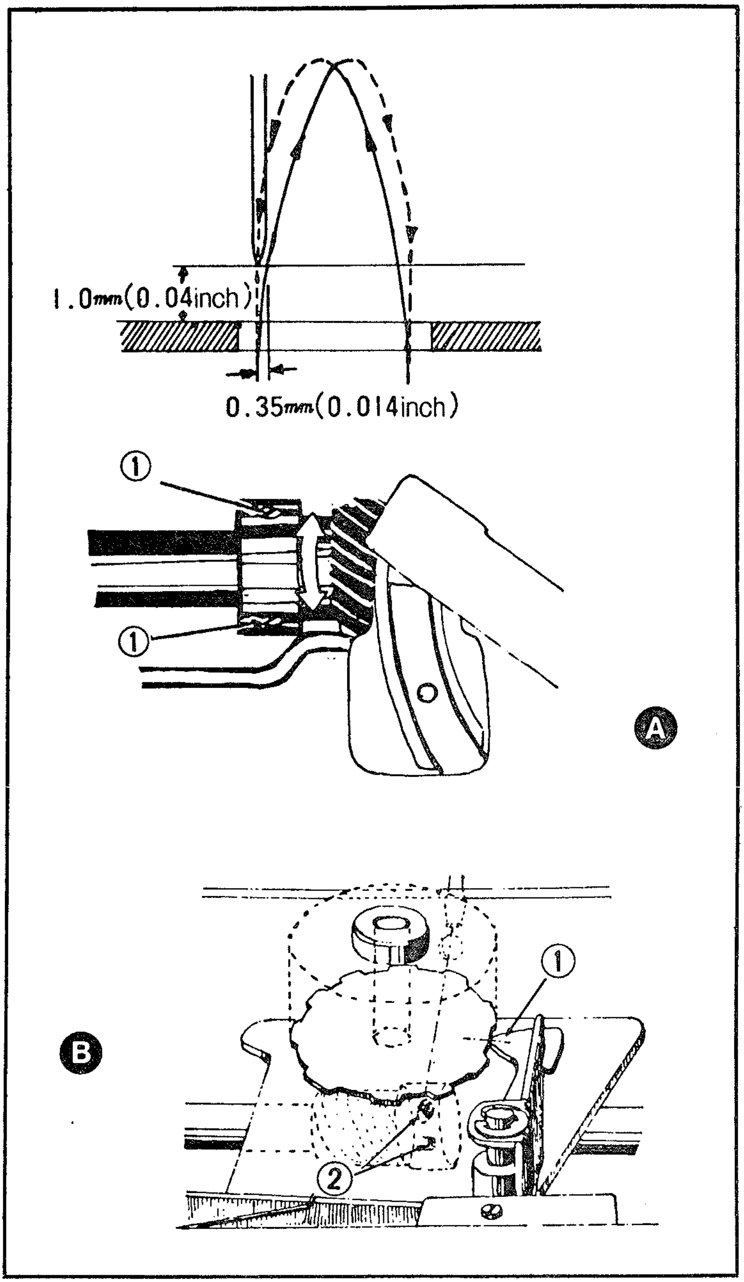


Fig. 5-58. On both side load and front load machines with oscillating shuttles, time the needle bar swing by referring to this figure and studying the text.

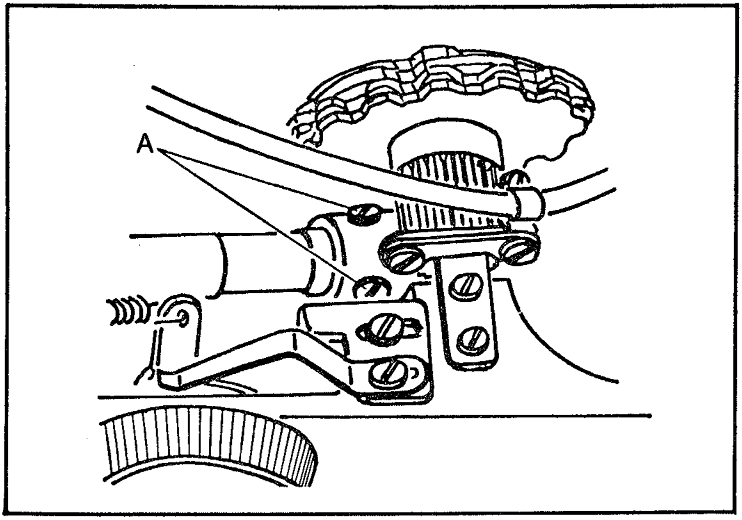


Fig. 5-59. Adjusting the timing of the needle bar swing on White models 782, 793, 804 and 970.

Front Load Machines. On front load machines, set the stitch pattern at regular zig-zag width, take off arm cover and check if the cam follower (Fig. 5-58B) faces to the center of the recess portion of the cam with the needle at the bottom of its stroke; or, to the center of the projecting portion of the cam when the needle is at the top of its stroke.

If not, loosen gear set screws 2 (Fig. 5-58B), inserting the screwdriver from the back of the arm. Readjust by turning the handwheel so that the conditions of the first step are met. When the adjustment is complete, tighten set screw 2 securely.

White Models 764 and 769

On White Models 764 and 769, the needle should not swing when it is in the fabric. To make this adjustment (Fig. 5-54), set the pattern change dial to position M and the zig-zag lever at 5. Loosen set screw E. If the needle swings in the fabric on its descending stroke, hold set screw E, and turn the hand wheel away from you. If the needle swings in the fabric on its upward stroke, hold set screw E and turn the hand wheel toward you. Tighten the set screw E securely. There should be absolutely no needle swing in the fabric on the down stroke of the needle; however, a slight swing on the upward stroke is allowable.

White Models 782, 793, 804 ad 970

On Models 782, 793, 804 and 970, the needle should not swing sidewise when it is in the fabric and sewing a zig-zag stitch. To make this adjustment (Fig. 5-59) set the pattern selector lever at manual zig-zag position, and the zig-zag width control at 5. On Model 782, set the decorative stitch control at M, and the zig-zag width control at 5. Loosen set screws A. If the needle swings in the fabric on the down stroke, hold either of the set screws, and turn the hand wheel away from you. If the needle swings in the fabric on its up stroke, hold either of the set screws and turn the hand wheel toward you. Tighten both set screws securely. There should be absolutely no needle swing in the fabric on the down stroke of the needle; however, a slight swing on the up stroke is allowable.

White Model 960.

On the White Model 960, the needle should not swing in the fabric when zig-zag sewing. Make this adjustment (Fig. 5-60) by setting the pattern change dial to position M, and the zig-zag width lever at 5. Loosen set screws A. If the needle swings in the fabric on its down stroke, hold either of the set screws and turn the hand wheel away from you. If the needle swings on its up stroke, hold a set screw and turn the balance wheel toward you. Tighten the set screws securely. There should be absolutely no needle swing in the fabric when the needle is on its down stroke; however, a slight swing on the up stroke is allowable.

CLEANING THE SHUTTLE RACE

The following information applies only to miscellaneous White Models with oscillating shuttles (Fig. 5-61). It is rarely necessary to open and clean the shuttle race; however, if necessary, raise the needle bar to its highest point and remove the bobbin case. Twist

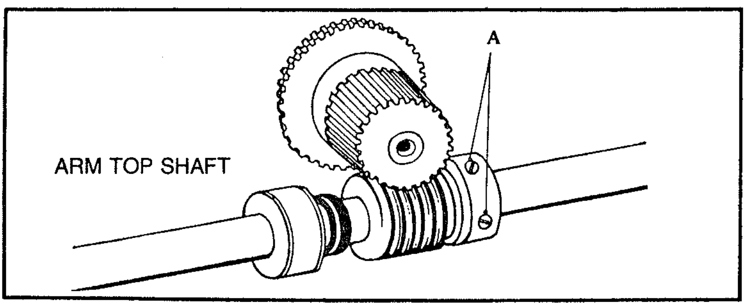


Fig. 5-60. To time the needle bar swing on Model 960, gain access to this mechanism through the top cover,and proceed as explained in the text.

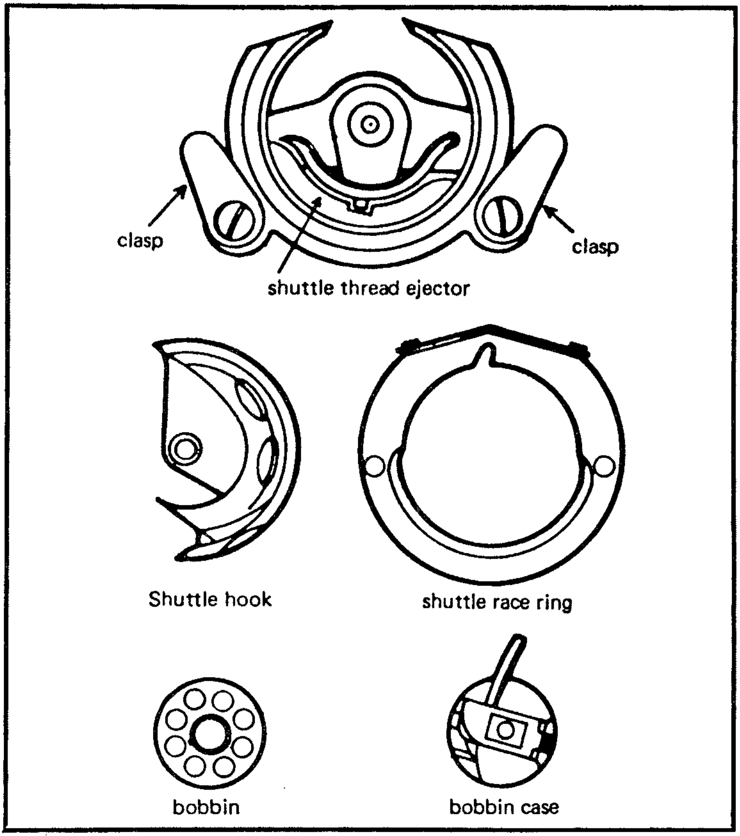


Fig. 5-61. On White Models with oscillating shuttles, refer to this figure and proceed as explained in the text.

the shuttle race ring clasps outward and take out the shuttle race ring. Remove the shuttle hook and clean out the shuttle race. Replace the assembly in a reverse procedure.

Caution. Handle the shuttle with care.

ADJUSTING MESHING OF CAM SHAFT GEARS TO MAIN SHAFT GEARS

To be sure to which White Models the following procedures apply, *read the headings carefully.*

White Models 764 and 769

On White Model 764 and 769, too much back-lash of the gears may cause noisy running. To correct this, refer back to Fig. 5-54 and to Fig. 5-62.

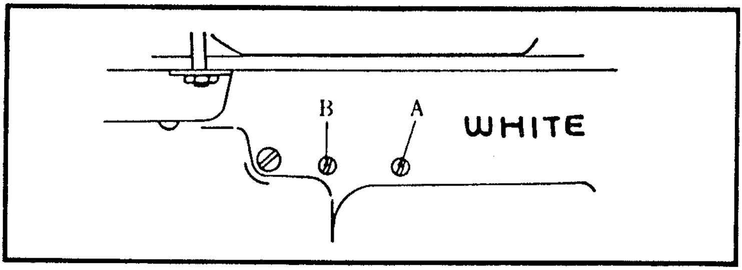


Fig. 5-62. Incorrect meshing of the cam shaft gear to the main shaft gear can cause noisy running on Models 764 and 769.

Loosen screws A and B (Fig. 5-62). Check the circumferential back-lash of gear A (Fig. 5-54), and adjust by turning the gear shaft B (Fig. 5-54) clockwise with a screwdriver, being careful that the meshing is not so tight that the mechanism will bind.

After this adjustment, tighten set screw A (Fig. 5-62). Check the back-lash in pattern cam C (Fig. 5-54) and gear A by turning counterclockwise with your fingers, making certain it is not too tight. If there is too much back-lash between gear A and C, loosen set screw B (Fig. 5-62) and turn screw D (Fig. 5-54) in the proper direction to remove the back-lash, making sure the gears don't mesh so tightly as to bind the mechanism.

Caution. When making this adjustment, if you move the pattern cam up or down, you will not be able to select the desired patterns.

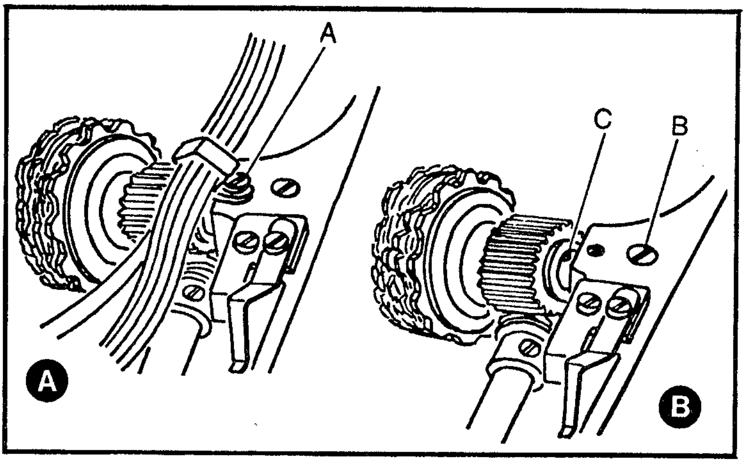


Fig. 5-63. Noisy running of Models 782, 793, 804 and 970 may be due to incorrect meshing of the cam shaft gear to the main shaft gear.

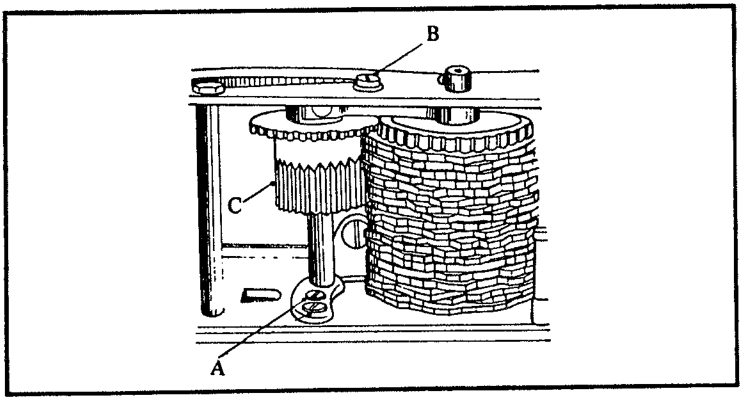


Fig. 5-64. Correcting the meshing of the cam shaft gear to the main gear on the Model 960 is simple.

White Models 782, 793, 804 and 970.

On White Models 782, 793, 804 and 970, too much back-lash of the gears may cause noisy running. Correct this by removing the wire by loosening screw A (Fig. 5-63A). Loosen screw B (Fig. 5-63B) slightly. Turn the cam stack shaft clockwise by inserting a small screwdriver into the hole C in the shaft, and tapping the screwdriver handle.

After the adjustment, make sure the mechanism does not bind. Tighten screw B, and the wire screw A.

Caution. When turning the cam stack shaft, be sure not to move it endwise.

The White Model 960

On the White Model 960, too much back-lash of the gears may cause noisy running. Correct this by loosening screws A and B (Fig. 5-64). Adjust by lowering gear C, being careful not to bind the mechanism. After the adjustment, tighten screws A and B.

ADJUSTING AND MAINTAINING UPPER TENSION CONTROL

The following procedure applies specifically to miscellaneous White Models with oscillating shuttles.

To disassemble, reassemble and adjust the tension of the upper tension control on White Models with the oscillating shuttles, proceed as follows (Fig. 5-65):

Disassembly. To disassemble:

- Pull out the cap 17 and remove screw 16.

- Remove the dial 14, washer 13, stopper 12, nut 11, spring 10, tray 9, pin 8, disc 6, washer 7 and disc 6, in this order.
- Loosen screw 3 and remove stud 5 and the thread check spring 4.

Reassembly and Adjustment. To reassemble and adjust the upper tension control, proceed as follows:

- Insert the thread check spring into the stud 5. Then insert the stud into the barrel 2. Tighten screw 3. At this time, the stud 5 should be located as shown in Fig. 5-65A. Adjust the position of the thread check spring 4 against the stud 5 so that the tension of the thread check spring is between 5 and 10 grams at the beginning tension.
- Insert disc 6, washer 7, disc 6, pin 8, tray 9 and spring 10 onto stud 5.
- Tighten nut 11, being sure not to compress the beehive tension spring. Refer to Fig. 5-65C and note that there is 1/64 inch clearance between the nut 11 and the spring 10.

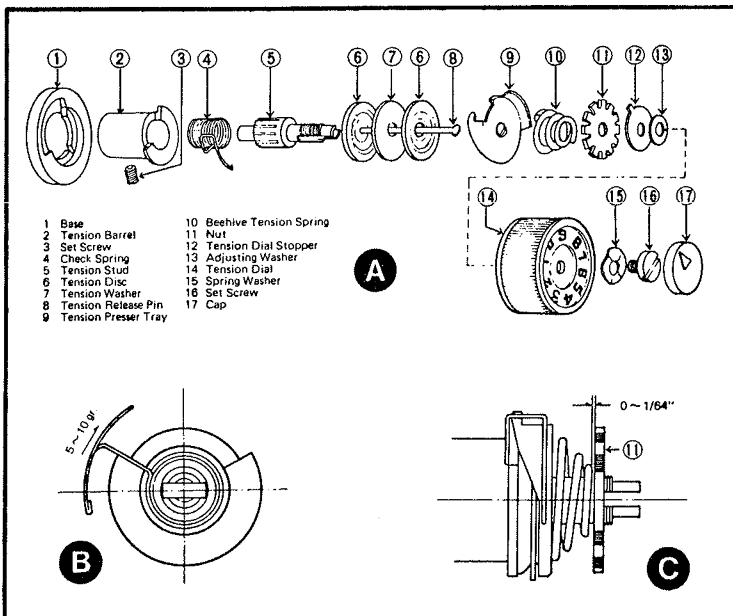


Fig. 5-65. If you have purchased a used White oscillating shuttle machine, you may wonder if the tension mechanism has been disassembled and incorrectly reassembled. Be sure to differentiate between the thread check spring 4, and the tension spring 10 (called the beehive tension spring), when reading the instructions.

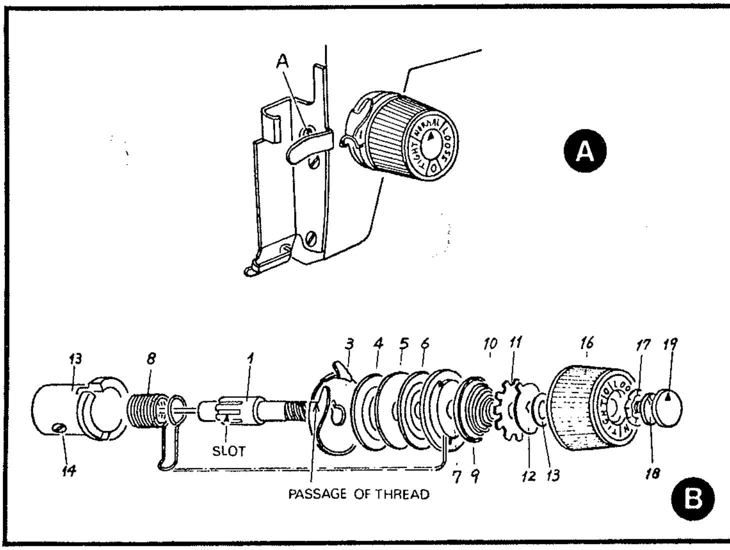


Fig. 5-66. The thread check spring 8 holds a slight tension on the upper thread, up to a certain instant in the sewing cycle to keep the needle on its downstroke from piercing the thread. The tension of the thread check spring 8 can be adjusted, or it can be replaced.

- Insert the stopper 12 with the raised part to the upper side, and then install washer 13.
- Insert the lower raised part of the dial 14 into the slot of the nut 11, with the number 0 to the upper side.
- Insert washer 15 and tighten screw 16.
- Check the tension of the upper thread, which should be between 0 and 10 grams when the dial is set at 0; and more than 220 grams when the dial is set at 9. If these conditions are not met, adjust it. If the maximum tension is too loose, turn nut 11 clockwise. If the maximum tension is too tight, turn nut 11 counterclockwise.
- As the final step, replace the cap *17* and the base *1*.

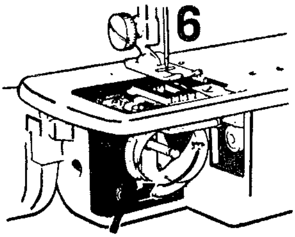
ADJUSTING OR REPLACING THREAD CHECK SPRING

The following procedure applies specifically to White Models 782, 793, 804 and 970 (Fig. 5-66):

- Loosen screw A (Fig. 5-66A) and remove the tension.
- Loosen screw 14 (Fig. 5-66B) and remove the tension seat.
- Slide the thread check spring off the tension stud 1 (Fig. 5-66B), and if the tension should be increased, rotate the

spring toward you and place the end of the spring in the next slot in the tension stud. To decrease the tension, rotate the spring in the opposite direction and place the end of the spring in the slot of the tension stud.

- Replace the tension and tighten screw A securely.



6 Adjustment and Repair Procedures For New Home Models

New Home sewing machines are manufactured in Japan and Taiwan, with U.S. disribution, sales and service implemented through U.S. distributors and retail dealers. The U.S. address of New Home is The New Home Sewing Machine Company, 171 Commerce Road, Carlstadt, New Jersey 07072.

Several New Home Models will be discussed in this chapter.

The Model 532. For a front view of the Model 532 and its operator controls, see Fig. 6-1. For the parts list of the Model 532, see Figs. 6-2 through 6-5.

The 54 Series Models. The 54 Series Models consist of Models 540, 541, 542, 543, 544, 545, 546, 547, 548 and 549. For a front view of the Model 545 and its operator controls, see Fig. 6-6. The various repair and adjustment procedures differ somewhat on the different Models of the 54 Series, so when reading the instructions, watch the headings carefully.

The Model 592. For a front view of the Model 592 and its operator controls, see Fig. 6-7. For the parts list of the Model 592, see Fig. 6-8 through 6-11.

All the New Home Models discussed in this chapter have oscillating shuttles.

CORRECTING A WAVERING STRAIGHT STITCH

To be sure to which of the New Home Models the following procedures apply, *read the headings carefully.*

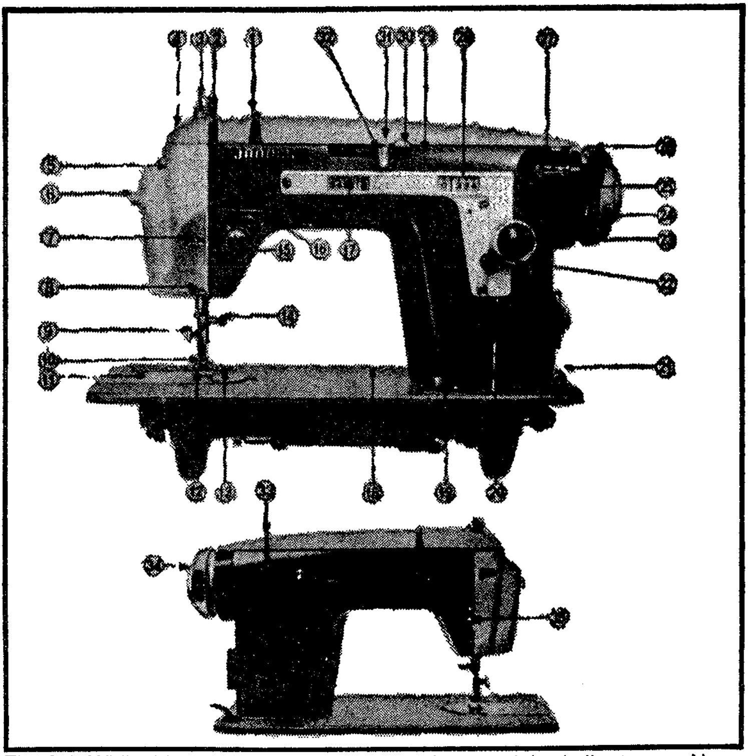


Fig. 6-1. While this machine bears the name Janome, it is similar to your New Home Model 532. The numbers correspond with the numbers in Table 6-1.

Table 6-1. Parts List Corresponding to Fig. 6-1.

1.	Upper arm thread guide	18.	Bed-plate
2.	Thread take-up lever	19.	Drop feed button
3.	Patchomatic pressure regulator	20.	Bed spool pin
4.	Top cover	21.	Bobbin winder tension bracket
5.	Face plate	22.	Reverse push button
6.	Light switch	23.	Stitch length regulating dial
7.	Face plate thread guide	24.	Balance wheel
8.	Face plate lower thread guide	25.	Bobbin winder push button
9.	Thumb screw	26.	Bobbin winder wheel
10.	Presser foot	27.	Bobbin winder spindle
11.	Slide plate	28.	Stitch length indicator
12.	Feed dog	29.	Arm
13.	Needle plate	30.	Zigzag width stopper screw
14.	Needle clamp	31.	Zigzag width stopper
15.	Thread tension regulator	32.	Zigzag width regulating lever
16.	Lower arm thread guide	33.	Arm spool pin
17.	Zigzag width indicator	34.	Stop motion screw
		35.	Presser bar lifter

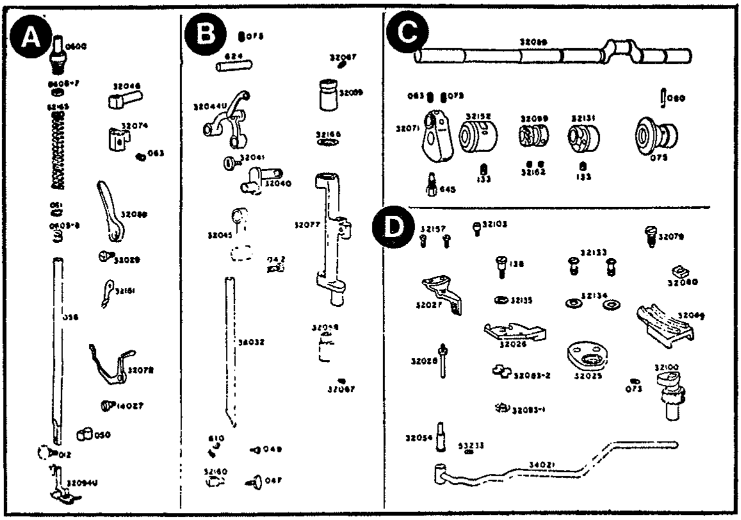


Fig. 6-2. A partial parts list for the New Home Model 532. Note that the illustrations are divided into sections A, B, C and D. When you find a part in the illustrated list, take its number to the appropriate section in Table 6-2 to find the name of the part.

Table 6-2. Parts List Corresponding to Fig. 6-2.

A	60C	Patchomatic darner
	060B-7	Patchomatic darner washer
	32165	Presser bar spring
	061	Presser bar spring washer
	060B-8	Patchomatic darner spring
	058	Presser bar
	050	Thread cutter
	012	Presser foot thumb screw
	3209U	Presser foot unit
	32046	Needle bar connecting stud
	063	Presser bar guide bracket set screw
	32074	Presser bar guide bracket
	32088	Presser bar lifter
	32161	Presser bar lifter washer
	32029	Presser bar lifter screw
	32072	Thread tension releasing lever
	14027	Releasing lever screw
B	073	Thread take-up lever set screw
	624	Thread take-up lever pin
	32044U	Thread take-up lever unit
	32040	Needle bar connecting link
	32041	Needle crank set screw
	32045	Needle bar crank
	042	Needle bar connecting stud screw
	38032	Needle bar
	610	Needle bar thread guide
	049	Thread guide set screw
	32160	Needle clamp
	047	Needle clamp screw
	32166	Needle bar supporter washer
	32059	Presser bar bushing
	32067	Presser bar bushing set screw
	32077	Needle bar supporter
	32058	Presser bar bushing
	32067	Presser bar bushing set screw
C	32089	Upper shaft
	32071	Thread take-up crank
	073	Needle bar connecting link set screw
	063	Needle bar connecting link set screw
	645	Thread take-up crank set screw
	32152	Upper shaft bushing
	133	Upper shaft bushing set screw
	32099	Upper shaft worm gear
	32162	Worm gear set screw
	32131	Feed cam
	133	Feed cam set screw
	075	Balance wheel bushing
	080	Balance wheel bushing pin
D	32026	Zigzag width adjustor
	138	Zigzag width adjustor set screw
	32135	Zigzag widht adjustor washer
	32103	Zigzag width adjustor stopper
	32027	Zigzag width lever
	32028	Zigzag width lever pin
	32157	Zigzag width lever set screw
	32054	Zigzag crank bushing pin
	53233	Zigzag crank bushing pin set screw
	34021	Zigzag crank connecting rod
	32025	Zigzag cam box bracket
	32134	Zigzag cam box bracket washer
	32133	Zigzag cam box brakcet set screw
	32083-1	Zigzag cam box bracket nut
	32083-2	Zigzag cam box bracket nut
	32079	Zigzag cam box bracket pin
	32060	Zigzag cam box slide block
	32084	Zigzag cam box
	32100	Zigzag cam & gear
	073	Zigzag cam set screw

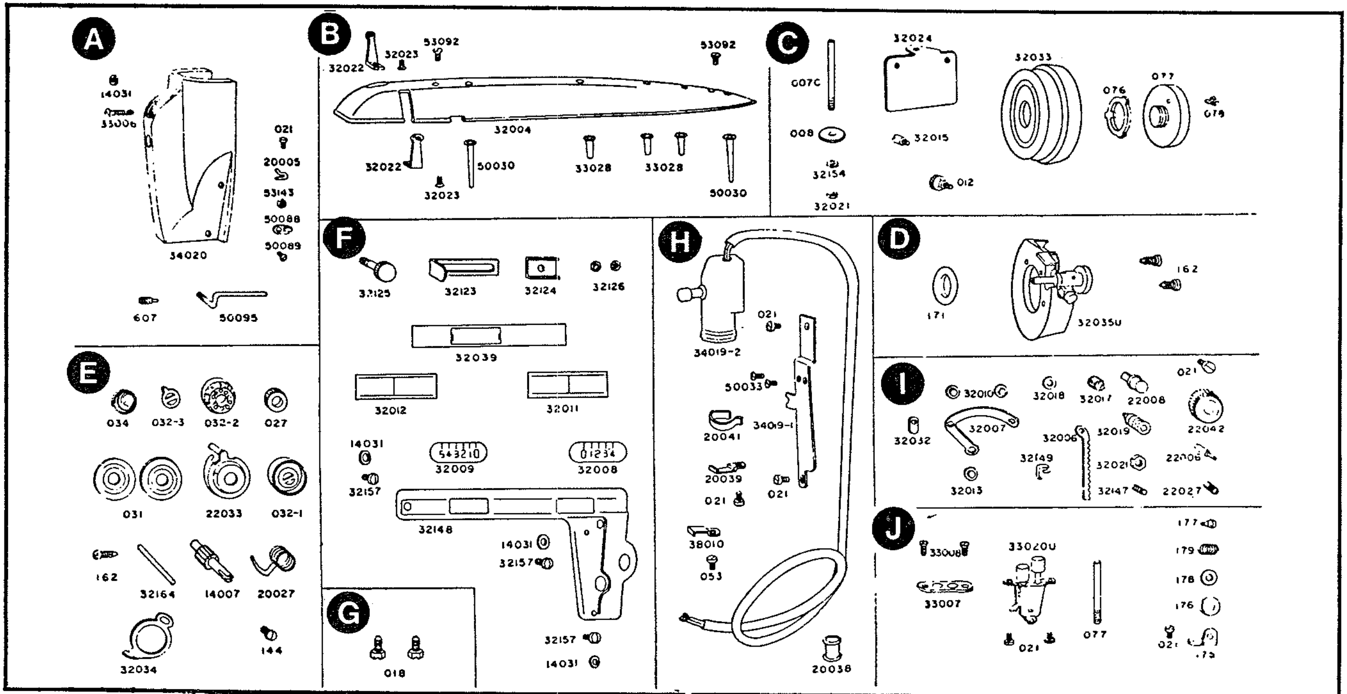


Fig. 6-3. A continuation of the Model 532 Parts List. Find the part in the illustration and then take the part number to the list of Table 6-3 to find the name of the part.

Table 6-3. Parts List Corresponding to Fig. 6-3.

	Part No.	Description
A	34020	Face plate
	33006	Face plate set screw
	14031	Fiber washer
	50095	Arm thread guide
	607	Arm thread guide set screw
	20005	Face plate thread guide (upper)
	021	Face plate thread guide set screw
	50088	Face plate thread guide (lower)
	50089	Thread guide set screw
	53143	Face plate thread guide set nut
B	32004	Top cover
	53092	Top cover set screw
	50030	Plastic oil tube (large)
	32022	Top cover thread guide
	32023	Top cover thread guide set screw
	33028	Plastic oil tube
C	007C	Arm spool pin
	32154	Spool pin washer
	32021	Spool pin clamping nut
	008	Spool pin belt
	32024	Spool pin base plate
	32015	Spool pin base plate set screw
	012	Spool pin base plate screw
	32033	Balance wheel
	076	Stop motion washer
	077	Stop motion screw
	078	Stop motion screw set screw
D	162	Bobbin winder set screw
	171	Bobbin winder rubber ring
	32035U	Belt cover & Bobbin winder unit
E	027	Tension regulator dial knob
	032-2	Thread tension numbered dial
	032-3	Tension numbered dial stopper
	034	Thread tension spring
	032-1	Thread tension disc washer
	22033	Tension thread guard
	031	Thread tension disc
	20027	Check spring
	14007	Thread tension stud
	32164	Thread tension releasing pin
	162	Thread tension stud set screw
	144	Check spring stopper set screw
	32034	Check spring stopper
F	32126	Zigzag width stopper nut
	32125	Zigzag width stopper screw
	32124	Zigzag width stopper plate
	32123	Zigzag width stopper
	32039	Zigzag & stitch indicator back plate
	32012	Zigzag width indicator plate
	32011	Stitch length indicator plate
	14031	Fiber washer
	32157	Stitch indicator panel set screw
	32148	Stitch indicator panel
	32008	Stitch length numbered plate
	32009	Zigzag width numbered plate
G	018	Hinge clamping screw
H	34019-1	Lamp socket set plate
	34019-2	Lamp socket with cord unit
	021	Lamp socket set plate set screw
	50033	Lamp socket screw
	38010	Lamp cord set plate
	053	Lamp cord set plate set screw
	20038	Lamp cord rubber grommet
	20041	Lamp cord clamp
	20039	Lamp cord clamp set plate
	021	Lamp cord set plate set screw
	32007	Stitch length indicator crank
I	32010	Stitch length indicator crank set screw
	32032	Stitch length indictor slide block
	32006	Stitch length indicator rack
	32013	Stitch length indicator set screw
	32149	Stitch length indicator rack spring
	22008	Stitch length dial knob shaft
	32017	Stitch length indicator pinion
	32018	Stitch length indicator pinion ring
	32019	Feed regulator screw
	32147	Feed regulator center screw
	32021	Feed regulator center screw nut
	22042	Stitch length dial knob
	021	Stitch length dial knob set screw
	22006	Stitch length dial knob pin
	22027	Stitch length dial knob pin spring
J	021	Tension bracket set screw
	175	Bobbin winder tension bracket
	176	Bobbin winder tension disc (large)
	178	Bobbin winder tension disc (small)
	179	Bobbin winder tension spring
	177	Tension disk set screw
	007	Bed spool pin
	33020U	Drop feed button unit
	021	Drop feed set screw
	33007	Drop feed indicator plate
	33008	Indicator plate set screw

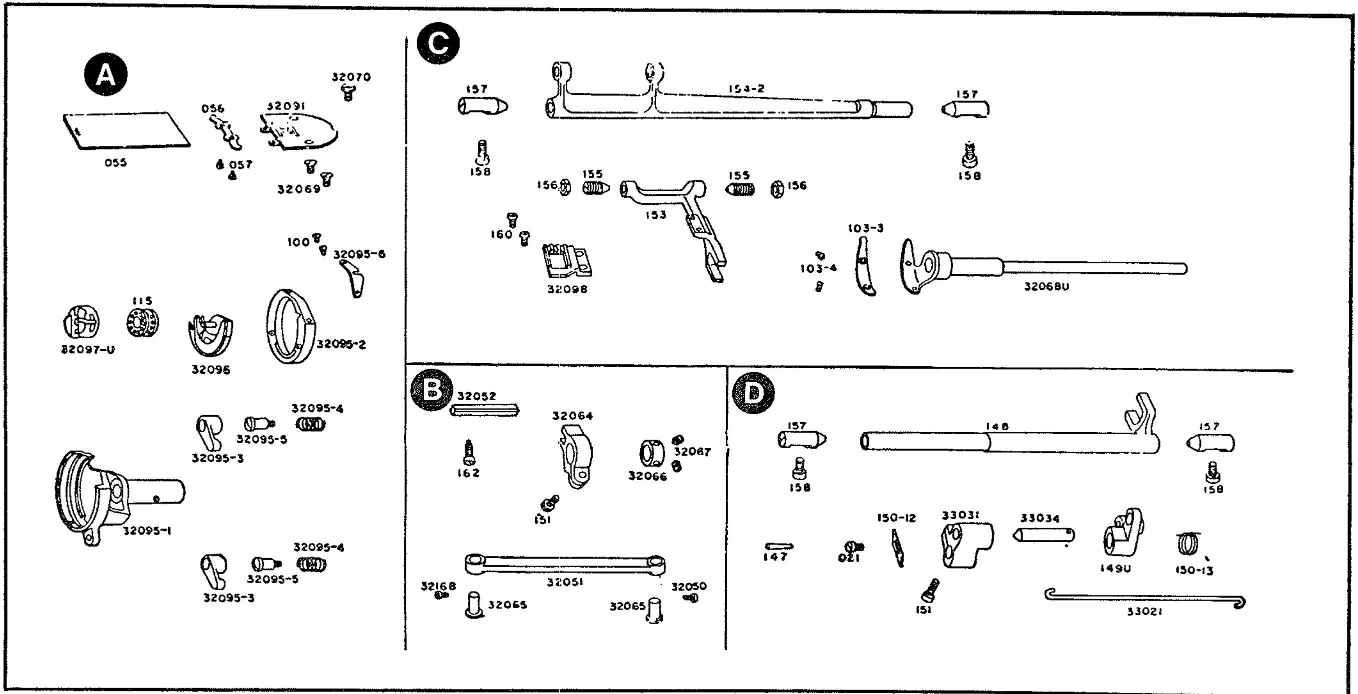


Fig. 6-4. A continuation of the illustrated parts list of the New Home Model 532. For the written parts list refer to Table 6-4. To use the list, find the part in the illustrated list and take its number to Table 6-4 for the descriptive name of the part.

Table 6-4. Parts List Corresponding to Fig. 6-4.

A	055	Shuttle race cover slide plate	C	154-2	Feed rock shaft
	056	Shuttle race cover slide plate spring		157	Center bar
	057	Cover slide plate spring set screw		158	Center bar set screw
	32091	Needle plate		155	Feed bar center screw
	32069	Needle plate set screw		156	Feed bar center screw nut
	32070	Needle plate set screw		153	Feed bar
	32097U	Bobbin case unit		32098	Feed dog
	115	Bobbin		160	Feed dog set screw
	100	Shuttle race spring set screw		32068U	Oscillating shaft with driver body
	32095-6	Shuttle race spring		103-3	Shuttle driver spring
	32095-1	Shuttle race body		103-4	Shuttle driver spring set screw
	32095-3	Shuttle race clasp			
	32095-4	Shuttle race clasp spring	D	148	Feed lifting rock shaft
	32095-5	Shuttle race clasp set screw		157	Center bar
	32096	Shuttle hook		158	Center bar set screw
				33031	Feed lifting rock shaft bracket
B	162	Guide shaft set screw		150-12	Feed lifting rock shaft crank plate
	32052	Shuttle race guide shaft		021	Rock shaft crank plate set screw
	32064	Shuttle race guide		147	Rock shaft crank stopper
	151	Shuttle race guide set screw		151	Rock shaft bracket screw
	32067	Oscillating shaft collar set screw		33034	Drop feed plunger
	32066	Oscillating shaft collar		33021	Drop feed plunger connecting rod
	32051	Shuttle race driving rod		149U	Feed lifting rock shaft crank unit
	32065	Shuttle race driving rod pin		150-13	Rock shaft crank spring
	32168	Shuttle race guide screw			
	32050	Driving rod pin set screw			

Model 532

On the Model 532, if the straight stitch wavers when the zig-zag width lever is set at 0, adjust as follows (Fig. 6-12):

- Set the zig-zag width regulator lever at 0.
- Turn the balance wheel and see if the needle bar (38032) swings when the zig-zag cam box (32085) moves to the right. If the needle bar swings to the same direction as the zig-zag cam box, loosen the zig-zag cam bracket set screws (32133) and move the cam box in the arrow-indicated direction A. If the needle bar swings in the opposite direction, move the cam box in the arrow-indicated direction B. Repeat the adjustment until the needle bar swing is .0008 inch (.02mm) or less.

54 Series Models

To be sure to which of the 54 Series Models the following procedures apply, read the headings carefully.

Models 540 and 542

A wavering straight stitch on the Model 540 and 542 when the zig-zag width is set at 0 is caused by the swing of the needle bar. To reduce this swing to .02mm, set the zig-zag width regulator knob at

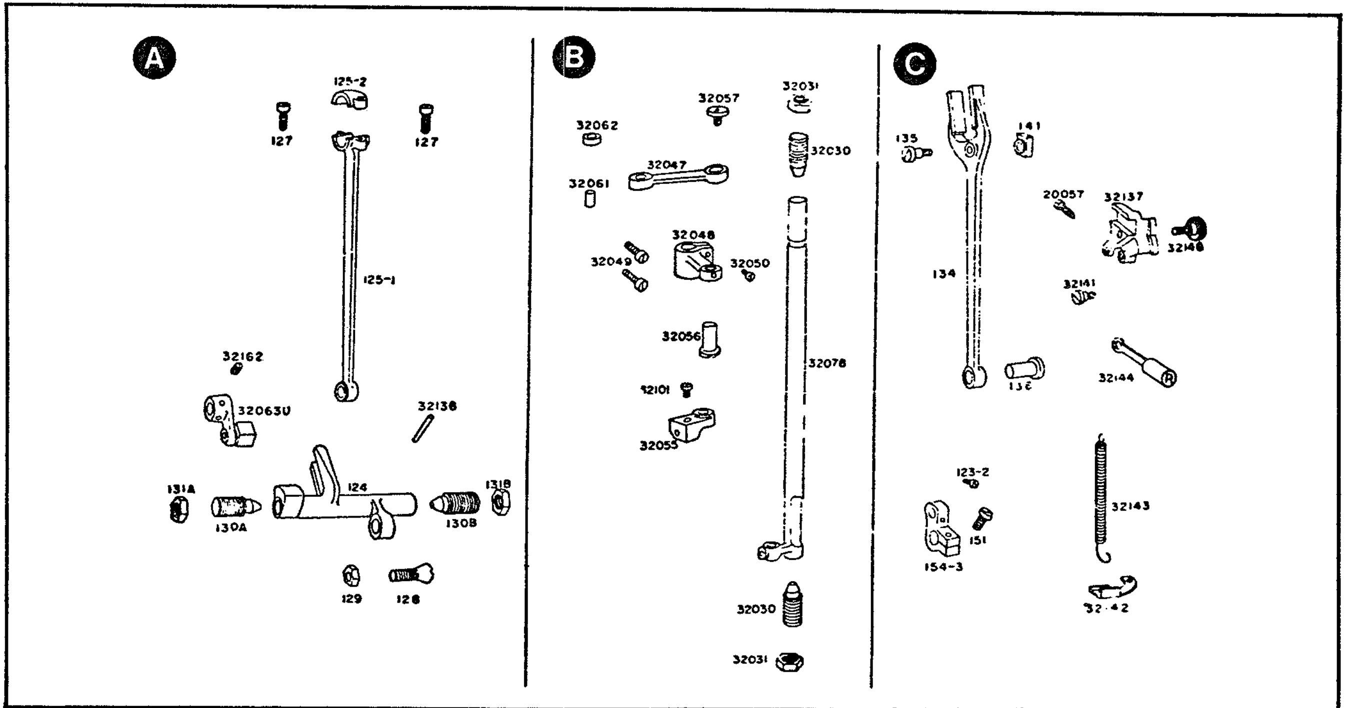


Fig. 6-5. Additional illustrated sections of the New Home Model 532. Refer to Table 6-5 for the names of the parts.

Table 6-5. Parts List Corresponding to Fig. 6-5.

Group	Part No.	Description
A	125-1	Crank connecting rod
	125-2	Crank connecting rod cap
	127	Crank connecting rod cap screw
	128	Crank connecting rod hinge screw
	129	Crank connecting rod hinge screw nut
	124	Oscillating rock shaft
	130A	Oscillating rock shaft center screw (small)
	131A	Oscillating rock shaft center screw nut (small)
	130B	Oscillating rock shaft center screw (large)
	131B	Oscillating rock shaft center screw nut (large)
	32063U	Oscillating shaft crank unit
	32136	Oscillating shaft crank pin
	32162	Oscillating rock shaft crank screw
B	32062	Zigzag width adjustor collar
	32061	Vertical shaft link pin
	32057	Vertical shaft link hinge pin screw
	32047	Vertical shaft link
	32048	Vertical shaft driving rod
	32049	Vertical shaft driving rod set screw
	32050	Vertical shaft link hinge pin set screw
	32055	Zigzag crank connecting rod bracket
	32101	Zigzag crank connecting rod set screw
	32056	Vertical shaft link hinge pin
	32078	Vertical shaft
	32030	Vertical shaft screw center
	32031	Vertical shaft screw center nut
C	134	Forked rod
	135	Feed connecting block stud screw
	141	Feed connecting slide block
	32137	Feed regulator
	32146	Feed regulator hinge screw
	20057	Feed regulator set screw
	32144	Reverse push button
	32141	Reverse push button set screw
	32143	Feed regulator spring
	32142	Feed regulator spring set plate
	154-3	Feed rock shaft crank
	151	Feed rock shaft crank set screw
	136	Feed connecting hinge pin
	123-2	Feed connecting hinge pin set screw

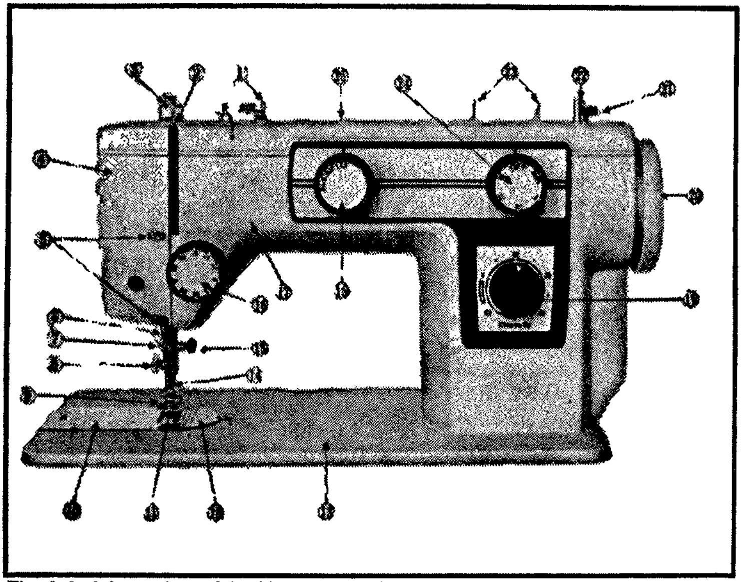


Fig. 6-6. A front view of the New Home Model 545, showing the locations of the operator controls. To use this illustration, take the number of the specific part or control to the written list of Table 6-6 which gives the descriptive name of that part or control.

0 (Fig. 6-13). Turn the balance wheel toward you and see which direction the needle bar swings when the zig-zag cam box (574503) moves to the right. If you observe a swing of the needle bar, loosen the two set screws (102021) and shift the zig-zag width regulator (540026) from its original position.

If the zig-zag cam box and needle bar move in the same direction, move the zig-zag width regulator in the arrow-indicated direction A.

Table 6-6. Parts Lists Corresponding to Fig. 6-6.

1	Top cover thread guides	15	Needle clamp screw
2	Thread take-up lever	16	Thread tension regulator
3	Pressure regulator	17	Arm
4	Face plate	18	Zigzag width regulator dial
5	Face plate thread guides	19	Stitch length regulator(Reverse feed knob)
6	Needle bar	20	Balance wheel
7	Needle bar thread guide	21	Bobbin winder stopper
8	Presser foot thumb screw	22	Bobbin winder spindle
9	Presser foot	23	Arm spool pins
10	Slide plate	24	Selector knob
11	Feed dog	25	Top cover
12	Needle plate		
13	Bed		
14	Presser bar		

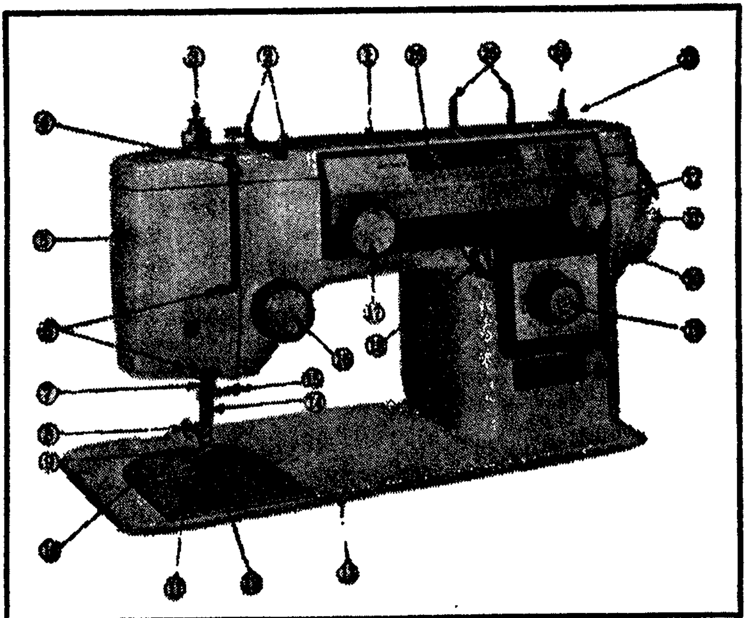


Fig. 6-7. A front view of the New Home Model 592, showing the operator controls. To use this illustration, take the number of the specific part or control to the list of Table 6-7 to find the descriptive name of that part or control.

If the zig-zag cam box and needle bar move in opposite directions, move the zig-zag width regulator in the arrow-indicated direction B.

When the needle bar swing is adjusted to a standard of .02mm, tighten the set screws (102021)

Table 6-7. Parts List Corresponding to Fig. 6-7.

1 Top cover	15 Needle clamp screw
2 Top cover thread guides	16 Thread tension regulator
3 Pressure regulator	17 Buttonhole knob
4 Thread take-up lever	18 Pattern selecting lever
5 Face plate	19 Stitch length regulator (Reverse feed knob)
6 Face plate thread guides	20 Belt cover
7 Needle bar	21 Balance wheel
8 Presser foot thumb screw	22 Zigzag width regulator
9 Presser foot	23 Bobbin winder stopper
10 Needle plate	24 Bobbin winder spindle
11 Slide plate	25 Spool pins
12 Feed dog	26 Pattern indicating plate
13 Bed	
14 Needle	

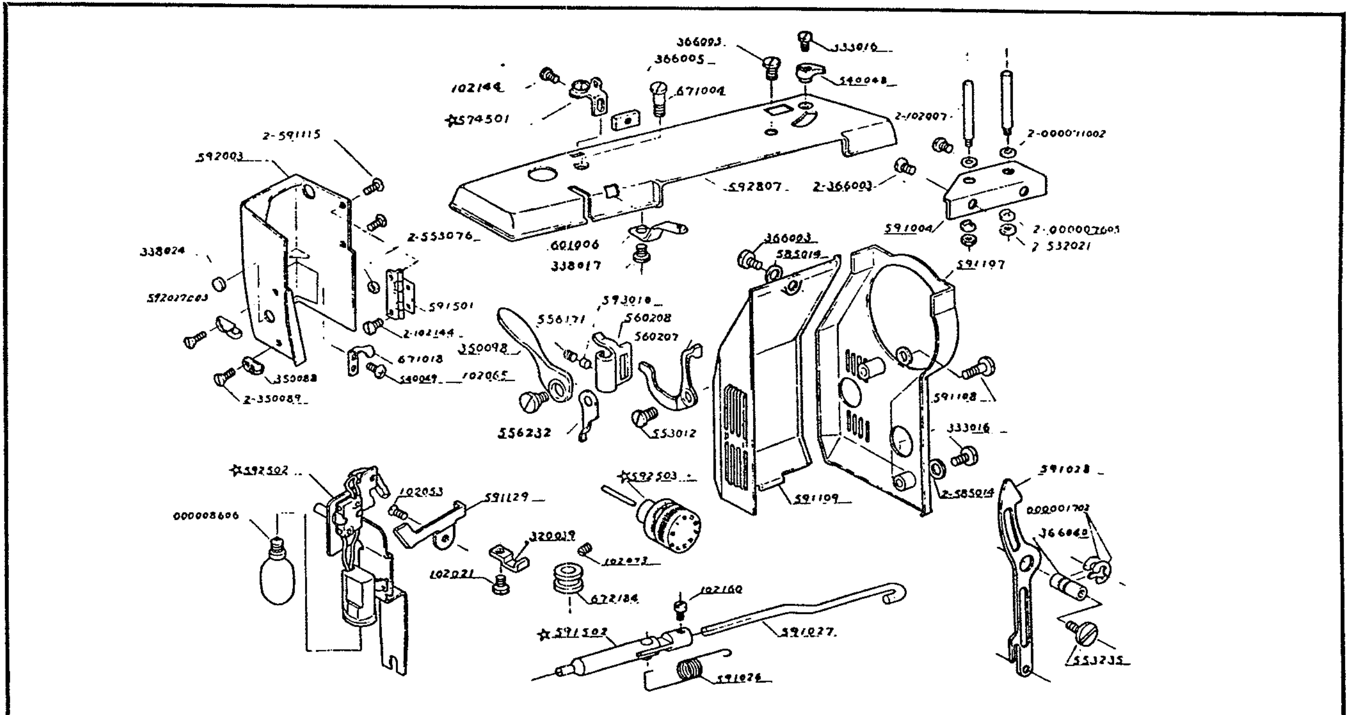


Fig. 6-8. An illustrated parts list of the New Home Model 592. The names of the parts can be found in Table 6-8.

Table 6-8. Parts List Corresponding to Fig. 6-8

1702	Snap ring E-S	366003	Set Screw	591028	Drop lever
7605	Spring washer	366005	Bobbin winder latch set screw nut	591107	Belt cover
8606	Light bulb	366040	Drop lever pin	591108	Belt cover set screw
71002	Spool pin base plate washer	532021	Spool pin nut	591109	Motor cover
102007	Spool pin	540048	Bobbin winder stopper	591115	Face plate hinge (B) set screw
102021	Set screw	540049	Face plate spring	591129	Coad holding plate
102053	Set screw	553012	Tension	591501	Face plate hinge unit
102065	Presser bar lifter holding screw	553076	Tension releasing lever pin	*591502	Drop feed plunger unit
102073	Set screw	553235	Drop lever pin screw	*592003	Face plate
102144	Set screw	556171	Set screw	*592502	Lamp socket unit
102160	Feed dog set screw	556232	Presser bar lifter washer	592503	Thread tension regulator unit
320029	Coad holding metal fitting	560207	Tension releasing lever	592807	Top cover
333016	Belt cover set screw (Lower)	560208	Tension releasing lever holder	593010	Presser bar lifter pin washer
338017	Top cover thread guide set screw	*574501	Top cover thread guide bracked (unit)	601006	Top cover thread guide
338024	Light indicator	585014	Belt cover set screw washer	671004	Top cover set screw
350088	Face plate thread guide	591004	Spool pin base plate	671018	Face plate spring
350089	Set screw	591026	Plunger spring	672184	Rubber bushing
350098	Presser bar lifter	591027	Plunger connecting rod	592027003	Face plate thread guide

(The parts marked with a star must be ordered in unit form.)

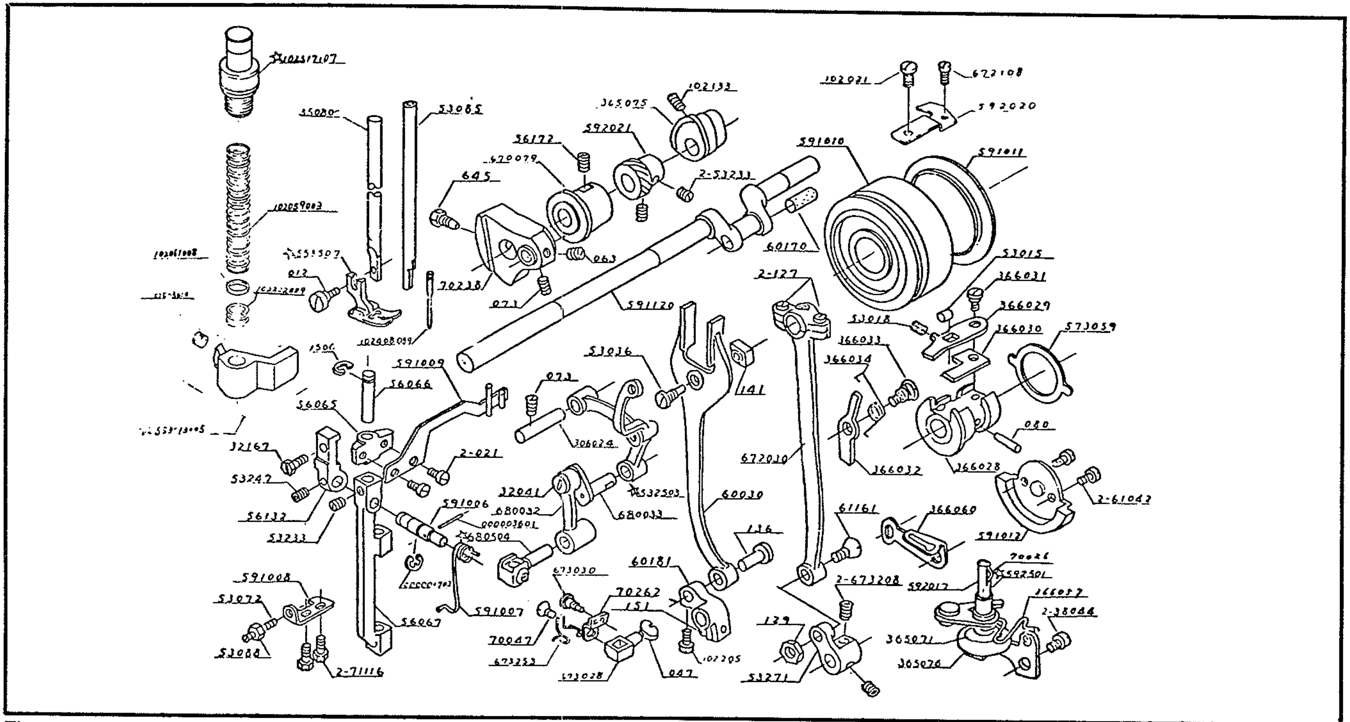


Fig. 6-9. A continuation of the parts list of the New Home Model 592. Its corresponding written parts list can be in Table 6-9.

Table 6-9. Parts List Corresponding to Fig. 6-9.

012	Presser foot thumb screw	56172	Upper shaft bushing set screw	573059	Balance wheel washer
021	Needle bar vibrating rod set screw	60030	Forked rod	591006	Needle bar supporter pin
047	Needle clamp set screw	60170	Upper shaft felt	591007	Needle bar supporter spring
063	Presser bar guide bracket set screw	60181	Feed rock shaft bracket	591008	Needle bar supporter stopper
073	Needle bar connecting link set screw	61042	Balance wheel balance weight set screw	591009	Needle bar vibrating rod
080	Tapered pin (large)	61161	Crank connecting rod tapered screw	591010	Balance wheel
127	Crank connecting rod screw	70026	Bobbin winder spindle pin	591011	Balance wheel cap
129	Crank connecting rod tapered screw nut	70047	Needle bar thread guide set screw	591012	Balance wheel balance weight
136	Feed rock shaft connecting pin	70238	Thread take-up crank	591120	Upper shaft
141	Feed regulator slide block	70262	Needle clamp plate	592017	Bobbin winder spindle
151	Feed rock shaft bracket set screw	71116	Needle bar supporter stopper set screw	592020	Oscillating stopper plate
645	Thread take-up crank set screw	102021	Set screw	592021	Upper shaft worm gear
1506	Snap ring E-4	102063	Presser bar guide bracket set screw	*592501	Bobbin winder unit
1702	Snap ring E-S	102133	Set screw	670079	Upper shaft bushing
3601	Spring pin	102205	Set screw	672030	Crank connecting rod
32041	Needle bar connecting link cap	306024	Thread take-up lever pin	672108	Set screw
32167	Needle bar supporter bracket screw	350804	Presser bar	673028	Needle clamp
38044	Bobbin winder spindle base plate set screw	366034	Declutching arm spring	673030	Needle bar screw set screw
53015	Declutching lever collar	365071	Bobbin winder wheel	673208	Feed lifting roller set screw
53018	Declutching lever spring	365075	Feed cam	673253	Needle bar thread guide
53036	Slide block stud	365076	Rubber grommet	680032	Needle bar crank rod
53072	Needle bar supporter stopper (left)	366028	Balance wheel bushing	680033	Needle bar connecting link
53085	Needle bar	366029	Declutching lever	*680504	Needle bar connecting stud unit
53088	Needle bar stopper set screw nut	366030	Declutching lever washer	102408089	Needle
53233	Needle bar vibrating rod bracket set screw	366031	Declutching lever set screw	*102517107	Pressure regulator unit
53247	Oscillating shaft bushing set screw	366032	Declutching arm	102059003	Presser bar spring
53271	Oscillating shaft crank	366033	Declutching arm set screw	102063000	Set screw
56065	Needle bar vibrating rod bracket	366057	Bobbin winder arm spring	102222009	Pressure regulating screw
56066	Needle bar vibrating and bracket pin	366060	Oil duct	102061008	Washer
56067	Needle bar supporter	*532503	Thread take-up lever unit	*553013005	Presser bar guide bracket
56132	Needle bar supporter bracket	*553507	Presser foot		

(The parts marked with a star must be ordered in unit form.)

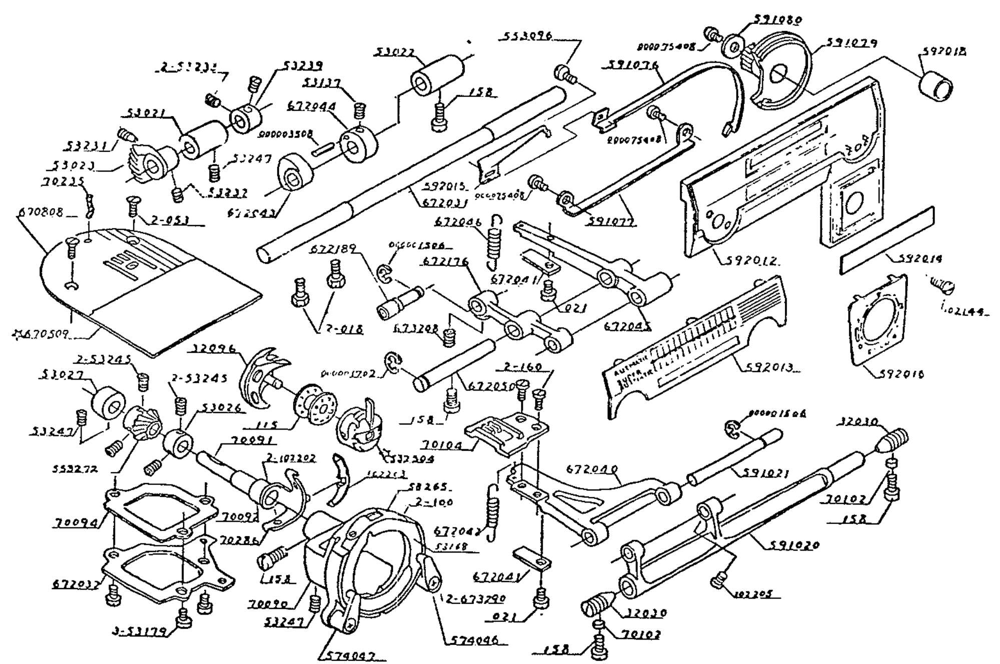


Fig. 6-10. More of the parts list of the New Home Model 592. The corresponding parts names can be found in Table 6-10.

Table 6-10. Parts List Corresponding to Fig. 6-10.

018	Hinge clamping screw	53247	Oscillating shaft bushing set screw	591080	Pattern indicating needle guide gear washer
021	Needle bar vibrating rod set screw	53265	Shuttle race spring	592012	Pattern indicating plate frame
053	Needle plate set screw	70090	Shuttle race body	592013	Pattern indicating plate
100	Shuttle race spring set screw	70091	Shuttle driving shaft	592014	Pattern indicating window
115	Bobbin	70092	Shuttle driver	592015	Indicating needle
158	Oscillating shaft bushing set screw	70094	Gear box cover oil seal	592016	Stitch length numbered plate
160	Feed dog set screw	70102	Center screw washer	592018	Pattern indicating needle guide gear ring
1506	Snap ring E-4	70104	Feed dog	670509	Needle plate unit
1702	Snap ring E-6	70235	Oil hole interior spring	670808	Needle plate
3508	Spring pin	70286	Shuttle driver spring	672031	Oscillating shaft
32030	Center screw	75408	Set screw	672032	Gear box cover plate
32096	Shuttle hook	102144	Set screw	672040	Feed bar
53021	Oscillating shaft bushing (front)	102202	Shuttle driver spring set screw	672041	Feed bar guide
53022	Oscillating shaft bushing (rear)	102203	Shuttle cleaner	672042	Feed bar spring
53023	Spiral bevel gear unit	102205	Oscillating shaft ring set screw	672043	Feed lifting cam
53026	Shuttle driving shaft ring	*532504	Bobbin case unit	672044	Feed lifting cam ring
53027	Shuttle driving shaft bushing	553096	Indicating needle set screw	672045	Feed lifting rock shaft crank
53137	Feed lifting cam ring set screw	553272	Spiral bevel gear unit	672046	Feed lifting rock shaft crank spring
53168	Shuttle race ring	574046	Shuttle race clasp (Right)	672050	Feed lifting rock shaft
53179	Gear box cover plate set screw	574047	Shuttle race clasp (Left)	672176	Feed lifting adjusting rock shaft
53231	Spiral bevel gear set screw A	591020	Feed rock shaft	672189	Feed lifting roller unit
53232	Spiral bevel gear set screw B	591021	Feed bar holding pin	673208	Feed lifting roller shaft set screw
53233	Oscillating shaft ring set screw	591076	Indicating needle conveyer-belt	673090	Shuttle race clasp set screw
53239	Oscillating shaft ring	591077	Indicating needle conveyer-belt guide		
53245	Spiral bevel gear set screw C	591079	Pattern indicating needle guide gear		

(The parts marked with a star must be ordered in unit form.)

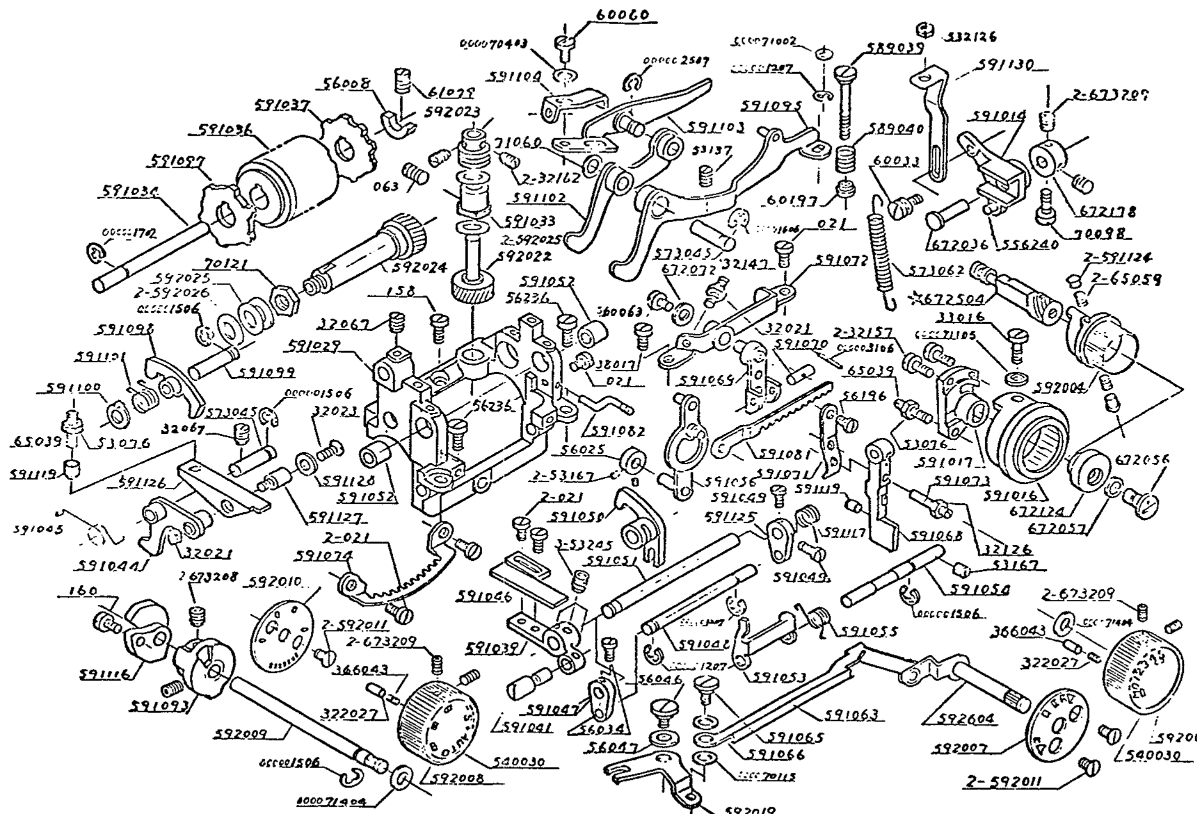
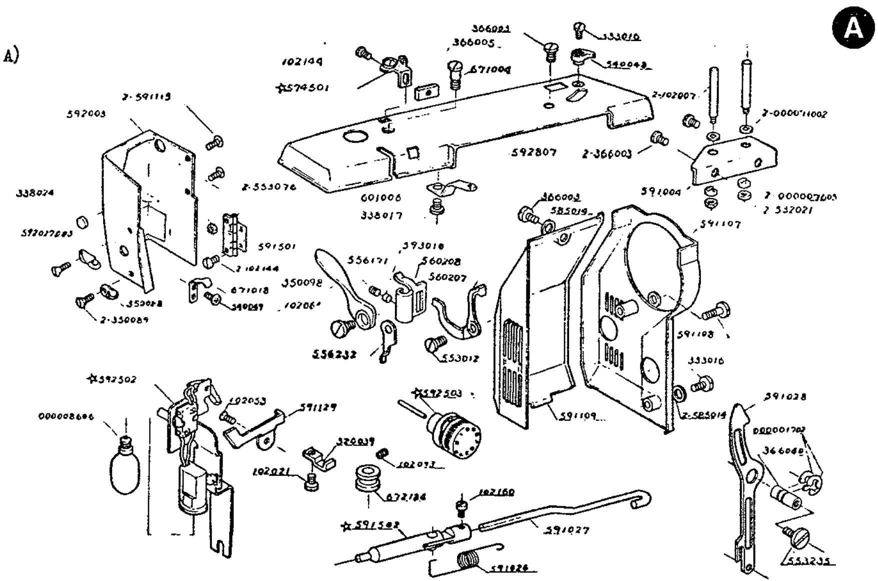


Fig. 6-11. The completion of the parts list of the New Home Model 592. The corresponding written parts list for this figure is found in Table 6-11.

Table 6-11. Parts List Corresponding to Fig. 6-11.

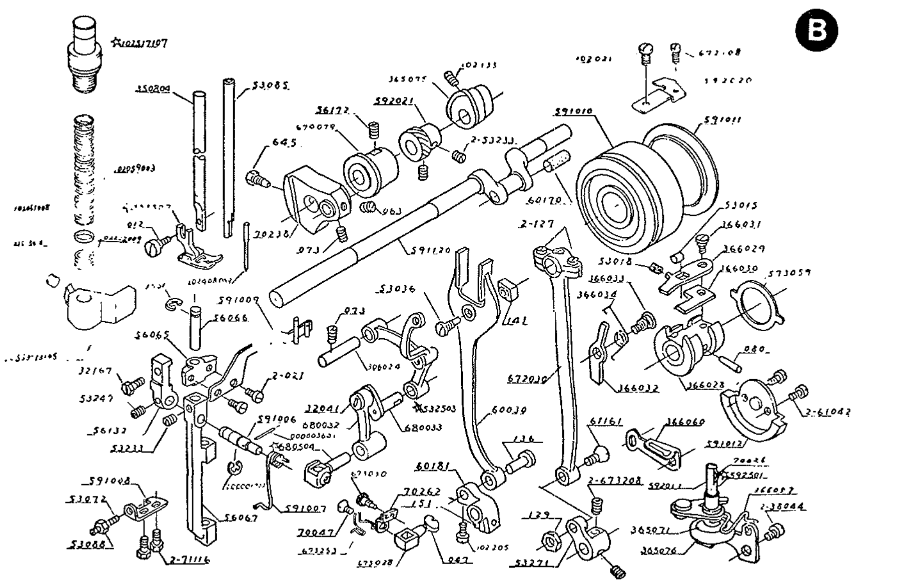
(A)



1702	Snap ring E-S
7605	Spring washer
8606	Light bulb
71002	Spool pin base plate washer
102007	Spool pin

102021	Set screw
102053	Set screw
102065	Presser bar lifter holding screw
102073	Set screw
102144	Set screw

102160	Feed dog set screw
320039	Coad holding metal fitting
333016	Belt cover set screw (Lower)
338017	Top cover thread guide set screw
338024	Light indicator
350088	Face plate thread guide
350089	Set screw
350098	Presser bar lifter
366003	Set screw
366005	Bobbin winder latch set screw nut
366040	Drop lever pin
532021	Spool pin nut
540048	Bobbin winder stopper
540049	Face plate spring
553012	Tension
553076	Tension releasing lever pin
553235	Drop lever pin screw
556171	Set screw
556232	Presser bar lifter washer
560207	Tension releasing lever
560208	Tension releasing lever holder
☆574501	Top cover thread guide bracked (unit)
585014	Belt cover set screw washer
591004	Spool pin base plate
591026	Plunger spring
591027	Plunger connecting rod
591028	Drop lever
591107	Belt cover
591108	Belt cover set screw
591109	Motor cover
591115	Face plate hinge (B) set screw
591129	Coad holding plate
591501	Face plate hinge unit
☆591502	Drop feed plunger unit
☆592003	Face plate
☆592502	Lamp socket unit
592503	Thread tension regulator unit
592807	Top cover
593010	Presser bar lifter pin washer
601006	Top cover thread guide
671004	Top cover set screw
671018	Face plate spring
672184	Rubber bushing
592027003	Face plate thread guide



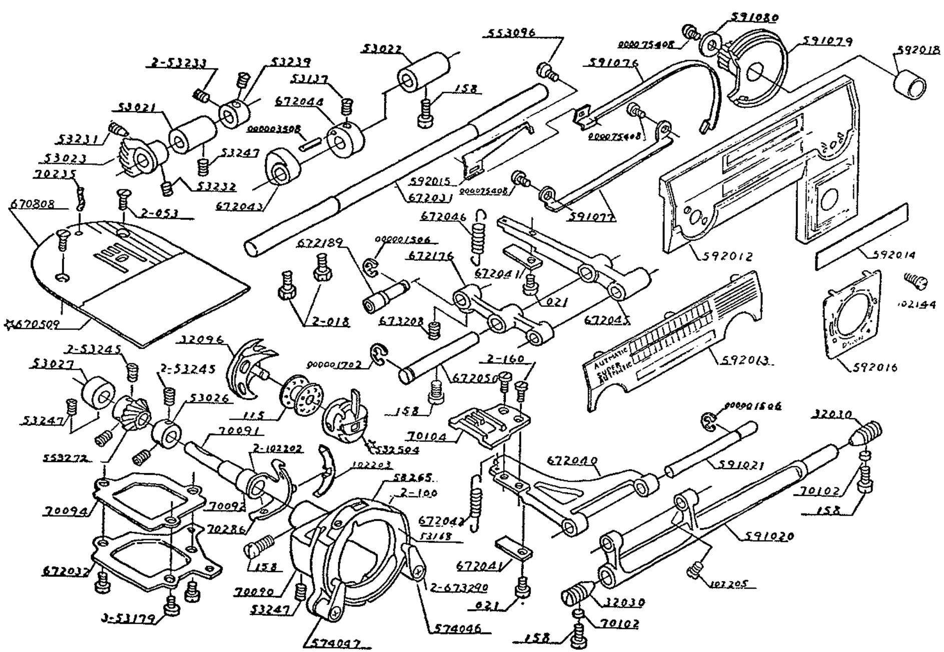
366031	Declutching lever set screw
366032	Declutching arm
366033	Declutching arm set screw
366057	Bobbin winder arm spring
366060	Oil duct
☆532503	Thread take-up lever unit
☆553507	Presser foot
573059	Balance wheel washer
591006	Needle bar supporter pin
591007	Needle bar supporter spring
591008	Needle bar supporter stopper
591009	Needle bar vibrating rod
591010	Balance wheel

591011	Balance wheel cap
591012	Balance wheel balance weight
591120	Upper shaft
592017	Bobbin winder spindle
592020	Oscillating stopper plate
592021	Upper shaft worm gear
☆592501	Bobbin winder unit
670079	Upper shaft bushing
672030	Crank connecting rod
672108	Set screw
673028	Needle clamp
673030	Needle bar screw set screw

673208	Feed lifting roller set screw
673253	Needle bar thread guide
680032	Needle bar crank rod
680033	Needle bar connecting link
☆680504	Needle bar connecting stud unit
102408089	Needle
☆102517107	Pressure regulator unit
102059003	Presser bar spring
102063000	Set screw
102222009	Pressure regulating screw
102061008	Washer
☆553013005	Presser bar guide bracket

012	Presser foot thumb screw
021	Needle bar vibrating rod set screw
047	Needle clamp set screw
063	Presser bar guide bracket set screw
073	Needle bar connecting link set screw
080	Tapered pin (large)
127	Crank connecting rod screw
129	Crank connecting rod tapered screw nut
136	Feed rock shaft connecting pin
141	Feed regulator slide block
151	Feed rock shaft bracket set screw
645	Thread take-up crank set screw
1506	Snap ring E-4
1702	Snap ring E-S
3601	Spring pin
32041	Needle bar connecting link cap
32167	Needle bar supporter bracket screw
38044	Bobbin winder spindle base plate set screw
53015	Declutching lever collar
53018	Declutching lever spring
53036	Slide block stud
53072	Needle bar supporter stopper (left)
53085	Needle bar
53088	Needle bar stopper set screw nut
53233	Needle bar vibrating rod bracket set screw
53247	Oscillating shaft bushing set screw
53271	Oscillating shaft crank
56065	Needle bar vibrating rod bracket
56066	Needle bar vibrating and bracket pin
56067	Needle bar supporter
56132	Needle bar supporter bracket
56172	Upper shaft bushing set screw
60030	Forked rod
60170	Upper shaft felt
60181	Feed rock shaft bracket
61042	Balance wheel balance weight set screw
61161	Crank connecting rod tapered screw
70026	Bobbin winder spindle pin
70047	Needle bar thread guide set screw
70238	Thread take-up crank
70262	Needle clamp plate
71116	Needle bar supporter stopper set screw
102021	Set screw
102063	Presser bar guide bracket set screw
102133	Set screw
102205	Set screw
306024	Thread take-up lever pin
350804	Presser bar
366034	Declutching arm spring
365071	Bobbin winder wheel
365075	Feed cam
365076	Rubber grommet
366028	Balance wheel bushing
366029	Declutching lever
366030	Declutching lever washer

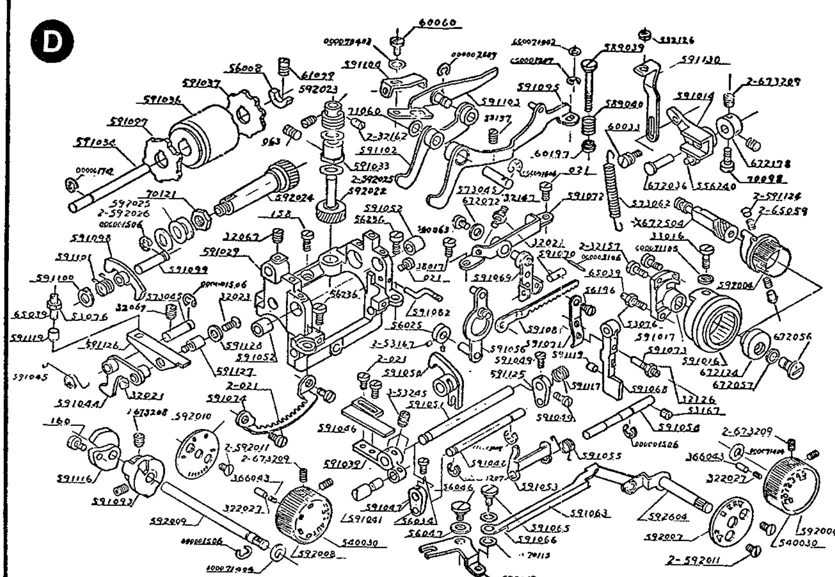
Table 6-11 continued



018	Hinge clamping screw
021	Needle bar vibrating rod set screw
053	Needle plate set screw
100	Shuttle race spring set screw
115	Bobbin
158	Oscillating shaft bushing set screw
160	Feed dog set screw
1506	Snap ring E-4
1702	Snap ring E-6
3508	Spring pin
32030	Center screw
32096	Shuttle hook
53021	Oscillating shaft bushing (front)
53022	Oscillating shaft bushing (rear)
53023	Spiral bevel gear unit
53026	Shuttle driving shaft ring
53027	Shuttle driving shaft bushing
53137	Feed lifting cam ring set screw
53168	Shuttle race ring
53179	Gear box cover plate set screw
53231	Spiral bevel gear set screw A
53232	Spiral bevel gear set screw B
53233	Oscillating shaft ring set screw
53239	Oscillating shaft ring

53245	Spiral bevel gear set screw C
53247	Oscillating shaft bushing set screw
53265	Shuttle race spring
70090	Shuttle race body
70091	Shuttle driving shaft
70092	Shuttle driver
70094	Gear box cover oil seal
70102	Center screw washer
70104	Feed dog
70235	Oil hole interior spring
70286	Shuttle driver spring
75408	Set screw
102144	Set screw
102202	Shuttle driver spring set screw
102203	Shuttle cleaner
102205	Oscillating shaft ring set screw
☆ 532504	Bobbin case unit
553096	Indicating needle set screw
553272	Spiral bevel gear unit
574046	Shuttle race clasp (Right)
574047	Shuttle race clasp (Left)
591020	Feed rock shaft
591021	Feed bar holding pin
591076	Indicating needle conveyer-belt
591077	Indicating needle conveyer-belt guide
591079	Pattern indicating needle guide gear
591080	Pattern indicating needle guide gear washer
592012	Pattern indicating plate frame
592013	Pattern indicating plate
592014	Pattern indicating window
592015	Indicating needle
592016	Stitch length numbered plate
592018	Pattern indicating needle guide gear ring
670509	Needle plate unit
670808	Needle plate
672031	Oscillating shaft
672032	Gear box cover plate
672040	Feed bar
672041	Feed bar guide
672042	Feed bar spring
672043	Feed lifting cam
672044	Feed lifting cam ring
672045	Feed lifting rock shaft crank
672046	Feed lifting rock shaft crank spring
672050	Feed lifting rock shaft
672176	Feed lifting adjusting rock shaft
672189	Feed lifting roller unit
673208	Feed lifting roller shaft set screw
673090	Shuttle race clasp set screw

D



021	Needle bar vibrating rod set screw
063	Set screw
158	Oscillating shaft bushing (rear) set screw
160	Feed dog set screw
1207	Snap ring
1506	Snap ring E-4
1702	Snap ring E-2
2507	Snap ring
3106	Spring pin
32021	Spool pin nut
32023	Needle bar crank guide set screw
32067	Pattern feed cam follower stud set screw
32126	Cam follower releasing plate stopper nut
32147	Zigzag width regulator stopper screw
32157	Leading screw guide set screw
32162	Cam drive gear (2) set screw
33016	Stitch length regulator knob base set screw
36017	Face plate spring set screw
55076	Top cover thread guide set screw nut
53137	Feed lifting cam ring set screw
53167	Cam follower releasing plate shaft set screw
53245	Spiral bevel gear set screw C
56008	Cam shaft ring
56025	Cam follower guide plate ring
56034	Transmission plate set screw (left)
56046	Zigzag width regulator plate set screw
56047	Zigzag width regulator plate washer
56196	Pattern selecting lever spring set screw
56236	Zigzag cam block frame set screw
60033	Buttonhole feed regulator set screw
60060	Pattern feed bracket plate set screw
60197	Buttonhole feed adjusting spring holder
61078	Cam shaft ring set screw
65039	Stitch length regulator knob stop screw
65059	Stitch length regulator knob pin spring
70045	Feed regulator bushing set screw
70115	Zigzag width regulator rod
70121	Cam shaft sleeve nut
70405	Washer
71002	Washer
71040	Buttonhole feed regulator bracket shaft washer
71105	Washer
71404	Washer
322027	Spring
366043	Buttonhole knob base pin
532126	Nut
540030	Zigzag width regulator dial
556240	Feed regulator pin
560063	Set screw
573045	Oscillating regulating arm pin
573046	Feed regulator spring
589039	Buttonhole feed adjusting screw
589040	Buttonhole feed adjusting spring
591014	Feed regulator
591016	Stitch length regulator knob base
591017	Leading screw guide
591029	Zigzag cam block frame
591033	Eccentric bushing pin
591034	Cam shaft
591036	Pattern cam
591039	Oscillating arm
591041	Oscillating arm pin
591044	Oscillating regulating arm
591045	Oscillating regulating arm spring
591046	Buttonhole width adjusting plate
591047	Oscillating transmission plate (left)
591048	Transmission plate pin
591049	Transmission plate set screw (right)
591050	Cam follower
591051	Cam follower shaft
591052	Cam follower shaft bushing
591053	Cam follower releasing plate
591054	Cam follower releasing plate shaft
591055	Cam follower releasing plate spring
591056	Cam follower guide plate
591063	Zigzag width rod unit
591065	Zigzag width rod screw
591066	Zigzag width rod spring washer
591068	Pattern selecting lever
591069	Pattern selecting lever plate
591070	Pattern selecting lever pin
591071	Pattern selecting lever spring
591072	Pattern selecting lever setting plate
591073	Cam follower releasing plate stopper
591074	Pattern selecting separator
591081	Indicating rack
591082	Indicating rack holding pin
591093	Buttonhole width adjusting cam
591095	Buttonhole feed regulator bracket
591097	Pattern feed cam
591098	Pattern feed cam follower pin
591099	Pattern feed cam follower stud
591100	Pattern feed cam follower washer
591101	Pattern feed cam follower spring
591102	Pattern feed regulating bracket
591103	Pattern feed bracket
591104	Pattern feed bracket plate
591116	Buttonhole width adjusting cam
591117	Cam follower shaft spring
591119	Buttonhole zigzag width adjusting stopper
591124	Stitch length regulator knob pin
591125	Oscillating transmission arm
591126	Oscillating arm plate
591127	Oscillating arm plate pin set screw
591128	Oscillating arm plate pin washer
591130	Buttonhole feed adjusting rod
592004	Stitch length regulator knob
592006	Stitch length indicating plate
592007	Zigzag width knob base
592008	Selector knob
592009	Selector knob indicating plate
592010	Selector knob rear plate
592011	Set screw
592019	Zigzag width regulator plate
592022	Cam drive gear (1)
592023	Cam drive gear (2)
592024	Cam shaft sleeve
592025	Cam shaft sheeve nut
592026	Cam shaft sleeve washer
592604	Zigzag width rod unit
672036	Feed regulator clamp pin
672056	Stitch length regulator knob adjusting screw
672057	Stitch length regulator knob adjusting screw ring
672072	Pattern selecting lever set screw washer
672124	Stitch length regulator knob lid
☆672504	Leading screw unit
673206	Set screw
673209	Set screw
672175	Feed regulator bushing

Models 541, 543, 544 and 545

On Models 541, 543, 544 and 545, if a wavering straight stitch occurs when the machine is set for straight stitching, you must adjust the swing of the needle bar to a standard of .02mm. To make this adjustment, set the zig-zag width regulator dial at 0 (Fig. 6-14). Set the selector knob at OFF. Turn the balance wheel toward you and note the direction of the needle bar swing when the zig-zag cam box (575501) swings to the right. Loosen the two set screws (568064 and 589030), and move the zig-zag width regulating lever (540026) in one direction or the other.

If the zig-zag cam box and needle bar move in the same direction, move the zig-zag width regulating lever in the arrow-indicated direction A.

If the zig-zag cam box and needle bar move in opposite directions, move the zig-zag width regulating lever in the arrow-indicated direction B. When the needle bar swing is adjusted to a standar of .02mm tighten the set screw (589030). Adjust the zig-zag width equal to the width between the right and left side of a buttonhole, while shifting the buttonhole width regulating lever (541009) longitudinally. Upon completion of the last step, tighten the set (568064).

Models 546, 547, 548, and 549

When the Models 546, 547, 548 and 549 are set for straight stitching, a swing of the needle bar in excess of .05mm will cause a wavering straight stitch. To correct this, set the zig-zag width regulator dial at 0 (Fig. 6-15). Set the selector knob at position L. Turn the balance wheel toward you to see the direction in which the needle bar swings when the zig-zag cam box (57501) is moving to the right.

To adjust the needle bar swing to a standard of .05mm, loosen the set screws (568064 and 589030). If the cam box and needle bar move in the same direction, shift the zig-zag width regulating lever (540026) in the arrow-indicated direction A. If the cam box and needle bar move in opposite directions, shift the zig-zag width regulator (540026) in the arrow-indicated direction B.

When the needle bar swing is adjusted to a standard of .05mm, tighten screw (589030). Adjust the zig-zag width equal to the width between the right and left side of a buttonhole by shifting the buttonhole width regulating lever (541009) longitudinally. When this adjustment is completed, tighten the screw (568064).

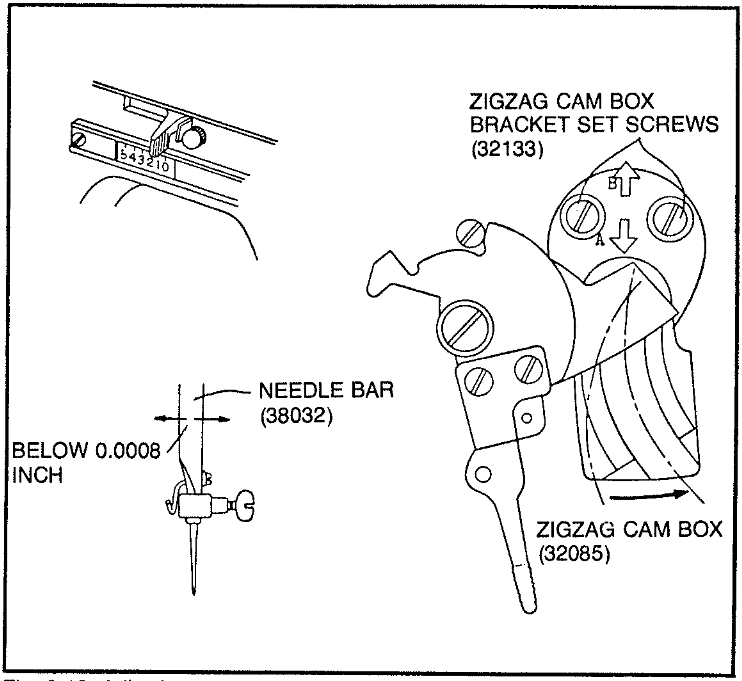


Fig. 6-12. Adjusting a wavering straight stitch on the New Home Model 532.

The Model 592

To minimize the needle bar swing when straight stitching on the Model 592, proceed as follows (Fig. 6-16):

- Set the zig-zag width regulator dial at 0. Set the buttonhole knob at AUTO, and the pattern indicator as shown in Fig. 6-16.
- Turn the balance wheel to see if the needle bar swings when the width regulator lever (591126) moves up and down. If the needle bar swings, loosen set screw (673209) on the zig-zag width regulator dial. Adjust the position of the zig-zag width regulator (592019) so that the needle bar does not swing when the width regulator lever (591126) moves up and down. Tighten the set screw (673209), with 0 at the indicating mark of the dial.

ADJUSTING THE FEED DOG HEIGHT

To be sure to which New Home Models the following procedures apply, *read the headings carefully.*

Model 532

The correct height of the top edge of the feed dog teeth above the top surface of the needle plate when the needle bar is at its highest position and the drop feed button is on SEW is .02 inch to .28 inch (.5mm to .7mm) on the Model 532. To make this adjustment, proceed as follows (Fig. 6-17):

- Set the drop feed button button on SEW position, and stitch length dial at 4.
- Depress the pop-up pressure release regulator (83 patch-omatic darner) to the read line, lower the presser bar lifter and turn the balance wheel until the needle bar comes to its highest point.

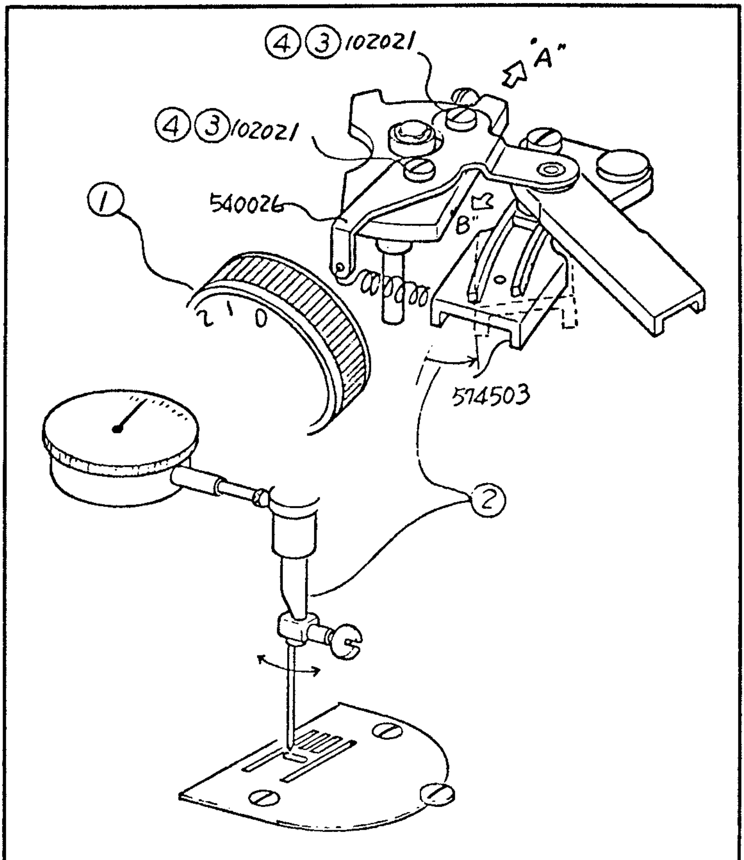


Fig. 6-13. Adjusting a wavering straight stitch on the New Home Model 540 and Model 542.

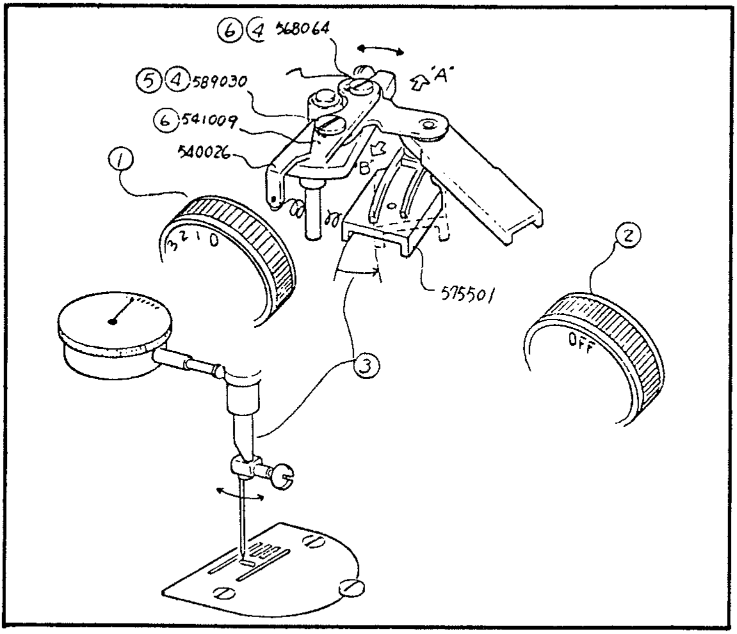


Fig. 6-14. Correcting a wavering straight stitch on the New Home Models 541, 543, 544, and 545.

- Loosen the feed rock shaft bracket screw (151)
- Rotate the feed lifting rock shaft unit (149) in the direction of A or B to set the feed at the correct height. If the feed dog is too high, rotate the feed lifting rock shaft (149) in the direction indicated by A. If the feed dog is too low, rotate the feed lifting rock shaft (149) in the direction indicated by B.
- When the adjustment is completed, tighten the screw (151) securely.

Model 592

On the Model 592, the correct height of the top edge of the feed dog teeth above the top surface of the needle plate is .7mm to .8mm when the needle is at its highest point and the presser is lowered with the maximum feed and strongest pressure force at the pressure regulator. To make this adjustment, set the stitch length regulator at 4, the pressure regulator at the highest pressure setting and raise the needle bar to its highest position (Fig. 6-18). Then lower the presser foot. Loosen the set screw (673208) of the feed lifting roller shaft. Turn the feed lifting roller shaft (672042)

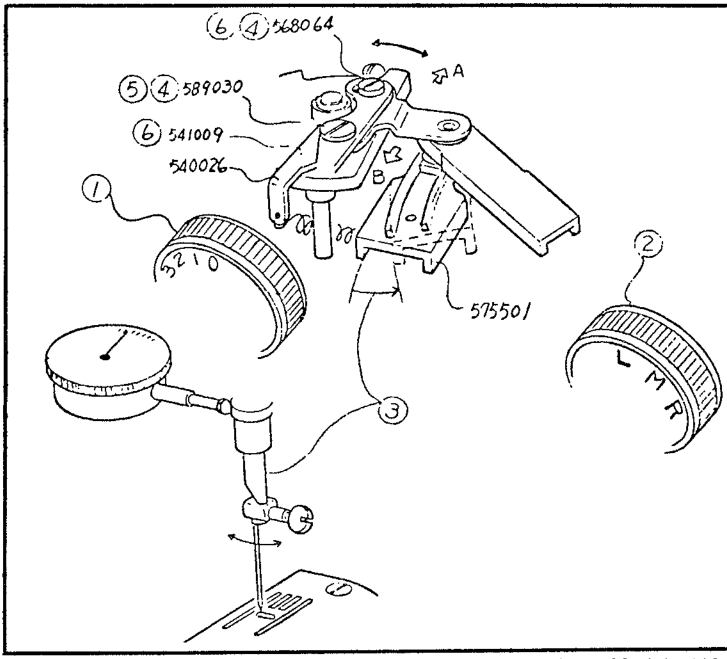


Fig. 6-15. Correcting a wavering straight stitch on the New Home Models 546, 547, 548 and 549.

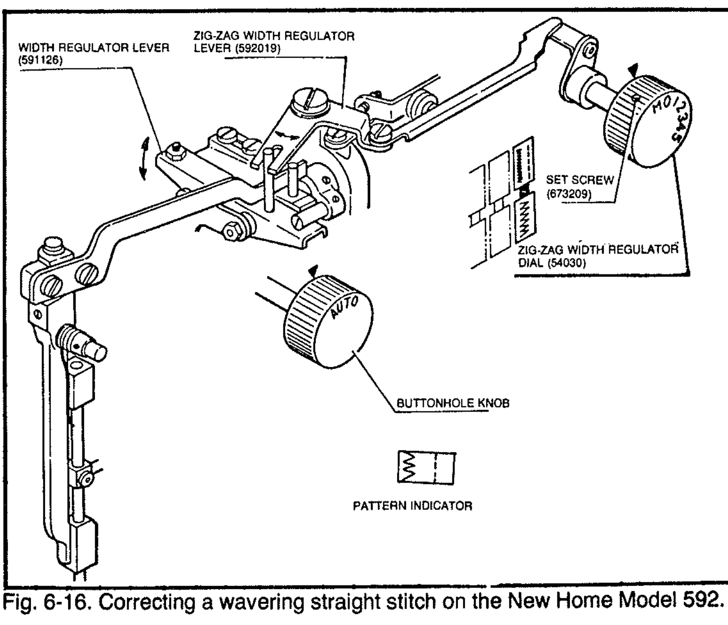


Fig. 6-16. Correcting a wavering straight stitch on the New Home Model 592.

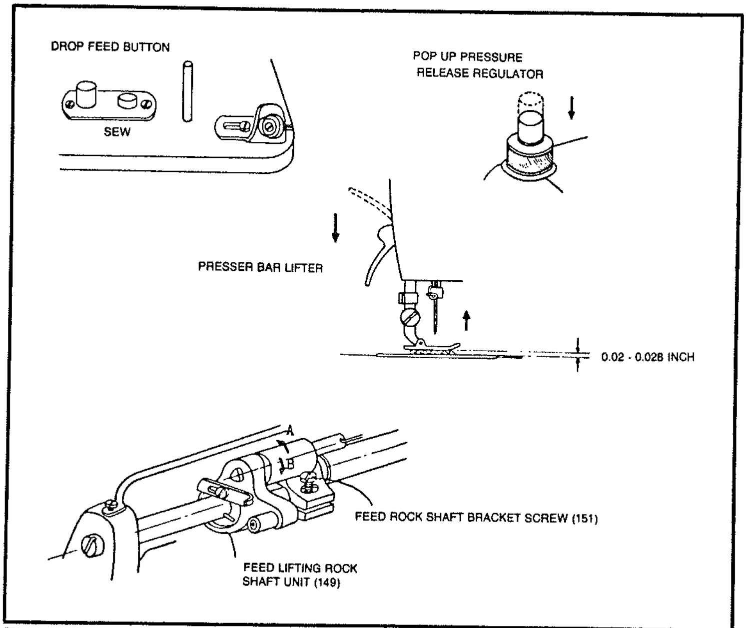


Fig. 6-17. Adjusting the feed dog height on the New Home Model 532. Always adjust the feed dog height with the drop feed button in the SEW position.

with a screwdriver to obtain the correct feed dog height. When the adjustment is complete, tighten the set screw (673208) securely.

ADJUSTING THE PRESSER BAR HEIGHT

On all New Home Models, the method for adjusting the height of the sole of the presser foot above the needle plate surface, when the presser bar is raised to its up position, is about the same as on any other sewing machine. To make this adjustment, remove or open the face plate and lift the presser bar lever to its up position. Loosen the set screw that secures the presser bar in position. Move the presser bar up or down, as required. Tighten the set screw.

ADJUSTING THE PRESSER FOOT ALIGNMENT

On all New Home Models, the edge of the presser foot should be aligned parallel with the edge of the needle plate. To make this alignment, proceed as if to adjust the presser bar height, but instead of raising or lowering the presser bar, slightly rotate it to align the presser foot. This alignment may also be routinely checked when adjusting the presser bar height. Then tighten the presser bar set screw without disturbing either the height or alignment of the presser foot.

TIMING THE SHUTTLE TO THE NEEDLE

To be sure to which New Home Models the following procedures apply, *read the headings carefully.*

Model 532

On the Model 532, the oscillating action of the shuttle is imparted through the oscillating shaft (see Part No. 32068U in the parts list). For the timing to be correct, the point of the shuttle hook should be just at the left edge of the needle, when the needle has descended to its lowest point and risen sufficiently to form a thread loop. At this time, the *vertical* distance of the hook from the top of

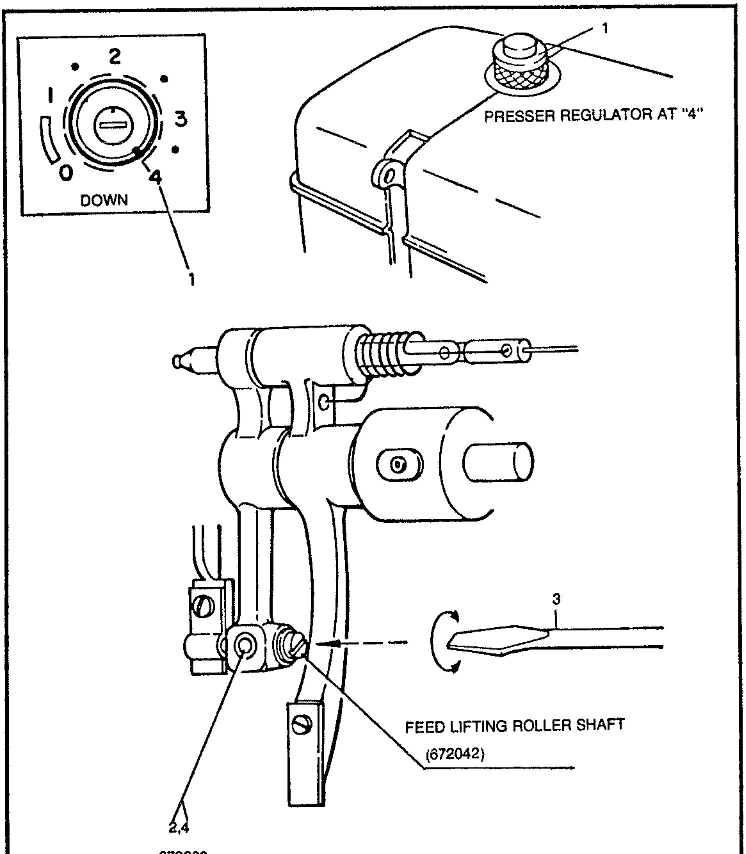


Fig. 6-18. Adjusting the feed dog height on the New Home Model 592.

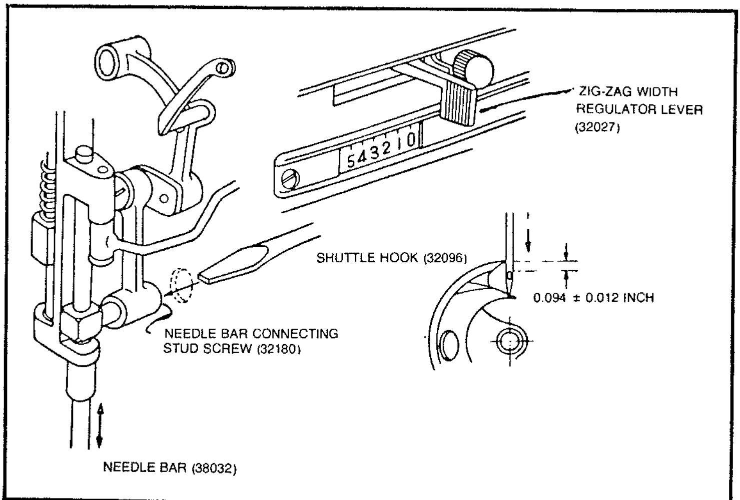


Fig. 6-19. Setting the needle bar height on the new Home Model 532. Remember that the needle bar height is associated with proper timing. It picks up a thread loop on every needle cycle.

the needle eye should be such that the hook will engage the thread loop. In the case of missed stitches, first be sure that a good grade of thread is being used and the correct needle is installed. Then, correct the timing in two steps. Set the shuttle hook to the needle, *if necessary,* adjust the needle bar height.

Setting the Hook to the Needle. To set the hook to the needle, rotate the balance wheel toward you until the needle reaches its lowest point and rises just enough to form a thread loop. Observe the position of the hook point in relation to the left edge of the needle.

If the hook point is not close enough to the needle to pick up a thread loop, loosen the set screws on the shuttle body and rotate the shuttle in the appropriate direction. Tighten the set screws.

If the vertical distance of the hook to the top of the needle eye is not correct (about 2mm), of if the machine still misses stitches, set the needle bar height.

Setting Needle Bar Height. To set the needle bar height on the Model 532, set the zig-zag width regulator lever (32027) at 0 (Fig. 6-19). Turn the blaance wheel toward you until the tip of the shuttle hook (32096) meets the left side of the needle. The distance between the top of the needle eye and the tip of the shuttle hook should be .094 inch (2mm). To make this adjustment, loosen the needle bar connecting stud screw (32180) by inserting a screwdriver through the hole in the machine arm, and move the needle bar up or down, as appropriate. Tighten the needle bar connecting stud screw (32180) securely.

If the shuttle needle timing is still slightly incorrect, it may be necessary to reset the shuttle hook point to the needle, as described previously.

The 54 Series Models

On 54 Series Models, the oscillating motion is imparted to the shuttle through the shuttle driving shaft as shown in Fig. 6-20. For the shuttle needle timing to be correct, the point of the shuttle hook should be at the left edge of the needle when the needle has reached its lowest point and risen sufficiently to form a thread loop. At the same time, the *vertical* distance of the hook from the top of the needle eye should be such that the hook will engage a thread loop. In the case of missed stitches, first be sure that a good grade of thread is being used and the correct needle is installed. Then correct the timing in two steps. Set the hook to the needle and *if necessary*, adjust the needle bar height.

Setting the Hook to the Needle. To set the hook to the needle, the precedure is essentially one of setting the needle-bar

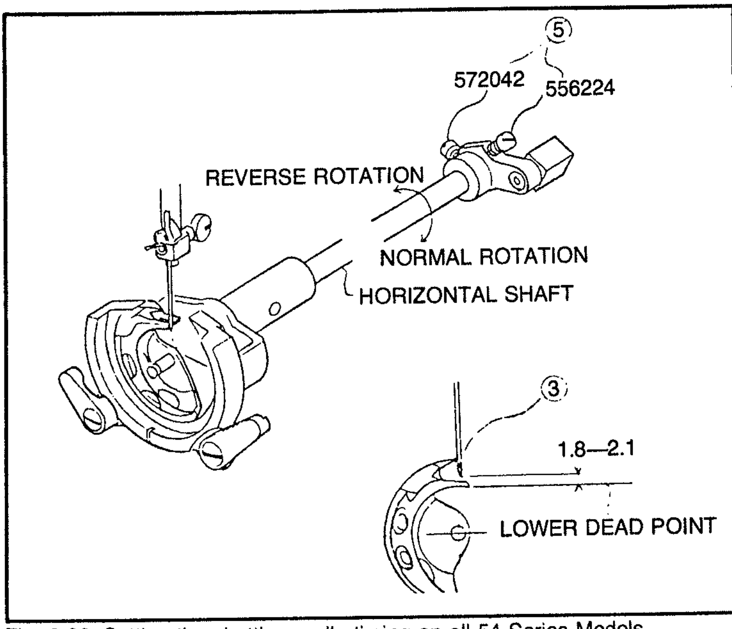


Fig. 6-20. Setting the shuttle-needle timing on all 54 Series Models.

rise that is sufficient to form a thread loop (1.8mm to 2mm) to coincide with the appearance of the oscillating hook point at the left edge of the needle (Fig. 6-20). Set the zig-zag width regulator dial at 0. Set the selector knob at OFF (Models 541, 542, 544 and 545 only); or set the selector knob at L (Models 546, 547, 548, and 549 only).

Turn the balance wheel toward you to lower the needle to its lower dead point, and continue rotating the wheel until the tip of the hook reaches the left side of the needle. Slightly turn the balance wheel to raise the needle about 1.95 mm from the lower dead position. Loosen the set screws (556224 and 572042), and rotate the shaft so that the hook comes to the left side of the needle.

When the needle is over the tip of the hook rotate the shaft in the reverse direction until a clearance of 2mm to 3mm is obtained between the needle and the tip of the hook. Then bring the hook to the edge of the needle by rotating the shaft in the normal direction.

When this adjustment is complete, tighten the two set screws.

If the vertical distance between the point and the top of the needle eye is not correct (about 2.4mm is correct), adjust the needle bar height.

Adjusting Needle Bar Height. To adjust the needle bar height, set the zig-zag width regulator dial at 0 (Fig. 6-21). Turn the balance wheel until the tip of the hook (532096) is at the left side of the needle. Loosen the screw (102042) by inserting a screwdriver through the hole in the arm housing. Raise or lower the needle bar to obtain a vertical distance between the hook point and top of the needle eye of about 2.4mm as shown in the Fig. 6-21. When the adjustment is complete, tighten screw (102042) securely.

Model 592

On Model 592, the oscillating motion is imparted to the shuttle through the oscillating shaft which is not attached solidly to the shuttle body, but transmits the motion through a set of gears. For the shuttle needle timing to be correct, the shuttle hook point should come to the left edge of the needle just as the needle has reached its lowest point and risen sufficiently to form a thread loop. If incorrect timing (missed stitches) persists after the hook is set to the needle, the needle bar height should be adjusted.

Setting the Shuttle Hook to the Needle. To set the hook to the needle, rotate the balance wheel to lower the needle to its lowest point, and rise just enough to form a thread loop—about 2mm. To bring the hook point to the left edge of the needle, loosen

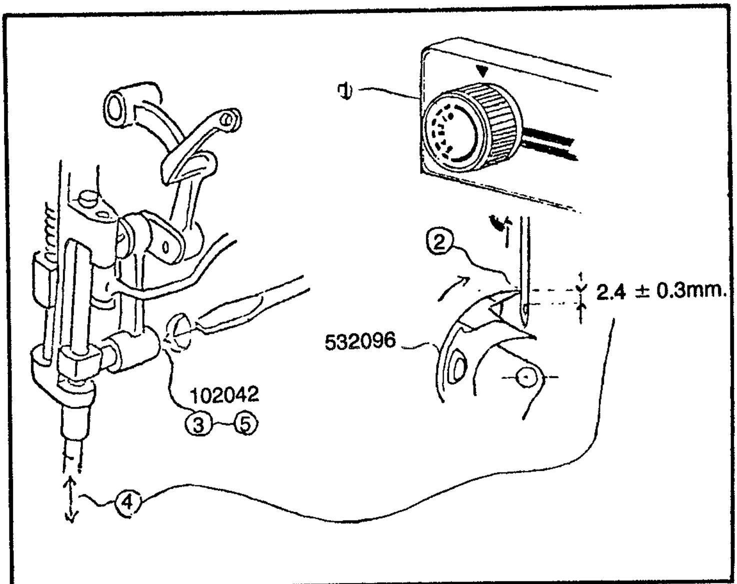


Fig. 6-21. Adjusting the needle bar height on the 54 Series Models. If the needle bar height is incorrect, the machine may miss stitches even through the shuttle-needle timing is correct.

the two screws and turn the shuttle body appropriately to bring the hook to the edge of the needle. Tighten the set screws.

If incorrect timing (missed stitches) persists after making the above adjustment, set the needle bar height.

Setting Needle Bar Height. When the hook is at the left edge of the needle, the height of the needle should be such that the *vertical* distance between hook point and the top of the needle is not so great that the hook will miss the thread loop (about 2mm to 2.5mm is correct). To make this adjustment, loosen the set screw that secures the needle bar (Fig. 6-16), and move the needle bar up or down, as appropriate. When the adjustment is complete, tighten the set screw.

ADJUSTING NEEDLE SHUTTLE CLEARANCE

To be sure to which of the New Home Models the following procedures apply, *read the headings carefully.*

The Model 532

If the clearance betweeen the shuttle and side of the needle is not correct (too wide), the machine may skip stitches despite the

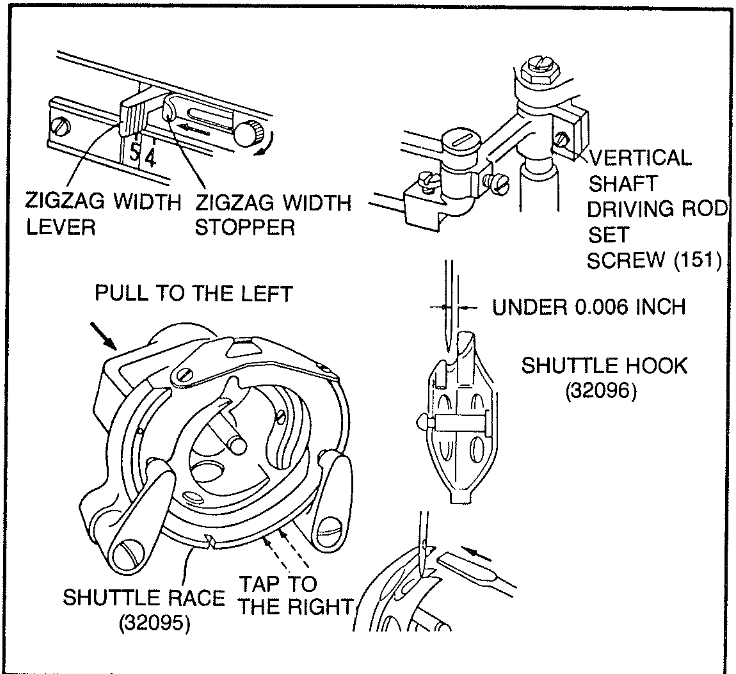


Fig. 6-22. Another factor in missed stitches is the clearance between the shuttle hook and side of the needle. Study this figure and the text to adjust this clearance on the New Home Model 532.

fact the timing is correctly set. On the Model 532, the shuttle should be as close as possible to the hook, without touching. To make this adjustment insert a new, perfect needle (Fig. 6-22). Remove the needle plate, bobbin case and shuttle race cover. Rotate the balance wheel until the needle is directly over the point of the hook. Hold the hook (32096) in place and touch the needle with a screwdriver. The needle should move only *slightly* before touching the hook (if you wish to make an actual measurement, .15mm is about right).

If the clearance is incorrect, set the zig-zag width lever at 5 and secure it with the stopper. Then loose the vertical shaft driving rod set screw (151) slightly.

Tilt the bed up and lightly tap the shuttle race (32095). Tap the shuttle race to the right if the clearance was insufficient. This would probably be indicated by noisy running of the machine. Pull the shuttle race to the left toward the needle if the clearance was too great (indicated by missed stitches) until it touches the needle, then lightly tap the shuttle race to the right (away from the needle) until the correct clearance is obtained.

Set the zig-zag width lever at 0 and recheck the clearance. When the adjustment is complete, tighten the set screw (151).

54 Series Models

On *all* 54 Series Models, the correct clearance between the hook and the side of the needle is as close as possible without touching. To make this adjustment on all 54 Series Models, proceed as follows (Fig. 6-23):

- Set the zig-zag width regulator dial at 5.
- Slightly loosen the screw (2 in Fig. 6-23) that secures the crank to the vertical shaft, leaving the screw tight enough that some pressure will be necessary to rotate the crank on the shaft.
- Check the clearance between the hook and needle (about .15mm is correct for the clearance) while holding the hook (532096).
- Adjust the clearance by tapping the shuttle race lightly, while at the same time pressing the needle against the side of the hook.

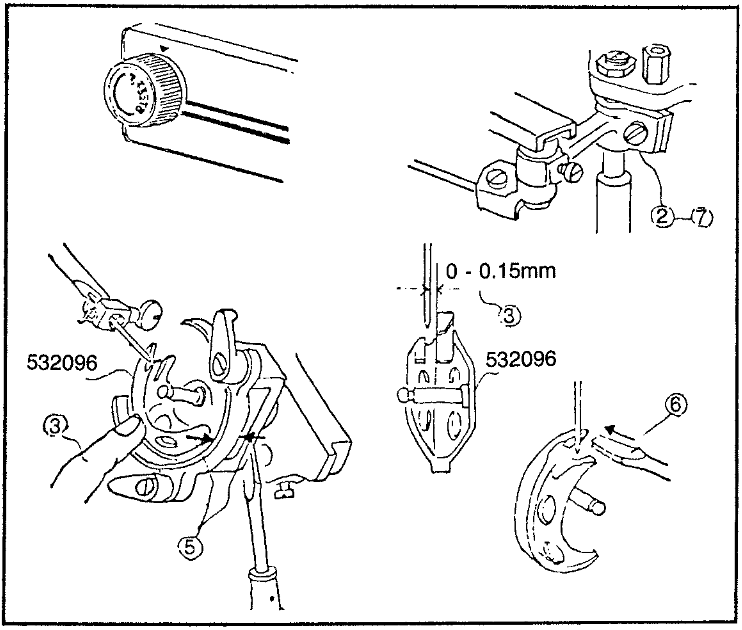


Fig. 6-23. Adjusting the shuttle-needle clearance on New Home 54 Series Models. Don't confuse this adjustment with the one required to bring the shuttle hook to the centerline of the needle.

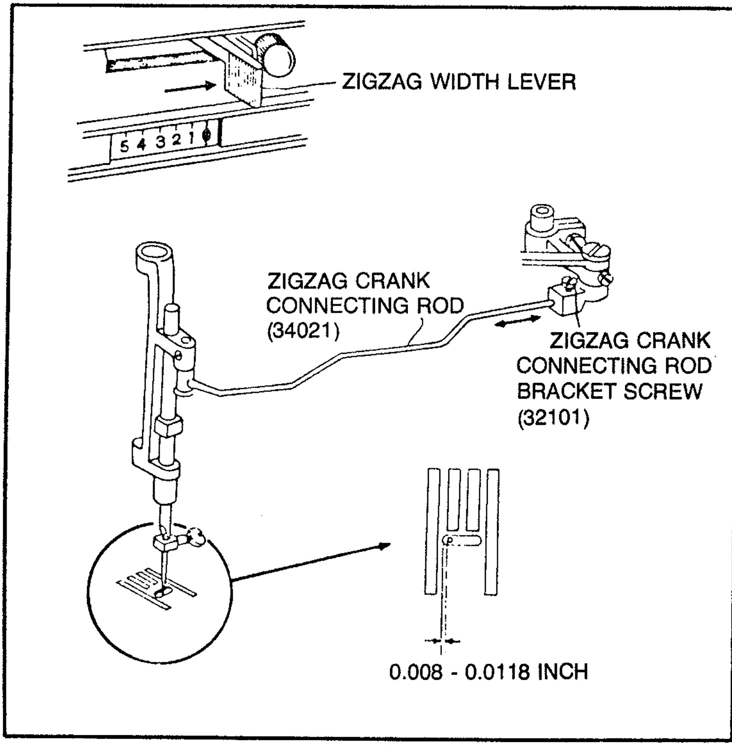


Fig. 6-24. On the New Home Model 532, the needle should enter the center of the needle plate slot when the zig-zag width lever is set at 0.

- When the correct clearance is obtained, set the zig-zag width regulator dial at 0 and recheck the clearance.
- Repeat the adjustment procedure until the shuttle needle clearance is correct when the zig-zag width regulator dial is set at both 0 and 5. Then tigthen the screw that secures the crank to the vertical shaft.

ADJUSTING NEEDLE POSITION

To be sure to which New Home Models the following procedures apply, *read the heading carefully.*

Model 532

On the Model 532, the needle should enter the needle plate slot about .088 inch (.2mm) from the left edge of the slot when the zig-zag width lever is set at 0. To make this adjustment, set the zig-zag width lever at 0 (Fig. 6-24). Check that the clearance between the needle and the left side of the needle plate is .088 inch (.2mm). If not, loosen the zig-zag crank connecting rod bracket screw (32101) slightly, and, by moving the zig-zag connecting rod (34021), you can adjust the entry of the needle into the needle plate slot.

When the adjustment is complete, tighten screw (32101) securely. After making the above adjustment, check the clearance between the shuttle and needle. They should be as close as possible without touching.

The 54 Series Models

To be sure to which of the 54 Series Models the following procedures apply, read the headings carefully.

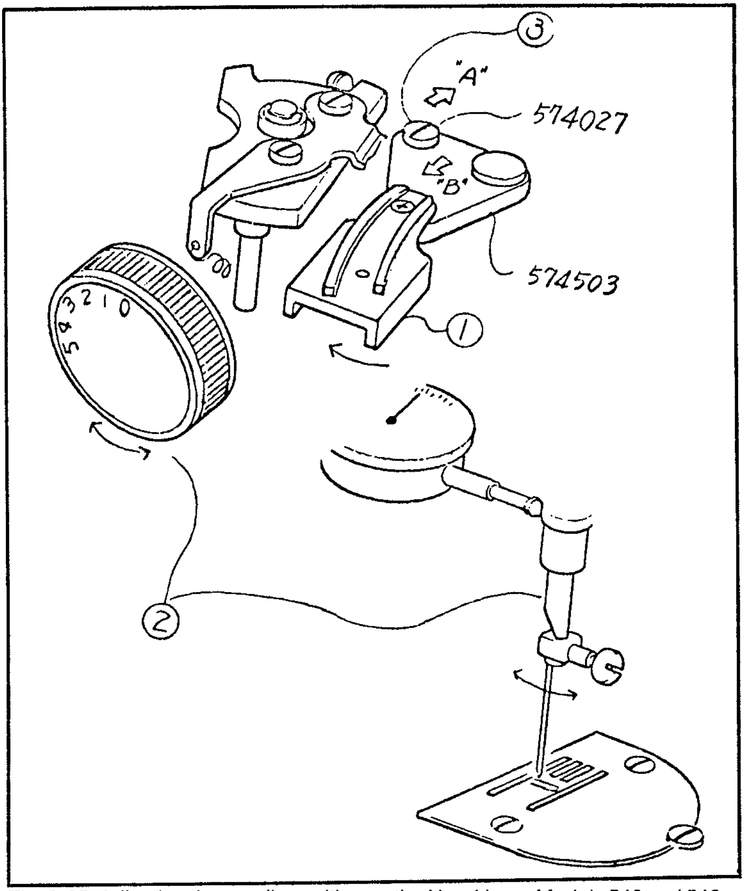


Fig. 6-25. Adjusting the needle position on the New Home Models 540 and 542.

Correcting Left Needle Position on Models 540 and 542. If the manual pattern sewing operation is irregular on the left stroke of the needle, due to the basic line deflection, adjust the irregularity as follows (Fig. 6-25):

- Turn the balance wheel toward you to shift the zig-zag cam box (574503) in the right direction, putting the cam box at its farthest left position.
- Check the direction of the deflection movement of the needle bar while turning the zig-zag width regulator dial from the graduation 0 to 5, and from 5 to 0.
- Loosen screw (574207) and shift the cam box from its original position to insure that the deflection of the needle bar is brought to a tolerance of .04mm, outward from the basic line. If the needle bar deflects to the left, move the cam box in the arrow-indicated direction A. If the needle bar deflects to the right, shift the cam box in the arrow-indicated direction B. When the adjustment is completed, secure screw (574027) securely.

Adjusting the Deflection from the Basic Line. On Models 541, 543, 544 and 545, if the stitches at the position of the basic line are irregular when changing the zig-zag width, due to deflection of the basic line, adjust to hold the deflection to a tolerance of .04mm (Fig. 6-26). Set the selector knob at OFF. Turn the balance wheel toward you to shift the zig-zag cam box (575501) to the right. Place the cam box in its farthest left position. Turn the zig-zag width regulator dial from 0 to 5, and from 5 to 0, noting the direction of the deflecting movement of the needle bar. Loosen screw (102021) and shift the basic line controlling lever (517007).

If the needle bar deflects outwardly, shift the basic line controlling lever in the arrow-indicated direction B. If the needle bar deflects inwardly, shift the basic line controlling lever in the arrow-indicated direction B. When the deflection is brought to within a tolerance of .04mm, tighten screw (102021) securely.

Deflection on the L and R Positions. On models 546, 547, 548 and 549, if the stitches at the basic line are irregular when changing the zig-zag width, the deflection can be adjusted to a tolerance of .1mm, outward from the basic lines L and R positions. To make this adjustment, set the selector knob at L (Fig. 6-27). Turn the balance wheel toward you until the zig-zag cam box (575501) is at its farthest left position. Turn the zig-zag width regulator dial from 0 to 5 and from 5 to 0. Note the direction of the deflection of the needle bar.

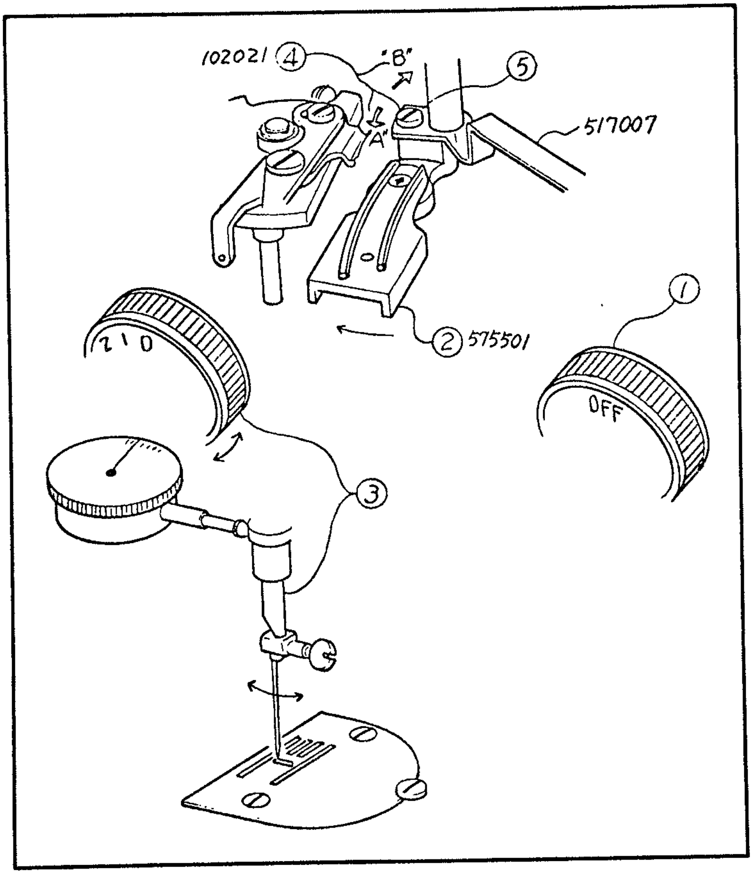


Fig. 6-26. Adjusting the needle position on New Home Models 541, 543, 544 and 545.

If the needle bar deflects inwardly, loosen screw (102021) and shift the basic line controlling lever (517007) in the arrow-indicated direction A. Then secure the needle bar lightly and temporarily in a position that it deflects outwardly. Set the selector knob at R. Turn the balance wheel toward you to set the cam box at the farthest right position. Turn the zig-zag width regulator dial from 0 to 5, and from 5 to 0. Note the direction that the needle bar deflects. If it deflects inwardly, loosen screw (102021) and shift the basic line controlling lever in the arrow-indicated direction B. Adjust so that the needle bar will reciprocate outwardly from the basic lines L and R with regularity. When the deflection is adjusted to within a tolerance of .1mm, tighten screw (102021).

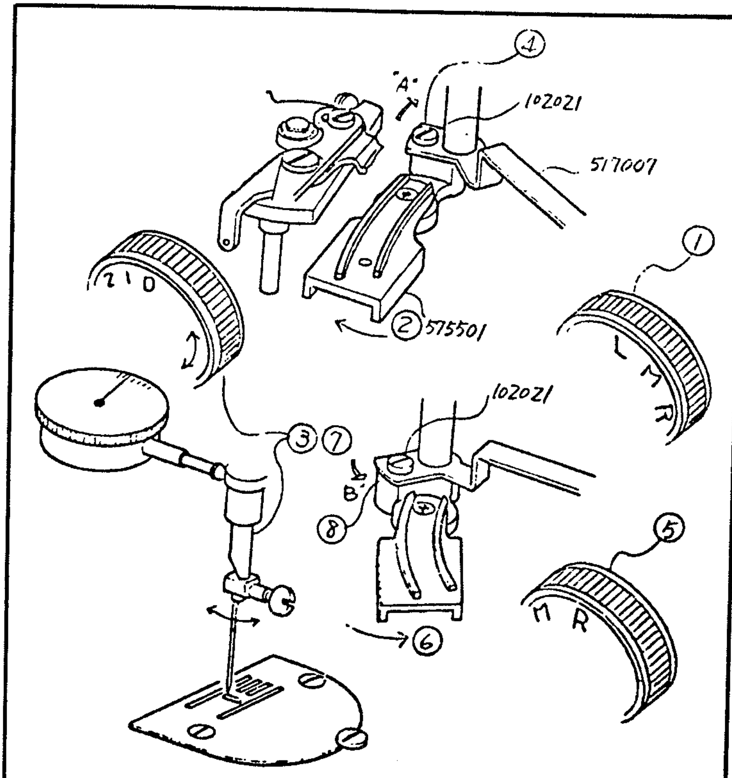


Fig. 6-27. Adjusting the needle position on the New Home Models 546, 547, 548, and 549.

The Basic Needle Position Deflection on Model 592

Adjusting the deflective needle position and correcting the deflective needle position after its adjustment is a two-part procedure on the Model 592 (Fig. 6-28).

Adjustment. Set the pattern indicator at the mark as indicated in Fig. 6-28, and set the buttonhole dial at AUTO. Turn the balance wheel to place the cam follower (591050) in the recess of the essential cam, which is marked with a dot. Loosen the width regulator bracket roller shaft set screw (553245) so that the needle can move slightly (about .1mm) to the left when the width regulator dial is turned from 0 to 5. Then, adjust the roller shaft (591041) using a screwdriver. When the adjustment is complete, tighten the screw (553245).

Correction. After the adjustment of the needle deflection, correct the needle position still referring to Fig. 6-28: Set the cam follower (591050) in the recess of the essential cam, and set the zig-zag width regulator dial at 5. Loose the locking nut (53088) on the needle bar supporter, and make the stopper screw (553072) lightly touch the needle bar supporter. Then, tighten the locking nut (553088). When the above adjustment is completed, check the right and left width of the buttonhole stitch.

Adjusting The Needle Entrance on Model 592.

On Model 592, when the zig-zag width regulator is set at 0, the buttonhole dial at AUTO and the pattern indicator at the mark shown in Fig. 6-29, the clearance between the needle and the left side of the needle plate slot should be about .2mm. To make this adjustment, set the zig-zag width regulator dial at 0, the buttonhole dial at AUTO and the pattern indicator at the mark as shown in Fig. 6-29. Loosen the set screws of the slotted BH width adjusting plate (591046) and move the plate to the end of its slotted adjustment, in the direction shown by the arrow (2). Tighten the set screw lightly. The final position of the BH width adjusting plate will be set with the adjustment of the buttonhole stitch width. Loosen the set screws

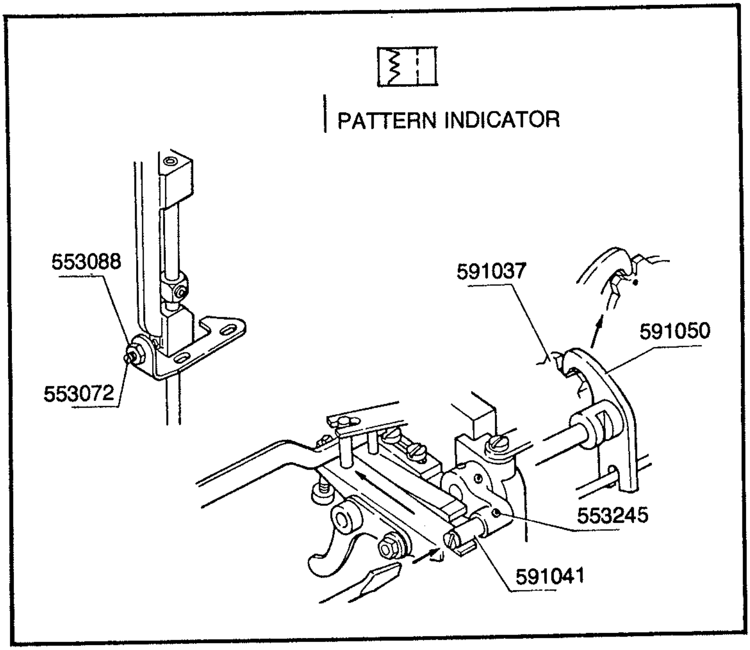


Fig. 6-28. The pattern indicator helps to adjust the needle position on the New Home Model 592.

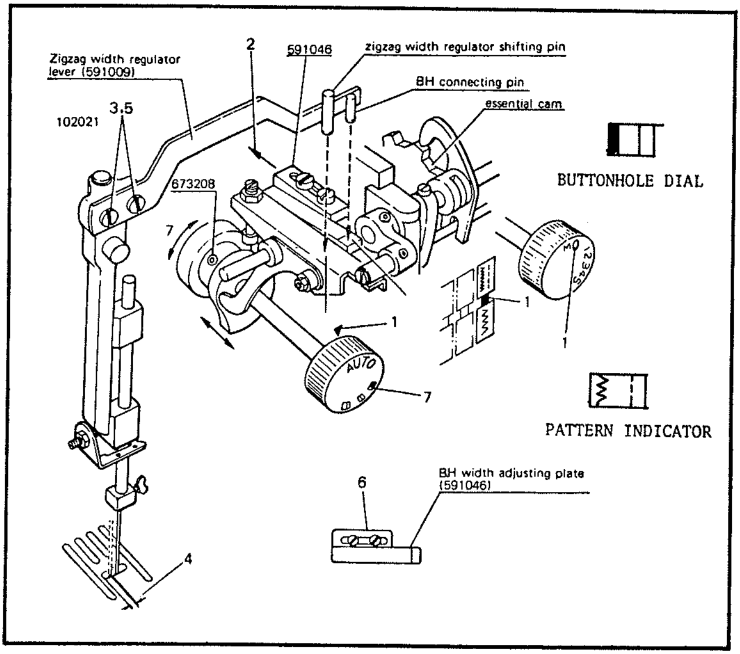


Fig. 6-29. Adjusting the entry of the needle into the needle plate slot on the Model 592.

(102021). Cause the BH connecting pin to touch the face of the BH transmission plate. Then move the zig-zag width regulator lever (591009) and needle bar supporter to that the clearance between the needle and the left side of the needle plate slot is .2mm. Tighten the zig-zag width regulator lever screws (102021). Loosen the BH adjusting cam set screw (673208) and move the cam forward and backward along the axis of its shaft. Tentatively tighten the set screw (673208) at a position where the zig-zag width regulator shifting pin touches the B face.

When the buttonhole dial is set as shown in Fig. 6-29, turn the cam slightly so that the oscillating regulating arm (591044) comes into the concave of the cam. Tighten screw (673208), move (591046) to center and tighten the screws.

Adjusting the M Position On Model 592

On Model 592, when the zig-zag width regulator dial is set at M, the needle should enter the center of the needle plate slot. To make this adjustment, loosen set screw (532147) and nut (532021). Set the zig-zag width regulator dial at M. Let the zig-zag width regulator lever (592019) touch the end of the set screw (532147). Then tighten the nut (532021). The nut should be tightened so that the regulating rod does not move (Fig. 6-30).

Turn the set screw (672108) of the width regulating stopper (592020) to bring the needle to the center of the needle plate slot.

TIMING THE NEEDLE BAR SWING

To be sure to which of the New Home Models the following procedures apply, *read the headings carefully.*

Model 532

On the Model 532, the swing of the needle bar should be timed to avoid a needle bar swing while the needle is in the fabric. To make this adjustment, proceed as follows (see Fig. 6-31): Set the zig-zag width regulator lever at 5, and secure it with the stopper (Fig. 6-31). Turn the balance wheel slowly toward you and observe the swing of the needle. If the swing is correctly timed, the needle will begin its sidewise movement about .08 inch to .18 inch (about 2mm to 4.5mm) above the needle plate. If the needle begins swinging too high above the needle plate, or swings in the fabric (Fig. 6-32), continue to the next procedure. Loosen the upper shaft worm gear

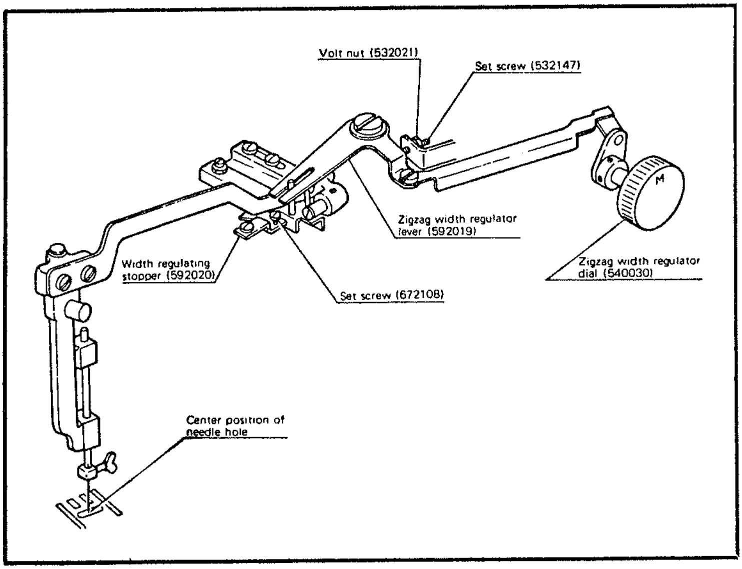


Fig. 6-30. Adjusting the needle entry to the center of the needle plate slot when the Model 592 zig-zag width regulator dial is set at M.

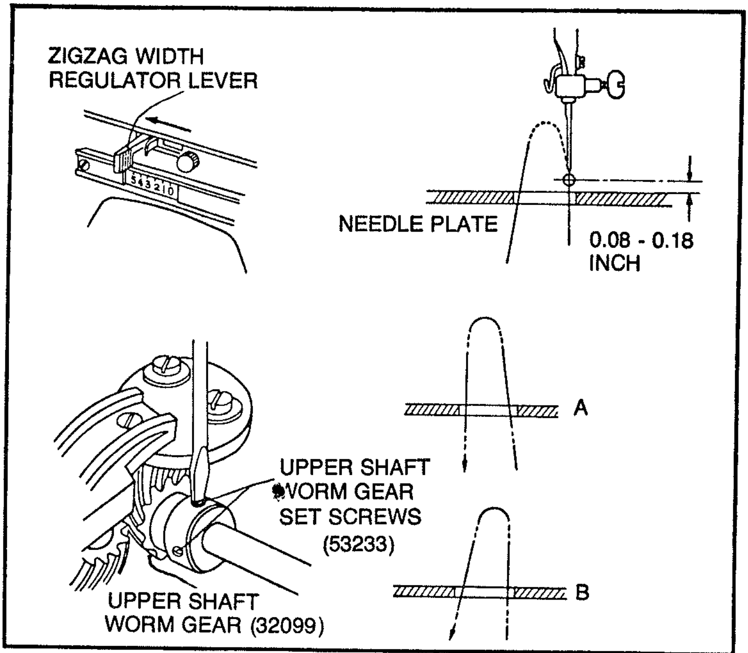


Fig. 6-31. On the Model 532, if the needle bar swing is correctly timed, the needle will begin its sidewise movement about 2mm to 4.5mm above the needle plate.

set screws (53233) slightly and hold one of the screws with a screwdriver to prevent the upper shaft worm gear (32099) from moving. Turn the balance wheel slowly toward you and tighten the screws (53233) temporarily. Again turn the balance wheel to check the result of the foregoing procedure. If the adjustment is correct, tighten screws (53233) securely. If the needle starts swing too late (Fig. 6-32), turn the balance wheel away from you and repeat the above procedure.

54 Series Models

To be sure to which of the 54 Series Models the following procedures apply, *read the headings carefully.*

Models 540 and 542. On the Models 540 and 542, the needle bar swings from the top surface of the needle plate to the lowest point of the needle stroke on either the upward or downward cycle, should be held to a tolerance of between .02mm and .05mm. To make this adjustment, set the zig-zag width regulator dial at 5 (Fig. 6-32). Turn the balance wheel toward you and observe the

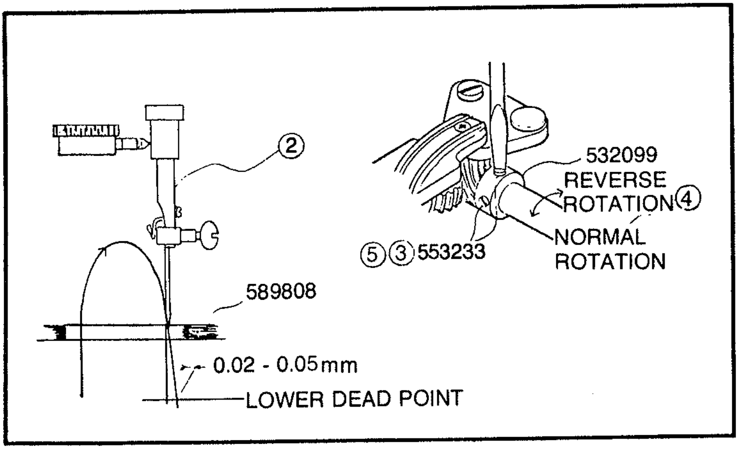


Fig. 6-32. Timing the needle bar swing on the New Home Model 540 and 542.

swing of the needle bar with the criteria as stated above. If adjustment is needed, loosen the two set screws (553233) of the upper shaft worm gear. Holding the worm gear in position on the shaft (with a screwdriver), turn the balance wheel slowly. If the needle swing in the restricted area from the top of the needle plate to the lowest point of the downward stroke of the needle is *large,* rotate the balance wheel away from you. If the needle swing in the restricted area is *slight*, rotate the balance wheel toward you. In any

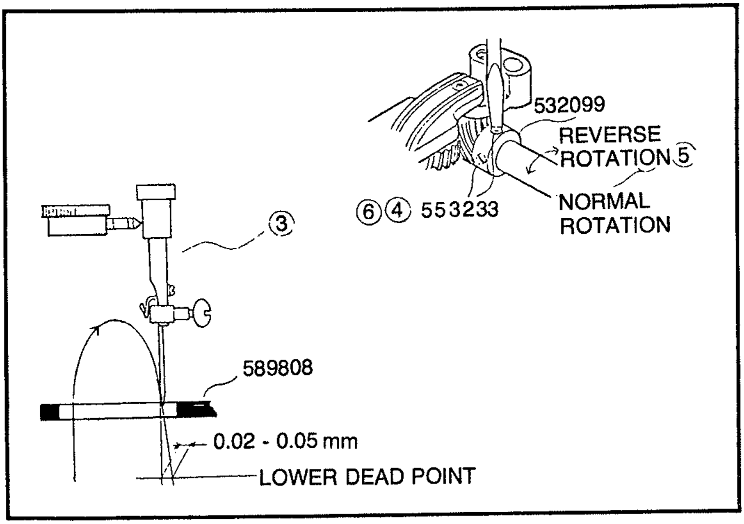


Fig. 6-33. Timing the needle bar swing on the Models 541, 543, 544 and 545.

case, be sure the worm gear does not rotate while making this adjustment. When the needle bar swing in the restricted area is brought to a tolerance of .02mm to .05mm, tighten the screws (553233) securely.

Models 541, 543, 544 and 545

On the Models 541, 543, 544 and 545, the needle bar swing while the needle is between the top of the needle plate and the lowest point of its down stroke, on either the upward or downward movement of the needle, should be held to a tolerance of .02mm to .05mm. To make this adjustment, set the selector knob at OFF (Fig. 6-33). Set the zig-zag width regulator dial at 5. Rotate the balance wheel toward you and observe the swing of the needle bar, with the criteria as stated above. If adjustment is needed, loosen the two set screws (553233) in the upper shaft worm gear. While holding the worm gear to prevent it from turning, rotate the balance wheel. If the needle bar swing in the restricted area is large, rotate the balance wheel away from you. If the needle bar swing in the restricted area is *small*, rotate the balance wheel toward you.

In any case, be sure to hold the worm gear so it will not move during the adjustment. When the needle bar swing in the restricted area is brought to a tolerance of .02mm to .05mm, tighten the set screws (553233) in the worm gear.

Models 546, 547, 548 and 549

On the Models 546, 547, 548 and 549, the needle bar swing while the needle is between the top surface of the needle plate and the bottom of its stroke should be held to a tolerance of .02mm to .05mm on its rightward swing. To make this adjustment, set the zig-zag width regulator dial at 5 (Fig. 6-34).

Set the selector knob at L. Rotate the balance wheel toward you and observe that the swing of the needle on the right down stroke, when the needle is between the upper surface of the needle plate and the bottom of its stroke, is within 1mm.

Set the selector knob at R. Rotate the balance wheel toward you and observe that the swing of the needle on the right up stroke, when the needle is ascending from its lowest point to the upper surface of the needle plate, is within 1mm. If adjustment is needed, loosen the set screws (553233) of the worm gear. Hold the worm gear to prevent it from turning, and rotate the shaft one direction or the other, until the needle swing in the restricted area meets the criteria stated at the beginning of this procedure.

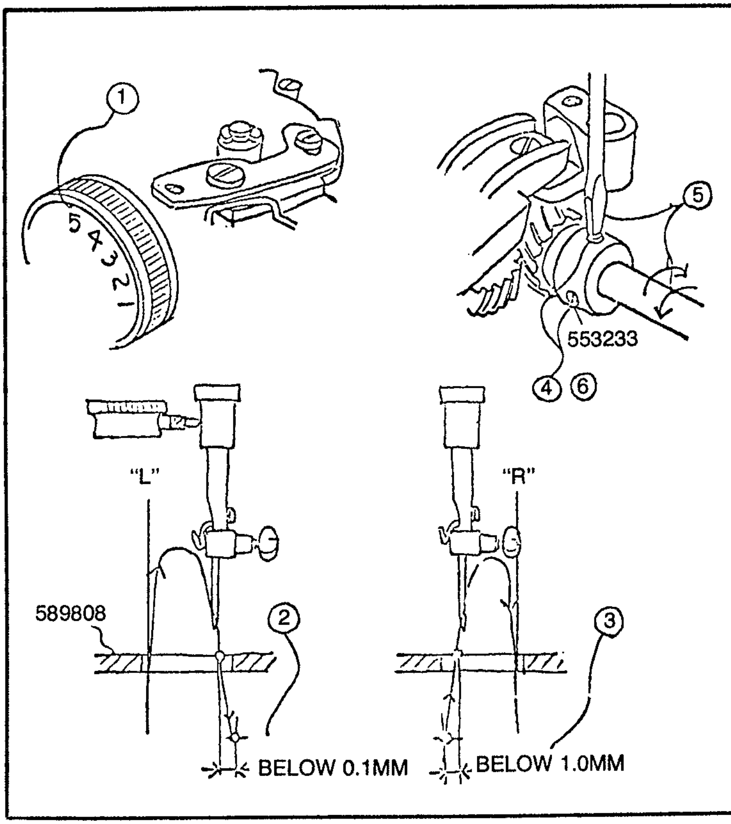


Fig. 6-34. Timing the needle bar swing on the Models 546, 547, 548 and 549.

When the adjustment is complete, tighten the set screws (553233).

Model 592

On Model 592, when the zig-zag stitch width is set at maximum and the balance wheel is turned, the needle bar swing when the needle is between the upper surface of the needle plate and the lowest point of the needle bar stroke should be held to a minimum. To make this adjustment, set the zig-zag width regulator dial at 5, the buttonhole dial at AUTO and the pattern indicator at the mark as shown in Fig. 6-35.

Turn the balance wheel slowly and observe where the needle starts to swing rightward when it leaves the fabric. Ideally, the swing should start when the needle is about 2mm to 3mm above the needle plate. If adjustment is required, loosen the two set screws

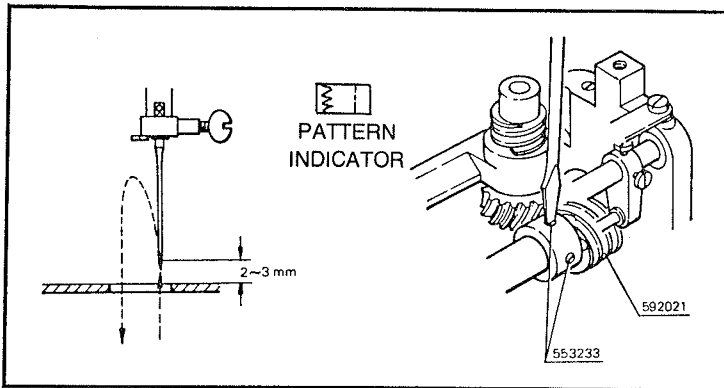


Fig. 6-35. Timing the needle bar swing on the New Home Model 592.

(553233) of the worm gear (592021). Holding the worm gear with a screwdriver to prevent it from turning, rotate the shaft to adjust the needle bar swing. Turn the balance wheel toward you if the needle begins its swing too soon; away from you if the needle begins its swing too late. When the adjustment is complete, tighten the two screws (553233).

EQUALIZING THE FORWARD REVERSE STITCHES

You can equalize the forward reverse stitches on Models 540, 542, 546 and 547, to 7.5-12.5 pitch on the reverse stitch/10 pitch on the forward stitch. When the reverse pitch is more than the forward pitch, loosen screw A, while at the same time tightening screw B (Fig. 6-36). When the reverse pitch is less than the forward pitch, loosen screw B while at the same time tightening screw A. When the adjustment is satisfactory, secure both screws A and B.

EQUALIZING THE BUTTONHOLE STITCH

To be sure to which New Home Models the following procedures apply, *read the headings carefully.*

Models 541, 543, 544, 545, 548 And 549

When the densities of the right and left buttonhole stitches on Models 541, 543, 544, 545, 548 and 549 are correctly adjusted, 10 stitches on the right side of the buttonhole will correspond to 8-12 stitches on the left side. To make this adjustment, set the stitch length regulator dial at 0.5 and the zig-zag width regulator dial at 0 (Fig. 6-37). Compare the length of the stitches on the left and right sides of the buttonhole.

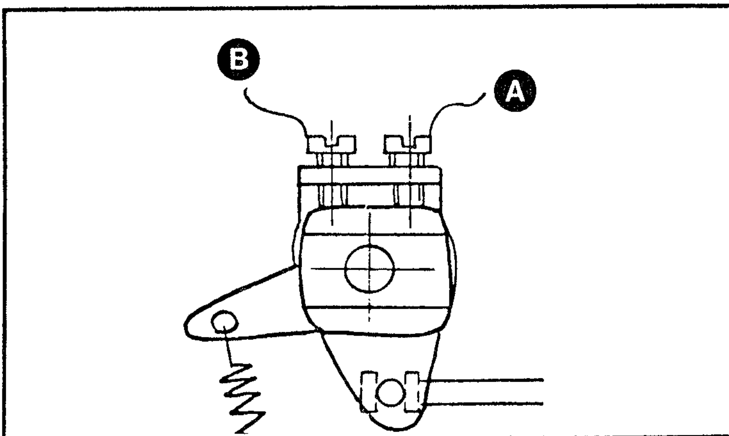


Fig. 6-36. Equalizing the forward-reverse stitches, within limits, on the New Home Models 540, 542, 546 and 547.

When the stitch on the left side is the longer, loosen screw B, while at the same time tightening screw A. When the stitch on the right side is the longer, loosen screw A, while at the same time tightening screw B. When the adjustment is complete, secure both screws A and B.

Model 592

On Model 592, when the densities of the right and left buttonhole stitches are correctly adjusted, 10 to 14 stitches on the right side will correspond to 10 stitches on the left side. To make this adjustment, set the stitch length regulator dial at about 0.5, the

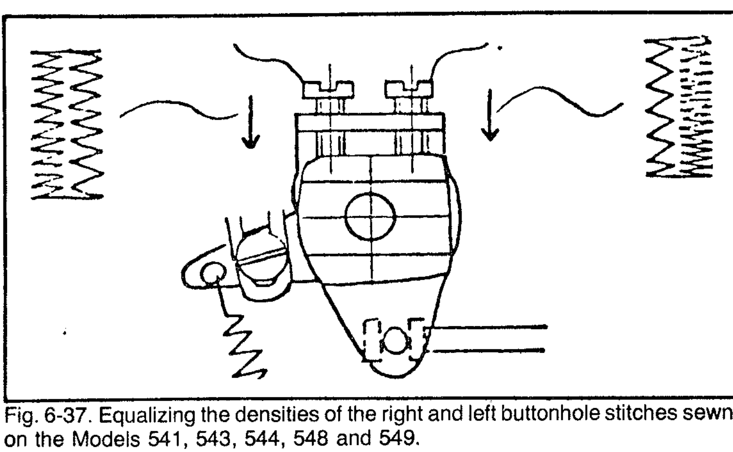


Fig. 6-37. Equalizing the densities of the right and left buttonhole stitches sewn on the Models 541, 543, 544, 548 and 549.

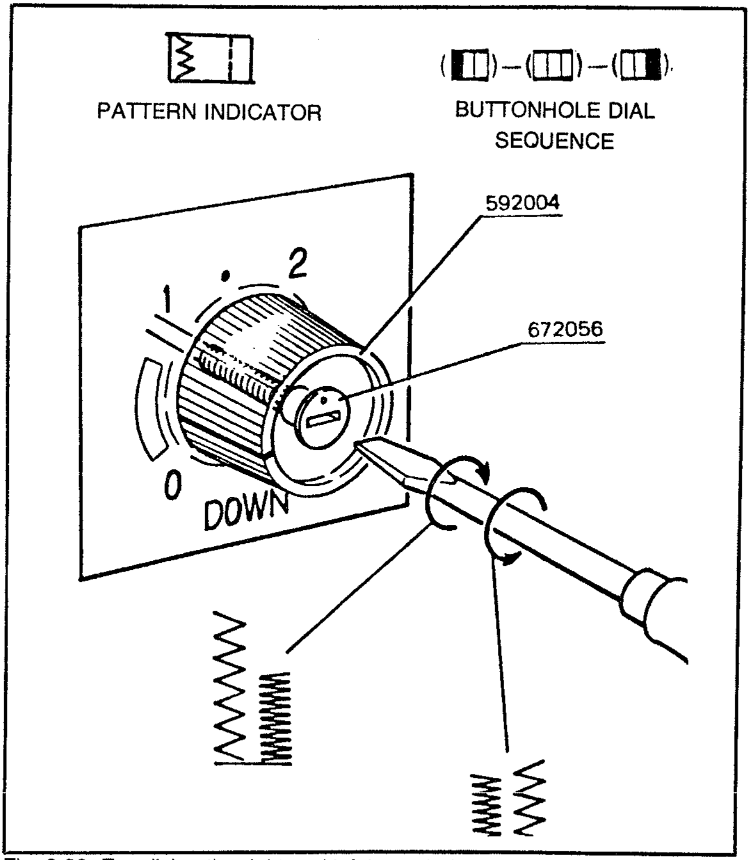


Fig. 6-38. Equalizing the right and left buttonhole stitches sewn by the Model 592.

zig-zag width regulator dial at 5, and the pattern indicator as shown in Fig. 6-38.

Turn the buttonhole dial in the sequence as shown in Fig. 6-38 while slowly sewing a buttonhole. Observe whether or not the density of the right and left stitches meet the criteria as stated at the beginning of these instructions.

If not, turn the adjusting set screw (672056) to the right if the left side stitch is too coarse; or to the left if the right side stitch is too coarse.

ADJUSTING THE BUTTONHOLE CUTTING SPACE

To be sure to which New Home Models the following procedures apply, *read the headings carefully*.

Models 541, 543, 544 and 545

On Models 541, 543, 544 and 545, the cutting space of the buttonhole should be between .3mm and .6mm. The width of the buttonhole stitching on the left and right sides is determined by the shape of the BH zig-zag width regulating cam (517012), so that the adjustment may not be required. If adjustment is required, set the stitch length regulator dial at 0.5, and the zig-zag width regulator dial at 0 (Fig. 6-39). Sew a buttonhole to check the cutting space.

Set the selector knob at OFF, and loosen screw (568064). If the cutting space is too wide, shift the BH zig-zag width regulating plate (541009) in the arrow-indicated direction A. If the cutting space is too narrow, shift the BH zig-zag width regulating plate in the arrow-indicated direction B.

When the adjustment is satisfactory, tighten screw (568064) securely.

Use the No. 545010 BH zig-zag width regulating cam with Model 545 and the No. 517012 cam with Model 541, 543 and 544.

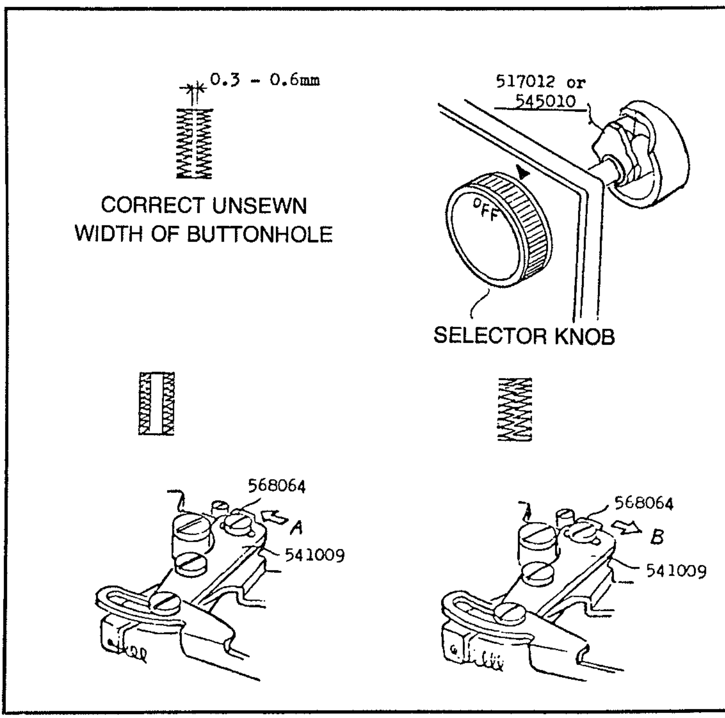


Fig. 6-39. Adjusting the buttonhole cutting space on the New Home Models 541, 543, 544 and 545.

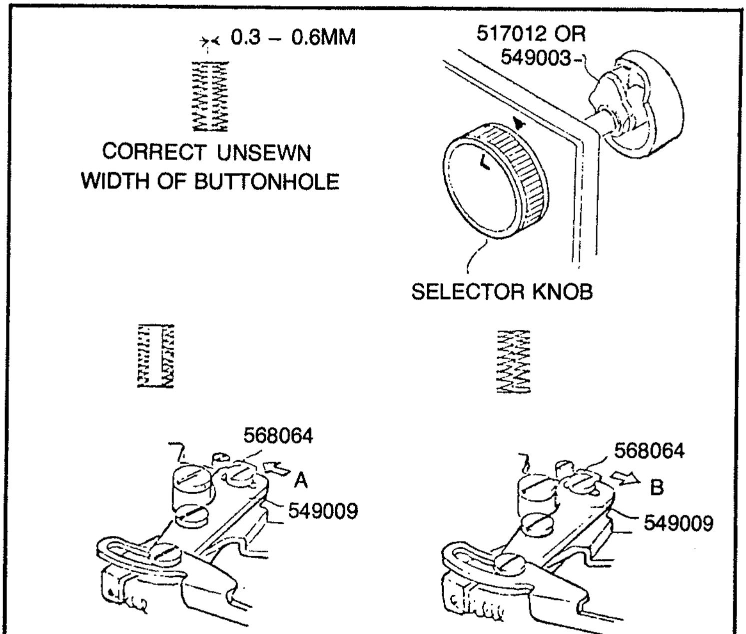


Fig. 6-40. Adjusting the buttonhole cutting space on the Models 548 and 549.

Models 548 and 549

On the Model 548 and 549, the buttonhole cutting space should range between .3mm and .6mm. The width of the left and right buttonhole stitch is determined by the shape of the BH zig-zag width regulating cam (517012 or 549003) so that the adjustment may not be required. If it is required, set the stitch length regulator dial at 0.5. and the zig-zag width regulator dial at 0 (Fig. 6-40).

Sew a buttonhole and check the cutting space width. Loosen screw (568064) and set the selector knob at L. If the cutting space is too wide, shift the BH zig-zag width regulating plate (549009) in the arrow-indicated direction A. If the cutting space is too narrow, shift the BH zig-zag width regulating plate (549009) in the arrow-indicated direction B.

When the adjustment is satisfactory, tighten screw (568064) securely. Use BH zig-zag width regulating cam No. 549003 on the Model 549; or use the cam No. 517012 on the Model 548.

ACHIEVING 0 FEED WHEN BARTACKING A BUTTONHOLE

To be sure to which New Home Models the following procedures apply, *read the headings carefully.*

Models 541, 543, 544, 545, 548 and 549

On Models 541, 543, 544, 545, 548 and 549, when the machine is set for bartacking, the fabric should not be fed even though the stitch length dial is set on a number for buttonhole sewing. More specifically, the fabric should not travel more than 1mm within 20 stitches. To make this adjustment, set the stitch length regulator dial at 4, and the selector knob at the mark indicated in Fig. 6-41.

If there is a difference in the point of contact between the BH feeding cam and the BH feeding crank, relative to the divisional indication on the selector knob, you must loosen the screw securing ring before making the adjustment.

With a piece of paper under the presser foot, turn the balance wheel. Note whether the paper moves forward or backward. If the paper moves forward, turn the BH feeding screw (518006) in direction A (clockwise). If the paper moves forward, turn the BH feeding screw (518006) in the direction B (counterclockwise).

Model 592

When Model 592 is set to bartack a buttonhole, the fabric should not be fed, even though the stitch length dial is set on a number for buttonhole sewing. To make this adjustment, set the stitch length regulator dial at 4, the zig-zag width regulator dial at 5,

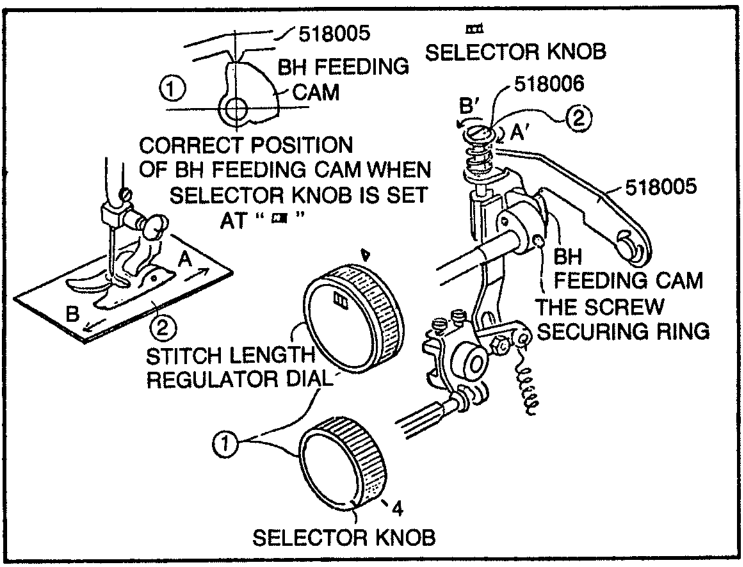


Fig. 6-41. Adjusting for no feed of the fabric when bartacking a buttonhole on Models 541, 543, 544, 545, 548 and 549.

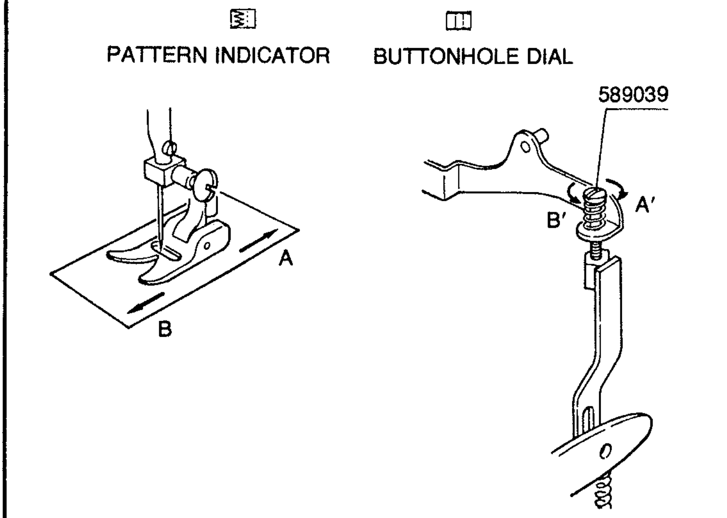


Fig. 6-42. Adjusting for no feed of the fabric when bartacking a buttonhole on the New Home Model 592.

and the buttonhole dial respectively at the two marks shown in Fig. 6-42.

With a piece of paper under the presser foot, turn the balance wheel toward you and make the adjustment. If the paper moves forward (in the A direction), turn the buttonhole feed adjusting rod set screw (589039) in the A direction. If the paper moves backward (in the B direction) turn the screw in the B direction.

MESHING CAM SHAFT GEAR TO MAIN DRIVE SHAFT GEAR

To be sure to which New Home Models the following procedures apply, *read the headings carefully*.

Model 532

Faulty meshing of the worm gear and main drive shaft gear on the Model 532 will cause noisy running. To make this adjustment, insert a screwdriver through the hole on the back of the machine arm (Fig. 6-43) to loosen the zig-zag spindle set screw (073).

Insert the screwdriver through the hole on the underside of the machine arm to turn the spindle, while at the same time moving the upper shaft back and forth with the balance wheel until the gears fit snugly without binding. When the adjustment is complete, tighten the screw (073).

ADJUSTING UPPER THREAD TENSION REGULATOR

If the upper thread tension regulator cannot be regulated to achieve thread tensions corresponding to the dial numbers, the New Home Models can be adjusted.

Model 532

On Model 532, when the upper thread tension regulator is set at 0, the thread should slip between the disc with no resistance. When the dial is set at 1, the resistance should be minimal. If there is a thread resistance when the tension regulator knob is set at 0, turn the thread regulator knob (027) counterclockwise while pressing the numbered dial (032-2) to disengage the pin that locks the knob to the dial.

If there is no thread resistance when the thread tension regulator dial is set at 1, turn the regulator knob clockwise while pressing the numbered dial to disengage the pin that locks the knob to the dial.

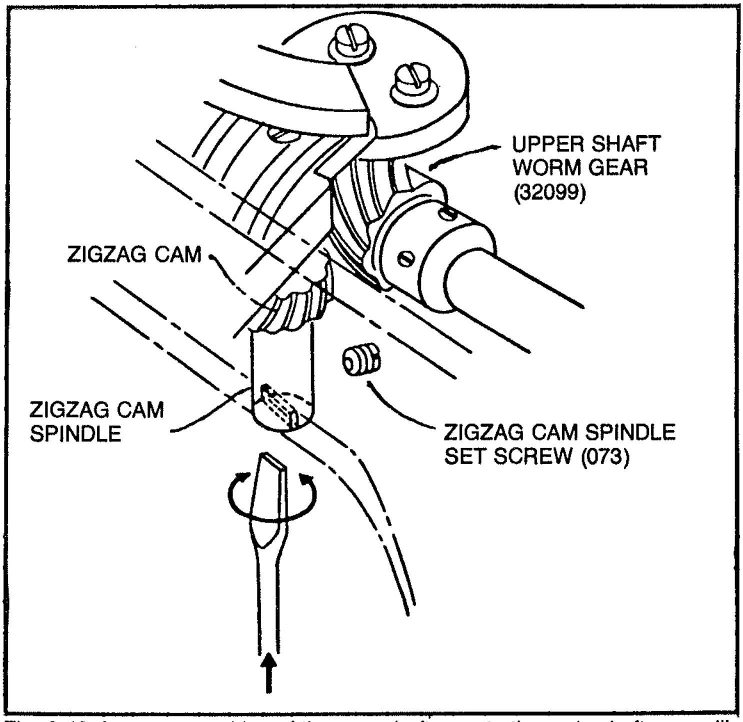


Fig. 6-43. Incorrect meshing of the cam shaft gear to the main shaft gear will cause noisy running.

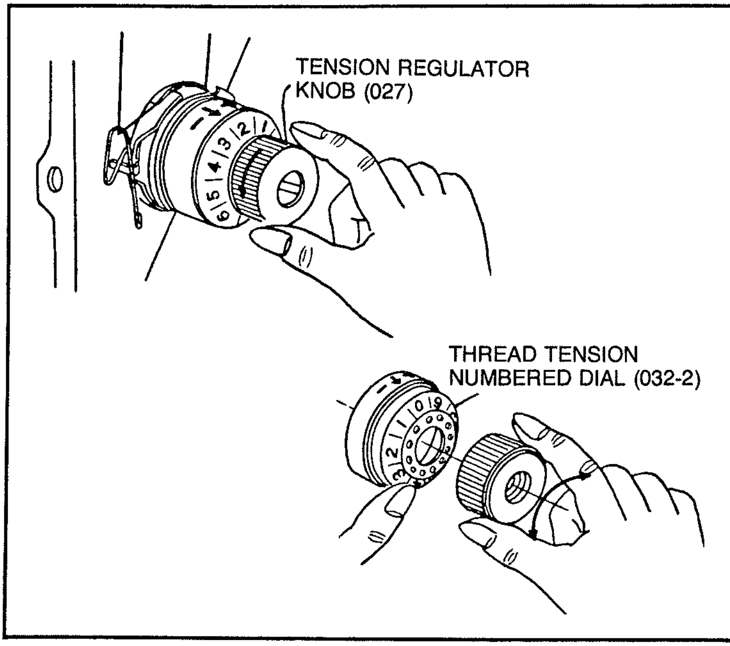


Fig. 6-44. Adjust the tension of the tension discs to correspond to the number on the dial on the Model 532.

54 Series Models

On 54 Series Models, when the tension regulator knob is set at 0, there should be no resistance to the thread as it slips between the discs. When the knob is set at 1, the resistance should be minimal. To make this adjustment, set the thread tension regulator dial at 9 and lower the presser bar lifter (Fig. 6-45). Pull the regulator dial from the arm. Loosen the thread tension leading screw until a No. 50 cotton thread (or cotton-wrapped polyester) slips between the discs without resistance. Set the dial number 0 to the indicator mark on the thread tension regulator dial indicator and push the dial in as far as it will go.

Model 592

On Model 592, when the tension regulator knob is set at 0 there should be no resistance as the thread is slipped between the discs. When the knob is set at 1, there should be a slight resistance. To make this adjustment, proceed as follows (see Fig. 6-46); Pull out the thread tension regulator dial from the dial unit (Fig. 6-46). Loosen the leading screw until the thread can be pulled through the discs without resistance. Set the 0 of the thread tension regulator dial at the scribed line on the thread tension bracket, push them to the end and tighten the screw.

REPLACING THREAD CHECK SPRING ON MODEL 532

To replace the thread check spring on Model 532, you must disassemble and reassemble the upper thread tension mechanism.

Disassembling Thread Tension Regulator Mechanism

To disassemble the thread tension regulator mechanism, set the thread tension regulator dial at 0 (Figs. 6-47 and 6-48). Loosen the thread tension regulator set screw (162) and remove the regulator from the machine. Turn the tension regulator knob (027) counterclockwise and remove it from the thread tension stud (14007), while pressing down on the thread tension numbered dial (032-2).

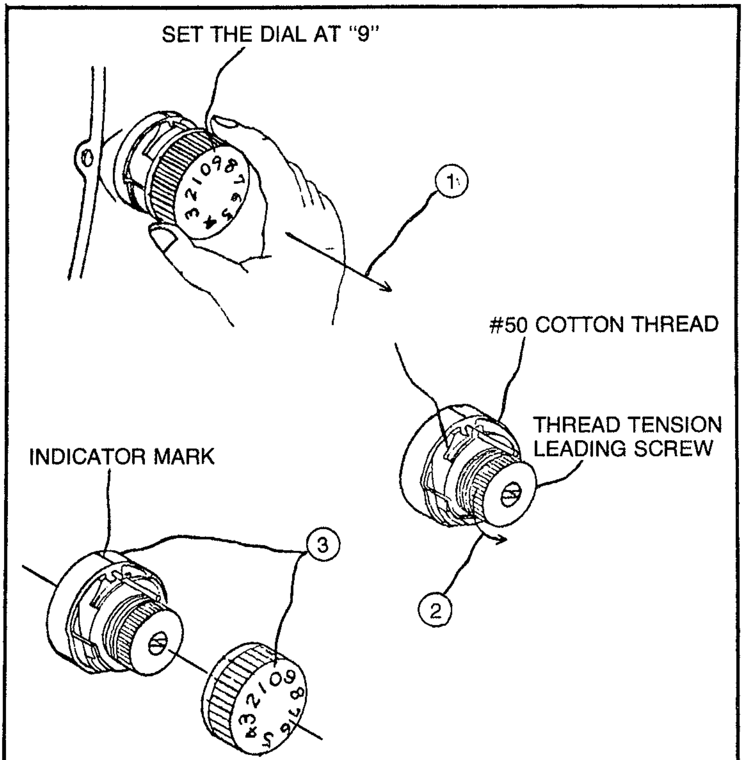


Fig. 6-45. The actual tension of the upper thread tension regulator on the 54 Series can be adjusted to correspond to the number on the dial.

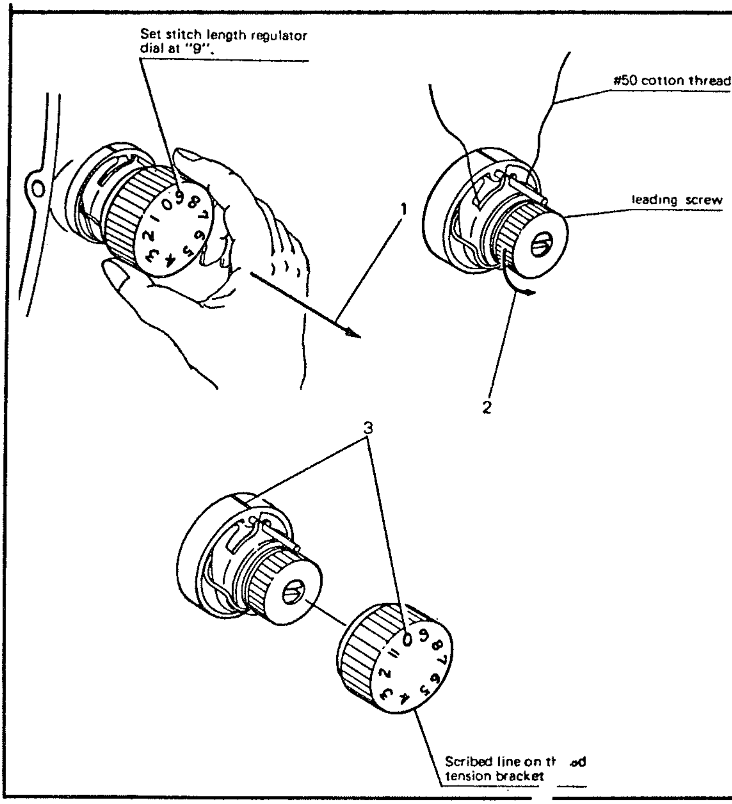


Fig. 6-46. The tension of the upper thread tension regulator corresponds to the number on the dial on the Model 592 when adjusted.

Pull out the thread tension stud (14007), which makes the thread check spring (50094) accessible. The thread check spring can now be replaced. Be sure not to move the check spring stopper (23034) of Fig. 6-48. To reassemble the unit, proceed to the next heading.

Reassembling Thread Tension Regulator Mechanism

To reassemble the thread tension regulator mechanism, adjust the arrow mark of the thread tension disc washer (032-1) to the pin of the tension thread guard (68008) as shown Fig. 6-48.

As you insert the thread check spring into the thread tension stud, try to find the position where the check spring touches the lower end of the slot in the tension thread guard (68008) lightly, without spring tension. Then reset the check spring into the second

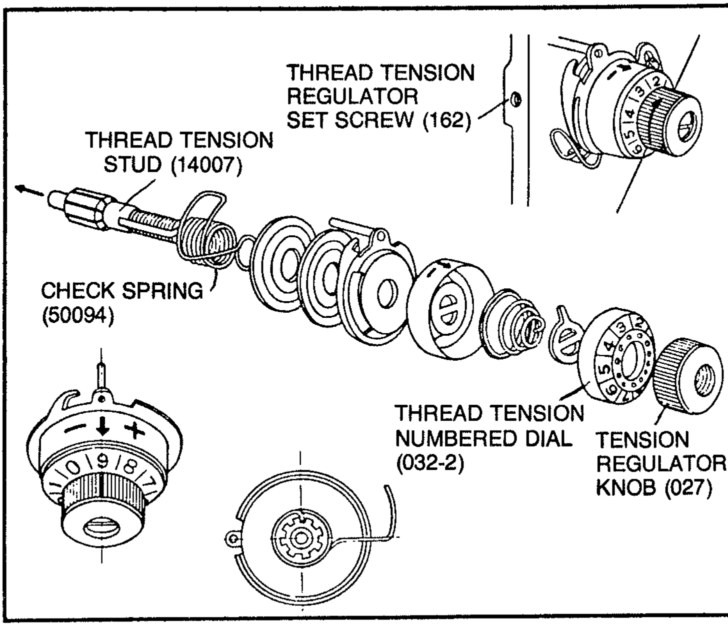


Fig. 6-47. The upper thread tension regulator is dissaembled on the New Home Model 532 in this figure as well as in Fig. 6-48. The tension of the thread check spring is set by inserting the end of the spring in the appropriate groove of the stud. This position may have to be determined by experimentation.

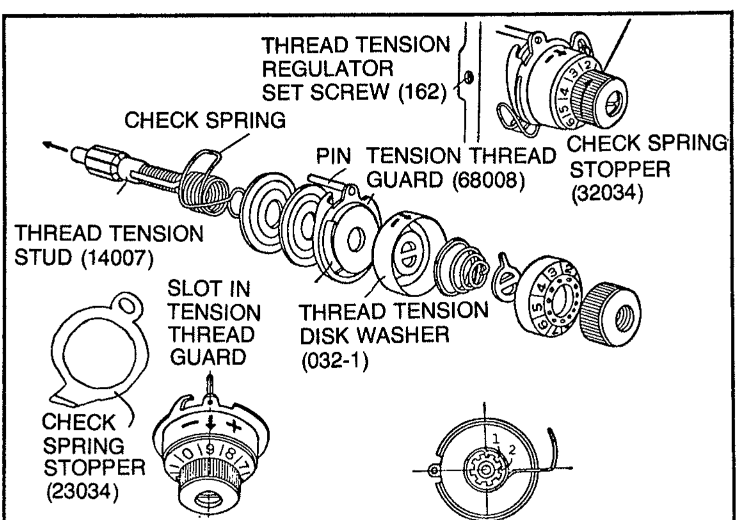
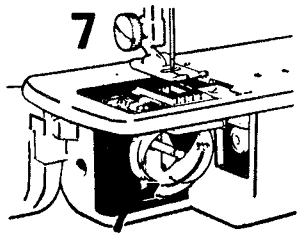


Fig. 6-48. Disassembly of the upper thread tension regulator of the New Home Model 532.

groove to the right (clockwise) from the original setting, as shown in Fig. 6-48. Reassemble the tension mechanism parts in the sequence shown in Figs. 6-47 and 6-48, and replace the unit in the machine, with the thread check spring against the check spring stopper (23034). Tighten screw (162). After disassembling and reassembling the tension regulator unit, it may be necessary to adjust the thread tension.

7 Adjustment And Repair Procedures For The Brother XL5001 (B740)



The Brother XL5001 is a fully automatic machine in that buttonholes and various decorative patterns can be made from a single setting of a dial. It is a machine that can be used as either a free-arm or full-bed machine. It has the fully rotating shuttle.

Other Brother sewing machines, which will *not* be discussed in this chapter, include the Brother XL1001 (B974); XL2001 (B735); XL3001 (B640); B606 and B607; B703; B701 and B704; B803, B604; and B750. This is only a partial list, however. Brother sewing machines are manufactured in Japan by Brother Industries, Ltd., and the U.S. corporate address is Brother International Corporation, 8 Corporate Place, Piscataway, New Jersey 08854.

For a full view of the brother XL5001, see Fig. 7-1.

For a description of the operator controls of the Brother XL5001, see Fig. 7-2.

For an illustrated view of the XL5001 parts, see Fig. 7-3 and Table 7-1.

CORRECTING A WAVERING STRAIGHT STITCH

When the Brother XL5001 is set at straight stitch, it should sew a stitch of unwavering straightness within a tolerance of about .02mm. When making this adjustment you will encounter one of two possible adjustment mechanisms, designated in Fig. 7-4 as Type A and Type B. To make the adjustment, proceed according to the following instructions.

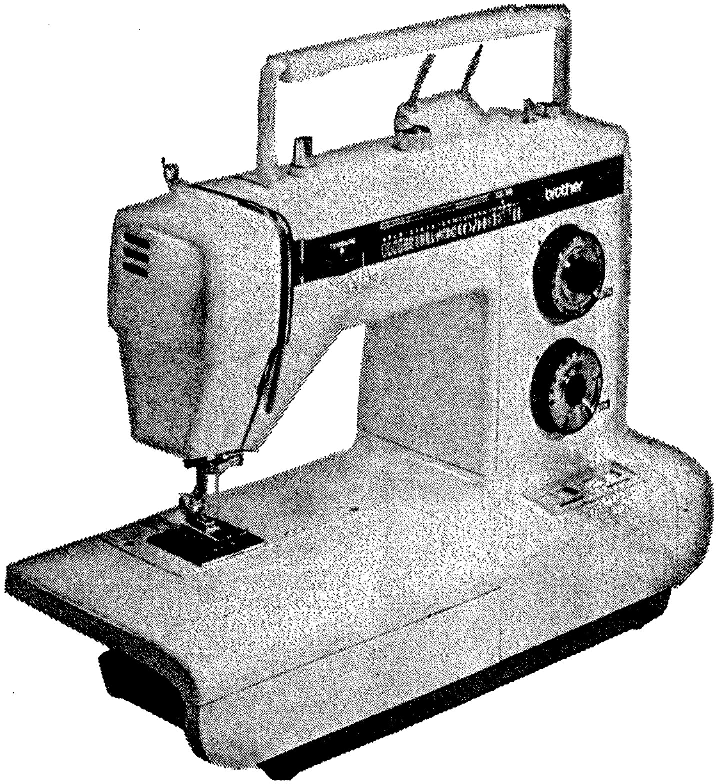


Fig. 7-1. A front view of the Brother XL5001 (B740).

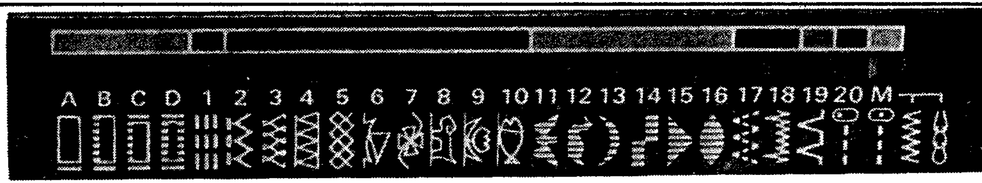
Type A Mechanism

To make the adjustment on the Type A mechanism, proceed as follows:

- Set the stitch width at straight stitch (needle in the center position).
- Remove the vinyl cap on the backside of the arm.
- Loosen the locking nut on the zig-zag width lever arm (as shown in Type A of Fig. 7-4).
- Adjust the needle swing by turning the adjustment screw in the appropriate direction.
- When the adjustment is completed, tighten the locking nut without disturbing the position of the adjusting screw.

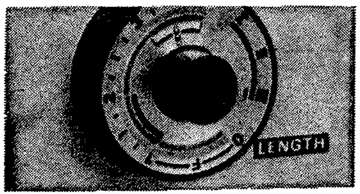
Type B Mechanism

On the Type B mechanism, the rear cover (No. 489 of Fig. 7-3) must first be removed. The adjustment is then made through an



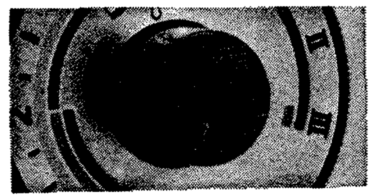
Super Automatic

Simply dial any one of the twenty built-in automatic patterns or the built-in automatic buttonholer for perfect buttonholes every time.



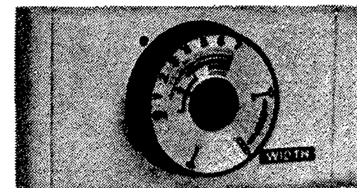
Stitch length regulator

Keeps the stitch at the exact length from 0 to 7 mm.



Reverse sewing button

Instant reverse sewing at the touch of a button for back-tacking and seem reinforcement.

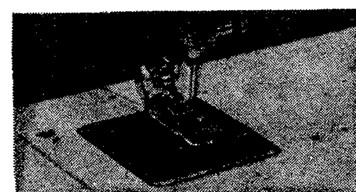


Zigzag with regulator

Sews at various width from 0 to 7mm for built-in patterns embroidering, monogramming, satin stitching and regular zigzag sewing.

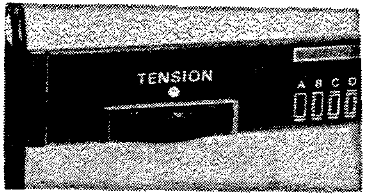
Drop feed button

Provides instant adjustment for embroidery and darning, etc.



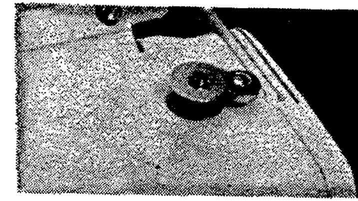
Twin needle

Specially constructed for optional twin needle.

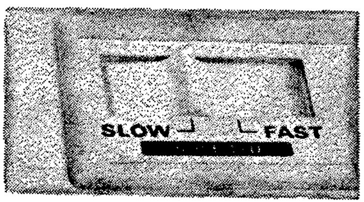


Thread tension dial
Recessed tension dial for easy control.

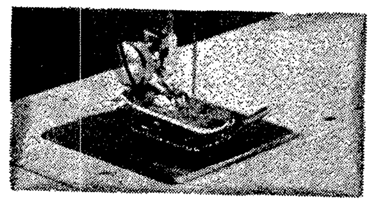
Pressure regulator
This simple adjustment allows you to keep the correct pressure on various thicknesses of fabric.



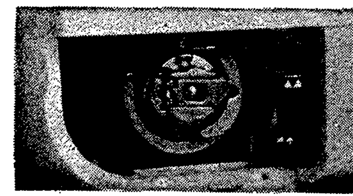
Automatic bobbin winder
Automatic clutch mechanism disengages drive to allow immediate bobbin winding. Bobbin cuts out when full.



Two-speed regulation
For simple precise control.



Automatic needle plate
Whether you are straight stitching, zig-zagging or chain stitching the needle plate changes automatically to cope with each function.



Rotary hook with jam proof race
The rotary hook and jam proof race provides professional sewing performance with noiseless, non-vibrating operation.

Fig. 7-2. The controls of the Brother XL5001. Note that the format of the thread tension dial is a departure from that of some of the older models discussed in this book.

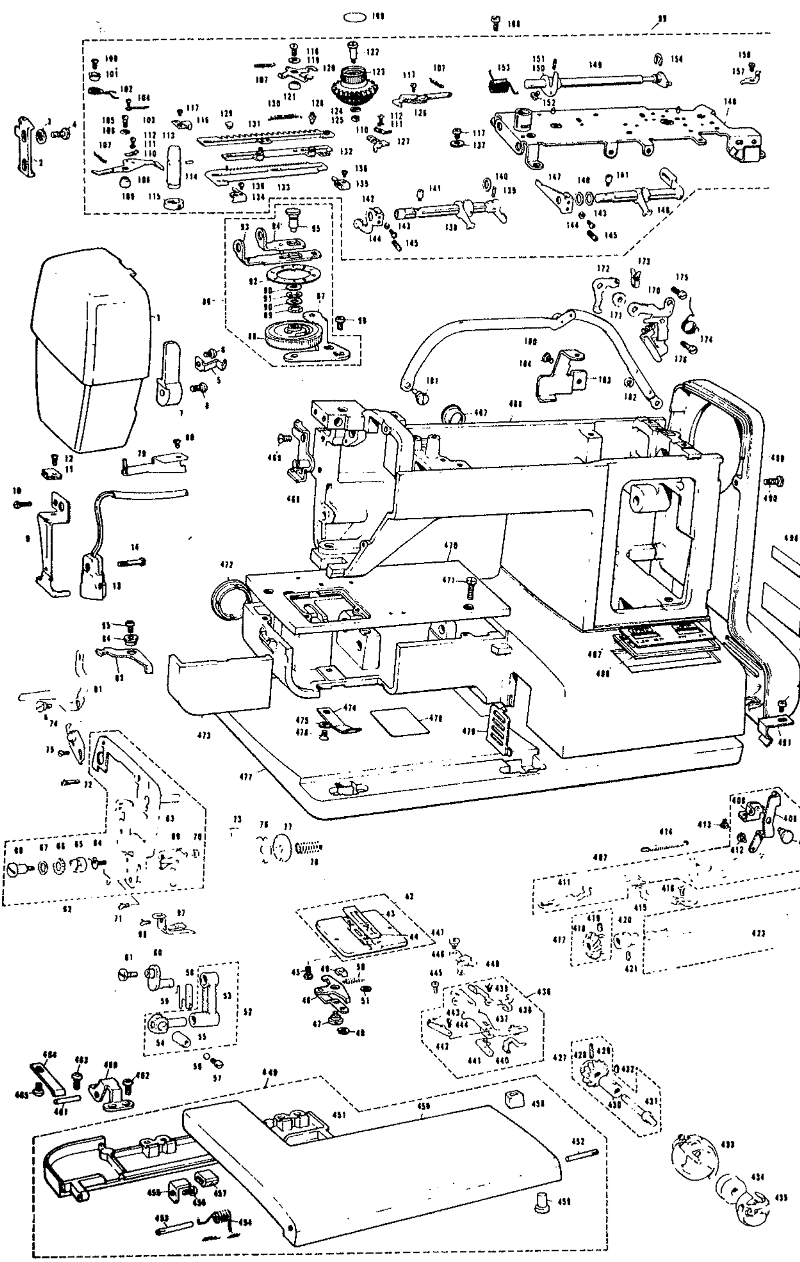


Fig. 7-3. Parts list of the Brother XL5001. To use it, take the reference number shown by the part to the written parts list in Table 7-1 to find the parts number and descriptive name of the part.

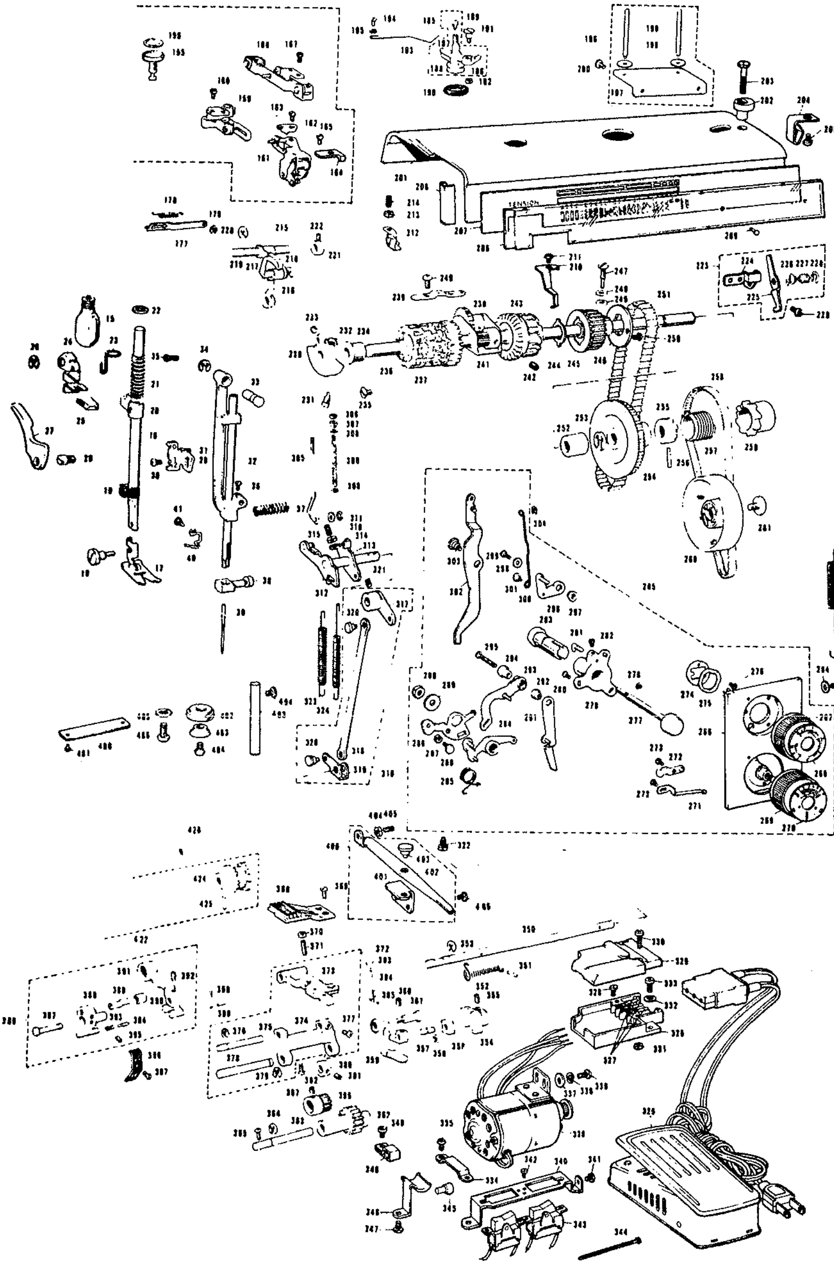


Table 7-1. Parts List for Model XL5001 (continued on pages 283 through 291)

REF.NO.	PARTS NO.	PARTS NAME
1	123760002	Face plate
2	120094001	Face plate hinge
3	117838001	Washer
4	009670812	Screw
5	120095001	Spring
6	002670612	Screw
7	124061001	Thread guide
8	002670612	Screw
9	124067001	Sew-light holder
10	002680712	Screw
11	120370001	Cord holder
12	002670612	Screw
13	124893001	Sew-light assembly
14	103386002	Screw
15	201434000	Sew-light bulb
16	100049000	Presser bar
17	121200001	Presser foot assembly
18	106120001	Thumb screw
19	101500001	Thread cutter
20	123843001	Presser bar guide bracket
21	104650001	Presser bar spring
22	100052001	Washer
23	123845001	Presser adjusting rod
24	123846001	Presser adjusting lever
25	121194002	Presser adjusting lever knob
26	048050342	Stop ring
27	121897002	Presser foot lifter
28	102037001	Stud screw
29	123030001	Presser indicator plate
30	002670412	Screw
31	120100001	Needle bar supporter
32	120101001	Needle bar
33	120102001	Needle bar supporter stud
34	048050342	Stop ring
35	002680712	Screw
36	123185001	Screw
37	120110001	Spring
38	121496001	Needle clamp assembly
39	117914014	Needle #14
40	124359001	Needle bar thread guide
41	100139001	Screw
42	124801001	Needle plate assembly
43	124802001	Needle plate A
44	124803001	Needle plate B
45	124365001	Screw
46	123826001	Needle plate B change arm
47	123830001	Stud screw
48	048020342	Stop ring
49	123829001	Spring washer
50	124180001	Spring
51	120454001	Stop ring

REF.NO.	PARTS NO.	PARTS NAME
52	123821001	Needle bar crank rod assembly
53	123822000	Needle bar crank rod
54	120108001	Stud for needle bar clamp
55	120109001	Needle bar clamp
56	100507000	Washer
57	009689412	Screw
58	120106001	Felt
59	120107001	Spring
60	123820001	Needle bar cank
61	100253001	Screw
62	124881001	Thread guard assembly
63	124882001	Thread guard body
64	124056001	Thread take-up spring
65	120436002	Thread take-up spring case B
66	120435002	Thread take-up spring case A
67	120265001	Spring washer
68	120335002	Stud screw
69	124057001	Thread take-up spring cover
70	021670403	Nut
71	102538002	Screw
72	106128003	Screw
73	124059001	Collar
74	122663001	Bobbin winder thread guide assembly
75	009669314	Screw
76	124241001	Tension disc
77	120324001	Tension disc
78	124058001	Tension spring
79	122670001	Cord guide
80	002660403	Screw
81	124046001	Tension releaser A
82	108790002	Stud screw
83	124880001	Tension releaser B
84	124048001	Collar
85	002670812	Screw
86	124873001	Upper thread tension complete
87	124874001	Upper tension bracket
88	124875001	Upper tension control knob
89	103810002	Spring washer
90	109763001	Washer
91	048040342	Stop ring
92	124890001	Upper tension control knob plate
93	124878001	Tension releaser plate
94	124876001	Tension control plate
95	124879001	Rivet
96	002670812	Screw
97	124523001	Thread guide
98	102538002	Screw
99	124839001	Pattern selector unit supporter assembly
100	123040001	Screw
101	118908001	Rack presser plate disc
102	120241001	Spring
103	122195001	Spring
104	123040001	Screw

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REF.NO.	PARTS NO.	PARTS NAME
105	002671016	Screw
106	400806004	Washer
107	503154001	Spring
108	120242001	Rack stop lever
109	118932001	Stud collar
110	118909001	Adjusting plate
111	028630243	Spring washer
112	114447003	Screw
113	118929001	Push button for pattern selection
114	047250642	Spring pin
115	124599001	Push button guide ring
116	116422001	Rack presser plate
117	123040001	Screw
118	002681016	Screw
119	025680232	Washer
120	122174001	Ratchet
121	124997001	Stud collar
122	123037001	Stud screw
123	124976001	Pattern selection knob
124	025680236	Washer
125	102571002	Nut
126	121267001	Rack knock plate assembly
127	121268001	Rack presser plate
128	124981001	Spring hanger
129	124982001	Rivet
130	121275001	Spring
131	124977001	Indicator rack
132	124978001	Cam finger plate
133	121263001	Rack assembly
134	120239001	Cam finger connecter A
135	121265001	Cam finger connector B
136	123040001	Screw
137	025040232	Washer
138	121915001	Zigzag finger shaft assembly
139	047251042	Spring pin
140	109763003	Washer
141	116393003	Stud screw
142	120214001	Release lever assembly
143	021630103	Nut
144	009630813	Screw
145	100128002	Screw
146	121234001	Feed finger shaft assembly
147	120229001	Feed release lever
148	124840001	Pattern selector unit supporter
149	122706001	Release lever shaft assembly
150	120221001	Release cam assembly
151	047251042	Spring pin
152	123040001	Screw
153	120224001	Spring
154	048040342	Stop ring
155	120476002	Adjusting knob
156	121262001	Adjusting knob plate
157	120477001	Spring

REF.NO.	PARTS NO.	PARTS NAME
158	123040001	Screw
159	121238001	Feed adjusting link support assembly
160	002670516	Screw
161	124842001	Feed change link assembly
162	121266001	Rack stopper
163	002670612	Screw
164	124848001	Stopper
165	001679412	Screw
166	121253001	Feed adjusting lever assembly
167	002670516	Screw
168	123031001	Screw
169	116415002	Pattern selector knob plate
170	122598001	Zigzag link assembly
171	120261001	Collar
172	121281001	Zigzag change link
173	121282001	Zigzag change link connector
174	121280001	Spring
175	002680712	Screw
176	002681012	Screw
177	121305001	Spring release link
178	121306001	Spring
179	048025342	Stop ring
180	124829001	Zigzag connecting rod
181	105433001	Eccentric stud
182	048050342	Stop ring
183	124849001	Pattern selector unit supporting plate
184	123031001	Screw
185	124036001	Bobbin winder assembly
186	124037000	Bobbin winder bracket
187	121283001	Bobbin winder shaft
188	111946002	Bobbin winder pulley
189	111524000	Spring
190	120448001	Bobbin winder rubber ring
191	120263001	Stud screw
192	102571003	Nut
193	120270001	Spring
194	002660403	Screw
195	025660132	Washer
196	170081000	Spool pin assembly
197	120347001	Spool pin stand
198	116480001	Washer
199	104269001	Spool pin
200	009670514	Screw
201	124791001	Top cover
202	121846001	Bobbin presser
203	101552002	Screw
204	122419001	Top cover spring
205	002670612	Screw
206	124793000	Top cover plastic plate
207	124792001	Pattern indicator plate
208	124794001	Clamp plate
209	124795001	Rivet
210	124828001	Pattern indicator

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REF.NO.	PARTS NO.	PARTS NAME
211	008630402	Screw
212	122522001	Top cover set plate
213	021670403	Nut
214	011671212	Screw
215	123839001	Thread take-up lever assembly
216	123840001	Thread take-up lever
217	123841001	The Thread take-up link
218	048050342	Stop ring
219	124811001	Stud for thread take-up link
220	048050342	Stop ring
221	124660000	Collar
222	011679312	Screw
223	124870001	Bobbin winder clutch assembly
224	124871001	Clutch holder
225	124872001	Bobbin winder clutch
226	122607001	Spring
227	122606001	Rivet
228	048050342	Stop ring
229	002680512	Screw
230	123817000	Eccentric counter weight
231	100018002	Screw
232	100251001	Screw
233	101706001	Screw
234	123815000	Upper shaft bushing, L
235	106629002	Screw
236	124799000	Upper shaft
237	124835001	Pattern cam assembly
238	124833001	Pin gear bracket assembly
239	122435001	Bracket presser
240	123031001	Screw
241	124832000	Pattern cam driving pinion
242	100251001	Screw
243	124837001	Feed pattern cam assembly
244	124827001	Timing pulley washer
245	124889000	Timing pulley upper
246	123889000	Timing pulley retainer
247	123888001	Screw
248	025350332	Washer
249	123023000	Washer
250	037300815	Screw
251	116624001	Timing belt
252	123816000	Upper shaft bushing, R
253	048080342	Stop ring
254	124393001	Timing pulley
255	123803000	Upper shaft bush
256	123187001	Pin
257	122837001	Clutch spring
258	124394000	Belt
259	122838000	Spring cover
260	124800001	Balance wheel
261	122544002	Cap screw
262	122839001	Spring
263	002681012	Screw

REF.NO.	PARTS NO.	PARTS NAME
264	025680232	Washer
265	124850001	Control panel complete
266	124851001	Control panel
267	124864001	Stitch length control knob
268	124865001	Stitch length control knob plate
269	124852001	Zigzag width control knob
270	124856001	Zigzag width control knob plate
271	122643001	Knoch plate
272	122650001	Set spring
273	002670612	Screw
274	121295001	Washer
275	118421001	Spring washer
276	009630813	Screw
277	124866001	Reverse sewing button
278	048030342	Stop ring
279	120309000	Feed regulator grooved cam bush
280	122827001	Screw
281	120028001	Guide shaft
282	002680512	Screw
283	121296000	Feed regulator grooved cam
284	124857001	Zigzag width lever arm unit, A
285	124859001	Spring
286	122622001	Zigzag width lever arm unit, B
287	102571003	Nut
288	122624001	Eccentric screw
289	118216000	Washer
290	021680202	Nut
291	124860001	Change lever assembly
292	121299001	Collar
293	124862001	Zigzag width control finger
294	122636001	Collar
295	002671602	Screw
296	121297001	Stitch length control link
297	121299001	Collar
298	025350332	Washer
299	122827001	Screw
300	124867001	Stitch length control rod
301	107510002	Stud screw
302	124868001	Change lever assembly
303	108790002	Stud screw
304	048030342	Stop ring
305	124817001	Feed regulator bar
306	106129002	Nut
307	120254002	Nut
308	105248003	Washer
309	120253001	Spring
310	102707003	Washer
311	048030342	Stop ring
312	124814001	Feed regulator cam assembly
313	121652000	Feed regulator adjusting plate
314	021660102	Nut
315	103978002	Adjusting screw
316	124818001	Feed regulator link assembly
317	124819001	Feed regulator link A

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REF.NO.	PARTS NO.	PARTS NEME
318	124823001	Feed regulating rod
319	124822001	Feed regulator link B
320	123553001	Rivet
321	013680612	Screw
322	124301001	Screw
323	120137001	Spring
324	120138001	Spring
325		Controller complete
326	122178001	3P Socket body
327	122372000	Contact pin
328	122373000	Screw
329	122179001	3P Socket cover
330	002301605	Screw
331	021300106	Nut
332	025710132	Washer
333	009711012	Screw
334	122155000	Cord guide plate
335	002670412	Screw
336		Motor complete
337	116662003	Washer
338	028050242	Spring washer
339	000711212	Screw
340	124885001	Switch holder
341	002670516	Screw
342	123010001	Screw
343	124886001	Switch assembly
344	122772000	Band
345	214808000	Closed end connector
346	124285001	Cord guide B
347	002670612	Screw
348	120679001	Cord holder
349	002670612	Screw
350	124813001	Feed regulator shaft
351	124690000	Spring pin
352	123872001	Spring
353	048050342	Stop ring
354	123870000	Feed regulator
355	013680612	Screw
356	123854001	Slide block
357	123853001	Slide block stud
358	048030342	Stop ring
359	123852000	Forked connecting link
360	013680810	Screw
361	123037001	Stud screw
362	123858000	Vertical feed cam
363	123859000	Vertical feed cam shaft
364	048050342	Stop ring
365	145992001	Screw
366	123857000	Reduction gear
367	101706001	Screw
368	124812001	Feed dog
369	100080003	Screw
370	021670102	Nut

REF.NO.	PARTS NO.	PARTS NAME
371	011671212	Screw
372	123847001	Horizontal feed assembly
373	123849000	Feed bar
374	123848000	Horizontal feed arm
375	123850000	Feed bar shaft
376	048040342	Stop ring
377	002680612	Screw
378	123851001	Horizontal feed arm shaft
379	048050342	Stop ring
380	142706001	Collar
381	011679312	Screw
382	120990001	Screw
383	102927000	Pin
384	503154001	Spring
385	120998001	Spring hanger
386	123860001	Vertical feed assembly
387	123863001	Shaft
388	123862000	Drop feed adjusting arm
389	123864001	Roller shaft
390	123865000	Vertical feed roller
391	124254001	Vertical feed arm
392	013680810	Screw
393	123867001	Spring
394	123866001	Knock pin
395	013680412	Screw
396	123868001	Drop feed decoration plate
397	141542001	Screw
398	123869001	Spring
399	100175000	Pin
400	124808001	Change arm assembly
401	124809001	Change arm bracket
402	124810001	Change arm
403	123958001	Rivet
404	021660102	Nut
405	103978002	Adjusting screw
406	002670612	Screw
407	124804001	Change lever assembly
408	124805001	Change lever supporter
409	124806001	Cange lever
410	123958001	Rivet
411	123835001	Change connecting rod
412	124807001	Rivet
413	002679612	Screw
414	123838001	Spring
415	123837001	Spring hanger
416	002670612	Screw
417	116630001	Lower shaft gear assembly
418	116631000	Lower shaft gear
419	123006001	Screw
420	123891000	Lower shaft bushing L
421	013680812	Screw
422	124825001	Lower shaft assembly
423	124826001	Lower shaft

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REF.NO.	PARTS. NO.	PARTS NAME
424	122159001	Timing pulley D
425	047251642	Spring pin
426	124824000	Lower shaft bushing R
427	122115001	Hook driving shaft assembly
428	116633001	Hook driving shaft gear
429	047251642	Spring pin
430	122116000	Hook driving shaft bushing
431	116634001	Hook driving shaft
432	013680810	Screw
433	122692001	Rotary hook assembly
434	100376002	Bobbin
435	121447001	Bobbin case assembly
436	123892001	Bobbin case holder bracket assembly
437	123893001	Bobbin case holder bracket
438	123895001	Looper
439	121223001	Stud screw
440	121218001	Looper lever
441	123896001	Looper lever hinge plate
442	123897001	Spring hanger
443	121217001	Spring
444	106556001	Screw
445	001670612	Screw
446	123898001	Chain stitch change arm
447	122539001	Stud screw
448	122762001	Spring
449	123783002	Accessory table assembly
450	123784002	Accessory table U
451	123785002	Accessory table D
452	123787001	Hinge pin
453	123788001	Hinge pin
454	123786001	Spring
455	123790001	Table stopper
456	002670612	Screw
457	123791001	Rubber cushion
458	124426001	Rubber cushion
459	123789001	Rubber cushion
460	123780001	Accessory table hinge
461	123781001	Hinge pin
462	000670703	Screw
463	000670703	Screw
464	123757001	Plate spring
465	002670612	Screw
466	124788001	Armbed assembly
467	115280001	Cap
468	123761001	Face plate hinge assembly
469	102843004	Screw
470	123766002	Upper plate
471	009671014	Screw
472	116577001	Cap
473	124889001	Hinged door
474	123768001	Spring
475	025350132	Washer
476	102843004	Screw

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REF.NO.	PARTS NO	PARTS NAME
477	124797001	Base plate
478	124370001	Upper plate sticker
479	123770002	Cleaning cover
480	122995001	Machine number plate
481	116231001	Pin
482	124688001	Rubber cushion for base plate
483	122110001	Washer
484	002660503	Screw
485	124242001	Washer
486	000711212	Screw
487	124798001	Switch plate
488	124884001	Switch decoration plate
489	124796001	Belt cover
490	009671414	Screw
491	123765001	Belt cover spring
492	002670612	Screw
493	123782001	Bed supporting bar
494	009680812	Screw
495	124891001	Model mark
496	124892001	CV Model mark

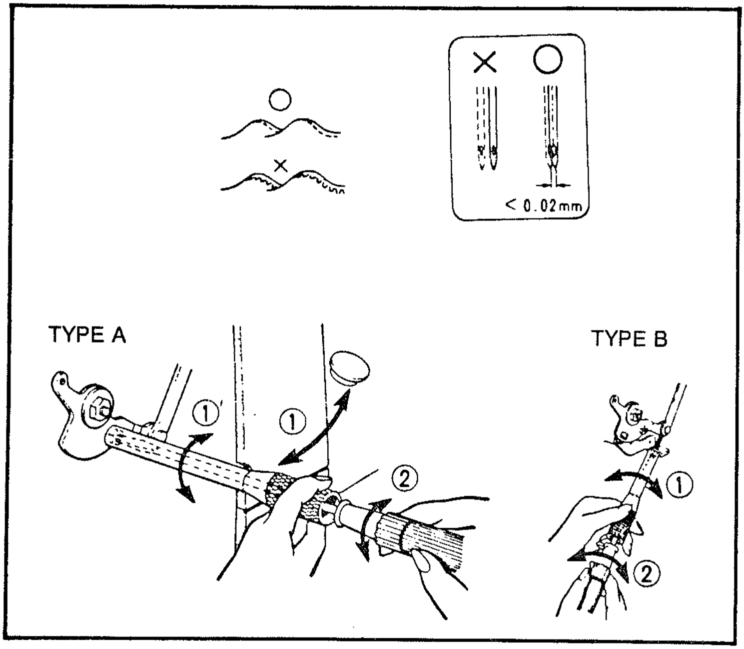

Fig. 7-4. When the Brother XL5001 is set for straight stitching, the stitches should be unwavering to within a tolerance of .02mm.

adjustment screw in the stopper bracket. Proceed as follows, still referring to Fig. 7-4:

- Loosen the locking nut on the adjustment screw.
- Adjust the needle swing by turning the adjustment screw in the appropriate direction.
- When the adjustment is completed, tighten the locking nut without disturbing the position of the adjusting screw.

ADJUSTING FEED DOG HEIGHT

On the XL5001, when the drop feed is set at the UP position and the balance wheel is turned to raise the feed dog to its highest position, the height of the upper surface of the feed dog teeth above the top surface of the needle plate should be 0.8mm to 1mm. To make this adjustment, proceed as follows, referring to Fig. 7-5:

- Set the drop feed at the UP position and remove the decoration plate on the feed adjusting arm.
- Rotate the balance wheel to bring the needle to its highest position.
- Inserting the screwdriver from the front of the arm, loosen the screws.
- Inserting the screwdriver from the left end of the arm, turn the feed adjusting arm in one direction or the other to bring the feed dog to a height of 0.8mm to 1mm above the top surface of the needle plate.
- When the adjustment is complete, tighten the screws and return the decoration plate to its original position and secure it.

ADJUSTING PRESSER BAR HEIGHT

On the Brother XL5001, the correct height of the sole of the presser foot above the top surface of the needle plate is 6mm to 6.5mm when the presser bar is in the up position. To make this adjustment, proceed as follows (Fig. 7-6):

- Remove the face plate and lift the presser bar lifter to the up position.
- Loosen the set screw of the presser bar guide bracket.
- Move the presser bar up or down, as needed, to obtain a distance of 6mm to 6.5mm between the sole of the presser foot and the surface of the needle plate.
- When the adjustment is complete, tighten the set screw securely.

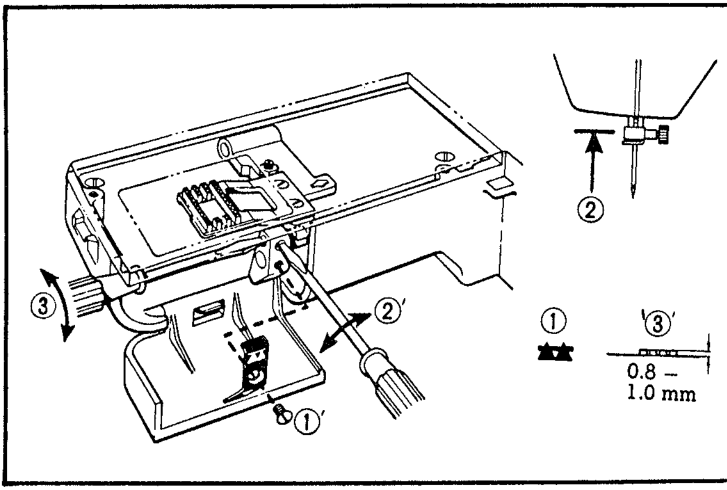

Fig. 7-5. The correct height of the feed dog teeth above the needle plate for normal sewing applications is between 0.8mm and 1mm on the Brother XL5001. When making this adjustment, be sure the drop feed is in the UP position and the needle is at its highest position.

ADJUSTING 0 PRESSURE OF THE PRESSER BAR

On the Brother XL5001, to assure 0 pressure when the presser foot lifter is down and the pressure adjuster is set at 0, there should be a clearance of 0.5mm between the upper end of the pressure spring and the stop, as shown in Fig. 7-7. To make this adjustment, proceed as follows:

- Lower the presser foot lifter until the presser foot rests on the needle plate.
- Set the pressure adjuster at the 0 position.
- Loosen the fastening screw and position the plate so that the play of the pressure spring is between 0mm and .5mm.
- Tighten the screw securely.

TIMING THE SHUTTLE TO THE NEEDLE

If missed stitches occur on the XL5001, first check such factors as the thread quality and needle straightness. If shuttle-needle timing is required, the procedures should be done in two steps: First, adjust the clearance between the shuttle hook and the side of the needle to under .15mm, and then adjust the shuttle hook to the centerline. The centerline of a needle corresponds to its groove. To make this adjustment, proceed as follows (Fig. 7-8):

- Set the pattern cam at M, and the stitch width at 7.
- Rotate the balance wheel to lower the needle on the right of its down stroke until the needle is at the bottom of its stroke. Continue to rotate the balance wheel until the needle rises 1.4mm to 1.8mm.
- When the needle bar rise is 1.4mm to 1.8mm, check the clearance between the shuttle hook and the side of the needle. If the clearance is not correct (under .15mm), loosen the three set screw of the hook and move the hook along the axis of its shaft and in the correct direction to obtain the clearance. Before tightening the set screws, check that the hook point is at the centerline of the needle. If it is not, rotate the hook around its shaft until the hook *point* is at the centerline of the needle. Be sure the shaft doesn't turn.

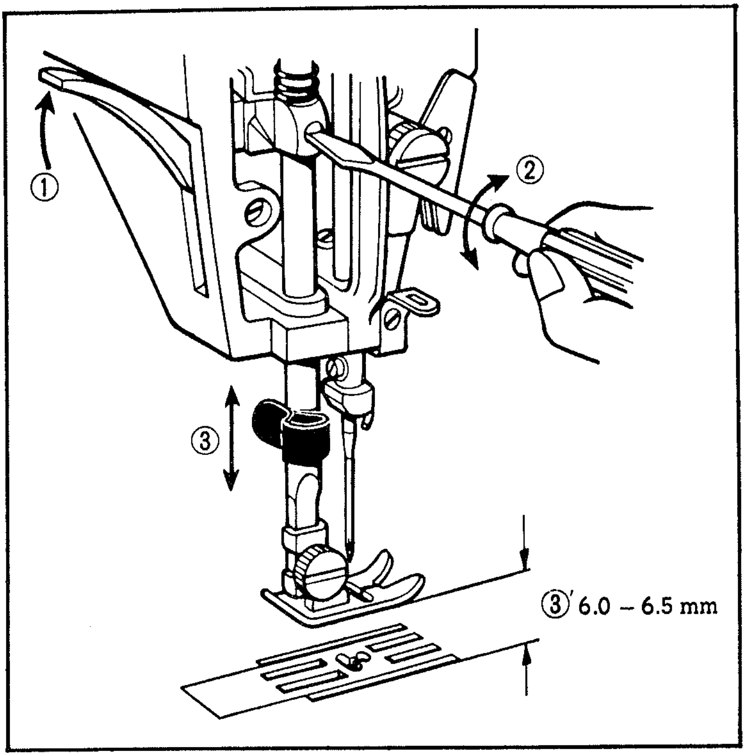

Fig. 7-6. For optimum performance on any sewing machine, there is a correct distance of the presser foot above the needle plate when the lifter bar is raised. This height is set at 6mm to 6.5mm on the Brother XL5001.

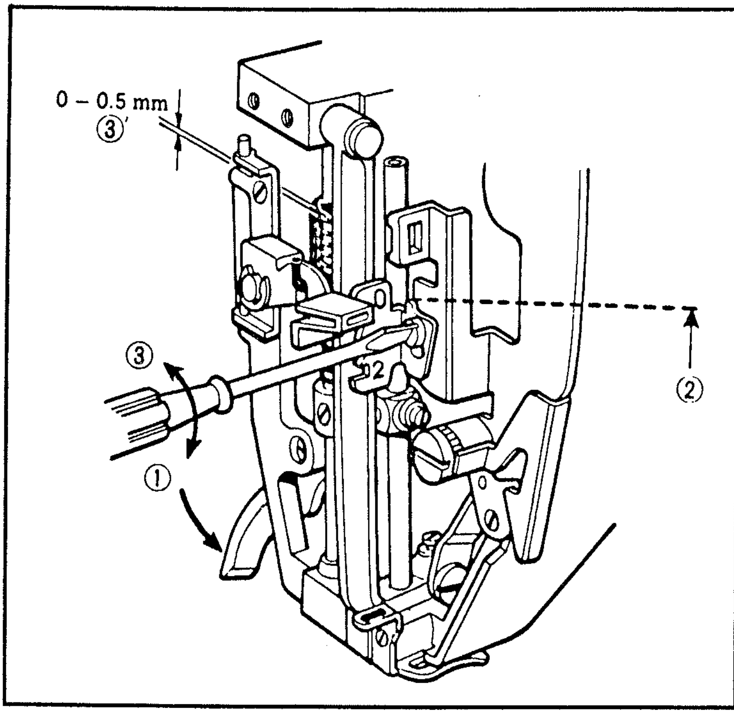

Fig. 7-7. When the presser foot pressure is set at 0, there should be 0 pressure on the fabric when the presser foot is down. To adjust the mechanism of the Brother XL5001 to meet these conditions, read the text thoroughly.

- Tighten the three set screws of the hook.

After making the above adjustment, if incorrect timing persists, the needle bar height may be incorrect.

ADJUSTING NEEDLE BAR HEIGHT

On the XL5001, when the shuttle-needle timing has been adjusted as explained in the previous section, the distance of the shuttle hook point above the top edge of the needle eye should be 0.4mm to 1mm when the needle is on the left side of its swing. To make this adjustment, proceed as follows (Fig. 7-9):

- Adjust the shuttle-needle clearance and timing.
- Set the pattern cam at M and the stitch-width dial at 7.
- Rotate the balance wheel to lower the needle on the left of its swing until the needle is at the bottom of its stroke. Then, carefully rotate the balance wheel to bring the shuttle hook to the centerline of the needle.

- Check that the vertical distance of the hook point above the top edge of the needle eye is 0.4mm to 1mm.
- If not, loosen the set screw of the needle bar clamp and move the needle bar up or down, as required. When correct, tighten the set screw of the needle bar clamp.

ADJUSTING NEEDLE POSITION ON MAXIMUM ZIG-ZAG STITCH WIDTH

On the XL5001, when the pattern cam is set at M and the stitch-width dial at 7, the needle should be the same distance from the left edge of the needle plate slot on the left swing of its stroke as it is from the right edge of the slot on the right swing of its stroke (about 0.8mm). To make this adjustment, proceed as follows (Fig. 7-10):

- Remove the top cover and locate the adjustment screw that is centered in front of the two main cam stacks.

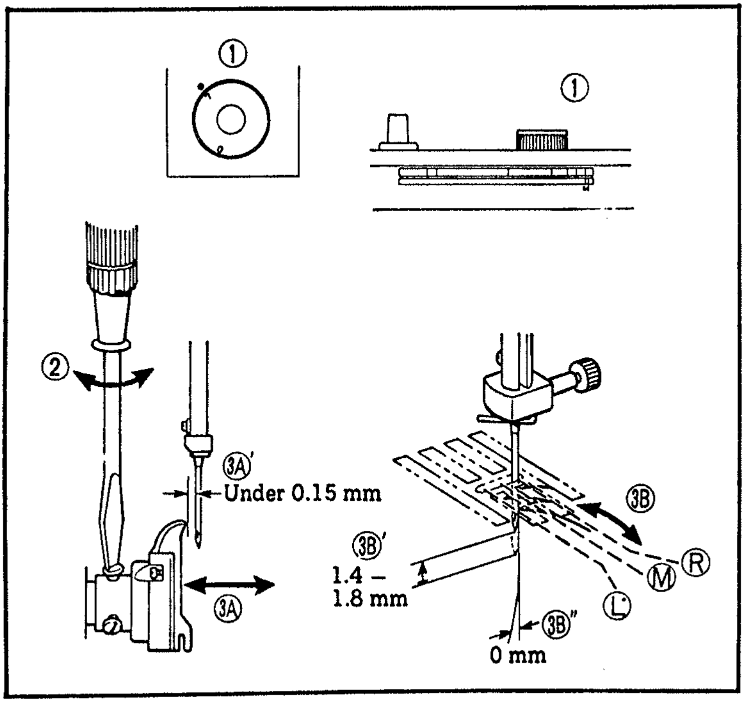

Fig. 7-8. A commonly heard complaint from many seamstresses is missed stitches. If this happens on your Brother XL5001, be sure the cause is not inferior thread or a bent needle. If a mechanical adjustment is necessary, you will find it to be straightforward and simple.

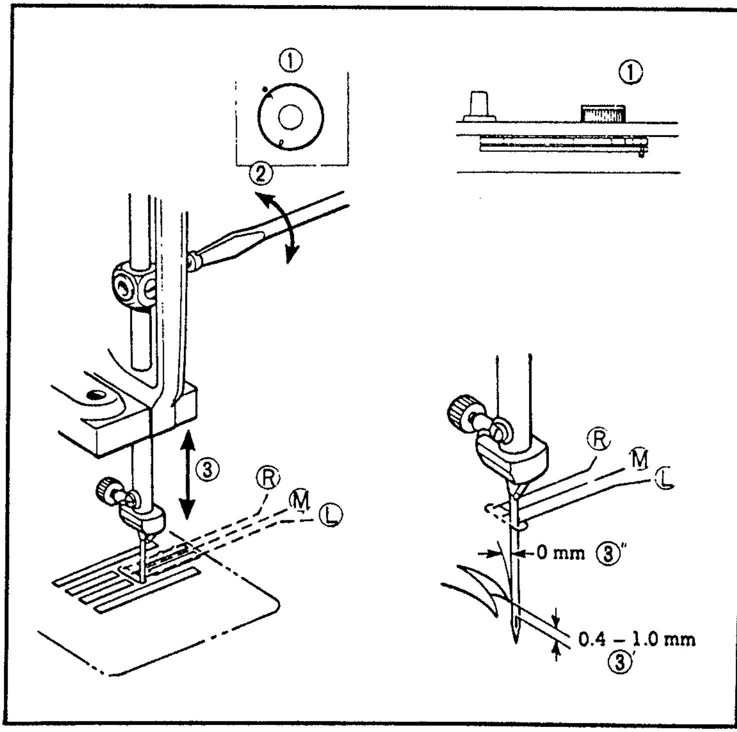

Fig. 7-9. On any rotating shuttle machine, the actual distance of the hook above the top edge of the needle eye will differ on the right and left swing of the needle. On the Brother XL5001, if this distance is set on the left swing of the needle to between 0.4mm and 1mm, it should be correct on the right swing.

- Set the pattern cam at M and the stitch width at 7.
- Loosen the screw.
- Turn the adjusting screw to the right or left until the needle enters the slot as illustrated.
- When the adjustment is completed, tighten the set screw.

CENTERING THE NEEDLE FOR STRAIGHT STITCHING

On the XL5001, when the pattern cam is set at M and the stitch-width dial for straight stitch (center needle position), the needle should descend at the center of the needle plate hole. To make this adjustment, proceed as follows (Fig. 7-11):

- Set the pattern cam at M and the stitch-width dial at straight stitch (center needle position).
- Rotate the balance wheel slowly to lower the needle to the area of the straight stitch needle hole. If it will not enter the

center of the hole, insert a screwdriver from the side to rotate the stud in the appropriate direction to center the needle in the needle plate hole.

- When the adjustment is complete, tighten the set screw.

EQUALIZING LEFT AND RIGHT SIDES OF BUTTONHOLE STITCH

On the XL5001, the densities of the right and left sides of the buttonhole stitch should look like that of the drawing 0 in Fig. 7-12. When the automatic sequence of the buttonhole process goes to bartack the buttonhole, there should be 0 feeding. If adjustment is required, proceed as follows (Figs. 7-12 and Fig. 7-13).

- Set the stitch width at 7, the stitch length at F, the pattern cam at A (buttonhole) and install the buttonhole foot.
- If the right and left stitches of the buttonhole are unequal, loosen the locking nut on the adjustment screw as shown in Fig. 7-12.

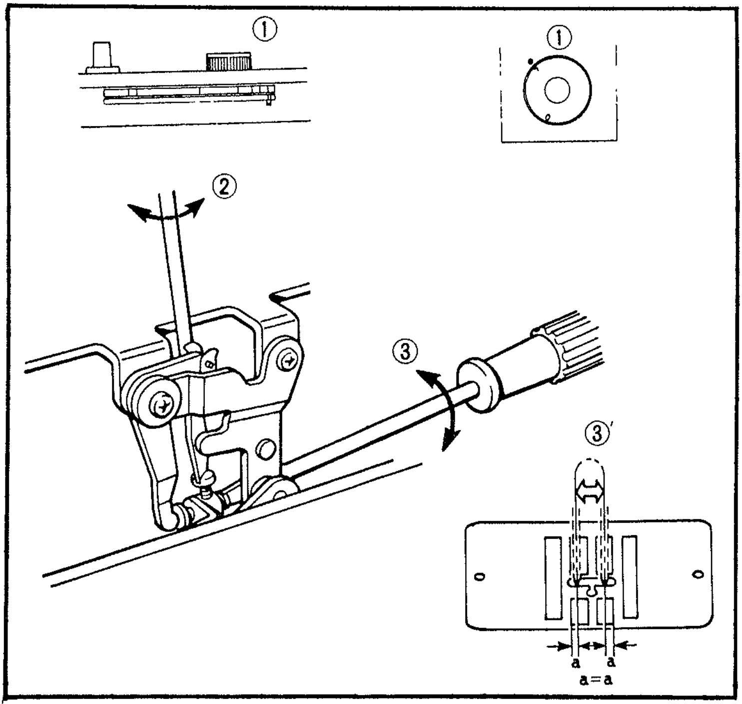

Fig. 7-10. The maximum needle swing on the Brother XL5001 is set so the needle is the same distance from the left edge of the needle plate slot on its left swing as from the right edge of the slot on its right swing.

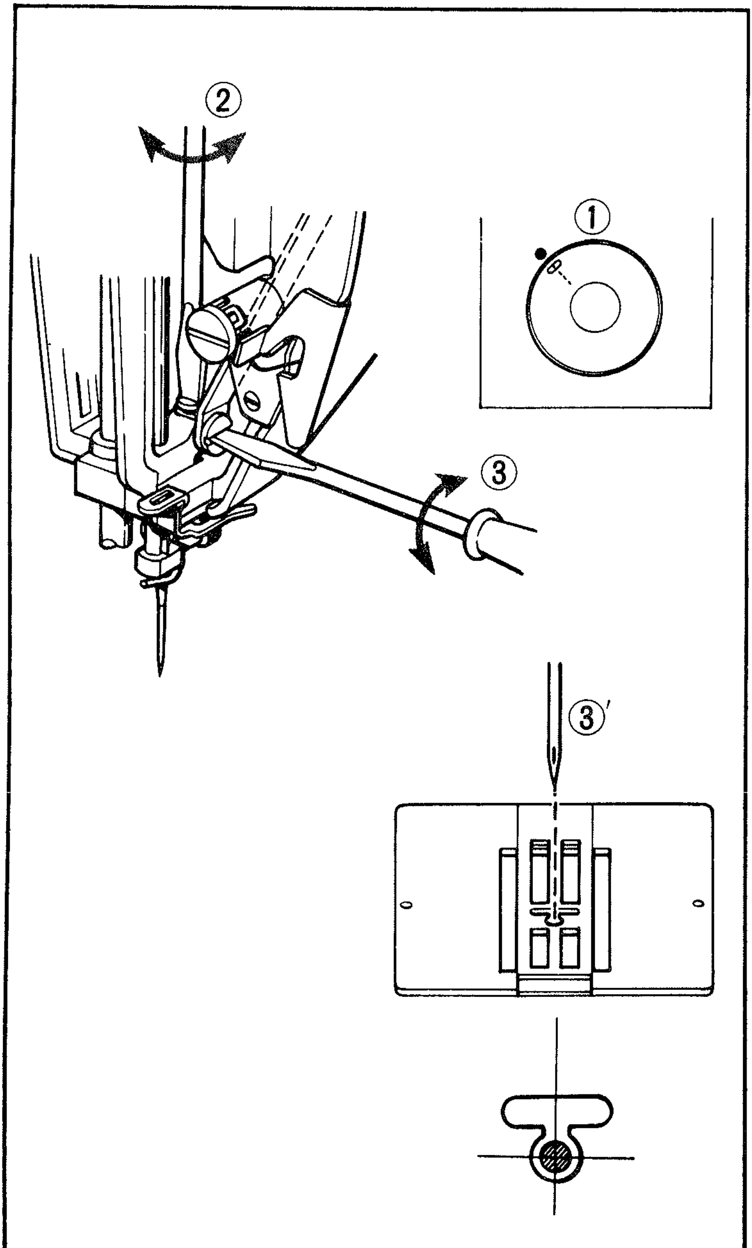

Fig. 7-11. When straight stitching on the Brother XL5001, the needle should descend in the center of the needle plate hole. When making this adjustment, be sure controls are set correctly (machine on straight stitch, etc.)

- If the forward seam is finer than the backward seam, turn the screw counterclockwise slightly. If the backward seam is finer than the forward, turn the screw clockwise slightly. Make this adjustment until the right and left stitches are equalized.
- Tighten the locking nut.

When this adjustment is complete, adjust the position of the feed regulator grooved cam, as follows (Fig. 7-13):

- Loosen the screw on the bushing.
- Set the stitch length at 0.
- Adjust the grooved cam so that the clearance between the feed regulator adjusting plate and the direction control stud is 0.
- Tighten the screw on the bushing.

TIMING THE NEEDLE BAR SWING

On the XL5001, the needle bar swing when the needle is descending and ascending in the area from the top of the needle plate to the bottom of the stroke should be about .05mm. To make this adjustment, proceed as follows (Fig. 7-14).

- Set the pattern cam at M and the stitch width at 7.
- Loosen the two set screws on the gear that will be located between the two main cam stacks on the main shaft.

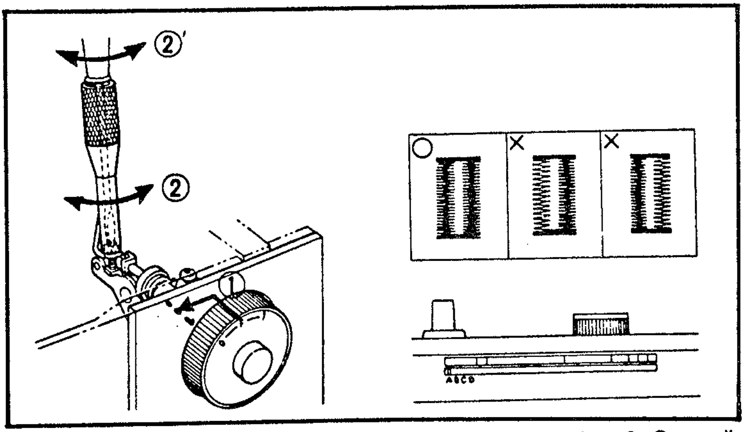

Fig. 7-12. A good buttonhole should look like the one in box 0. Generally speaking, when the Brother XL5001 is precisely set for equality of the left and right buttonhole stitch, there may be some inequalities between the forward and reverse stitch at longer lengths. However, precise equality of forward and reverse stitching is rarely desirable.

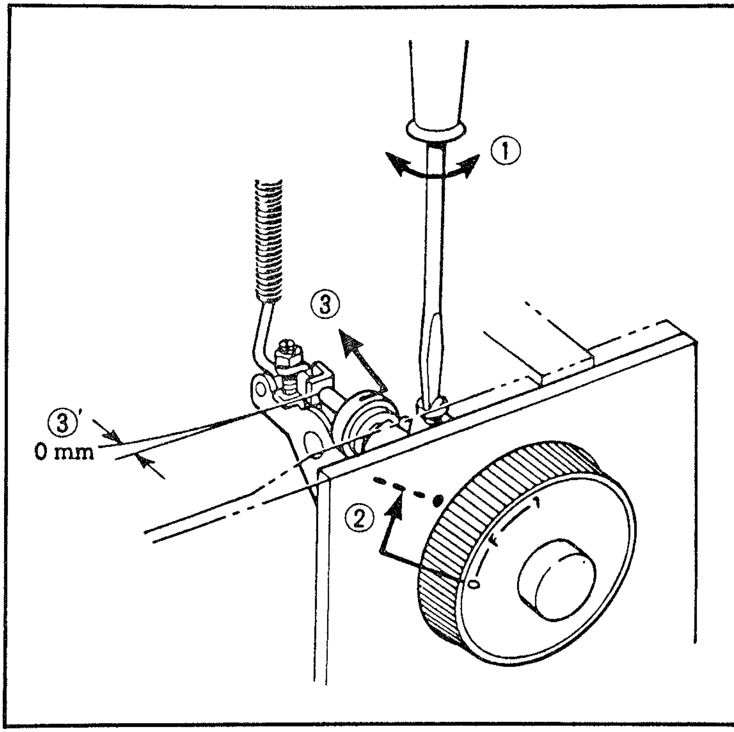

Fig. 7-13. Another criteria of buttonhole stitching is that the fabric is not fed when the automatic sequence of buttonholing goes to the bartack. To adjust for 0 feed, study the text.

- Rotate the gear around the shaft until you find a position where the needle enters and leaves the needle plate slot vertically at the same point.
- Tighten the gear set screws.

ADJUSTING THE UPPER TENSION CONTROL

Adjust the upper tension control on the XL5001 as follows (Fig. 7-15):

- Lower the presser bar lifter and set the upper tension dial at 0.
- Loosen the two screws on the upper tension bracket.
- Adjust the position of the bracket so that the clearance between the tension discs is about 0.3mm.
- Tighten the two screws and set the upper tension dial at 9.
- Loosen the screw on the tension releaser B.

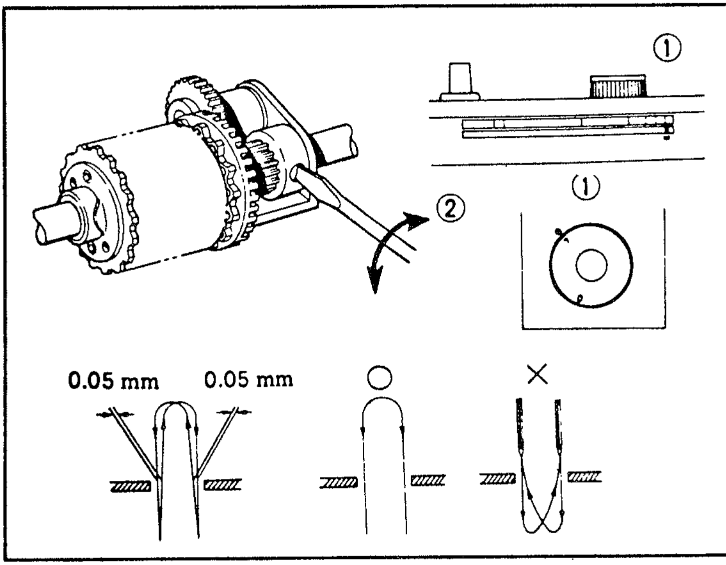

Fig. 7-14. On the Brother XL5001, the needle bar swing is timed by changing the position of the main shaft gear to the cam shaft gear. When moving the gear, make sure no other mechanism in the machine moves, or your effort will be defeated.

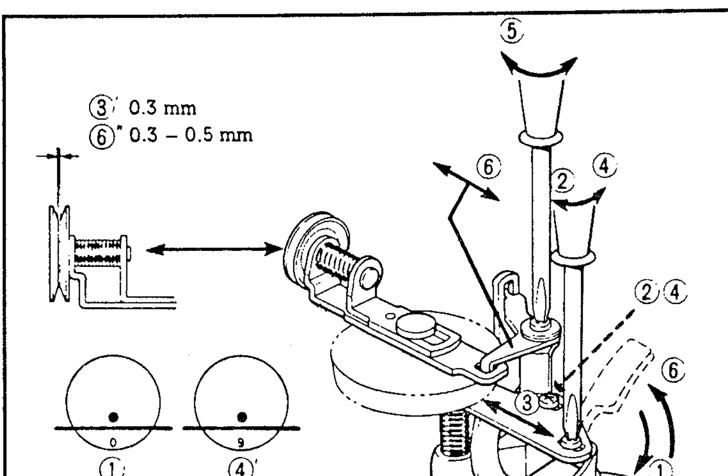

Fig. 7-15. Under two conditions there should be 0 tension between the tension discs: When the thread tension dial is set at 0 and when the presser bar lifter is raised, with the thread tension dial on any setting. To make the Brother XL5001 meet this criteria, read the text thoroughly.

- Adjust the tension releaser B so that when you raise the presser bar lifter the clearance between the tension discs is between 0.3mm and 0.5mm.
- When the adjustment is complete, tighten all screws securely.

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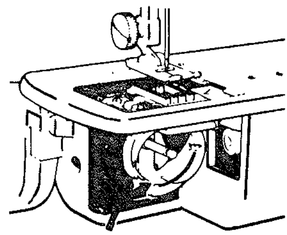

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Howard Hutchison is a technical writer with several books to his credit. He lives in Brookings, OR.

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