

# Compound Feed Walking Foot Machines



**A PRIMER  
FOR THEIR MAINTENANCE AND REPAIR  
WITH  
EXTENSIVE TROUBLE SHOOTING GUIDANCE**



This book has been written by an engineer with close to 50 years experience with industrial sewing equipment.

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# Introduction

Most experts will agree that among the various types of professional and industrial lockstitch sewing machines, those with walking foot and needle feed mechanisms are the most universal types to be found. They can be used on most kinds of materials from lightweight wovens to heavy leather, plastics and laminates, not to speak of canvas and just about any material imaginable, provided it can be sewn.

At first sight, to be sure, their mechanisms with their levers, eccentrics, links and knobs and their multiple adjustments look a bit complex, and, to some people, even bewildering. However, a step-by-step analysis of the functions of their various components and devices will lift the veil of mystery from the how and why. It is the purpose of this primer to explain, clarify and create a good understanding of the operating modes of the walking foot/needle feed machines, their maintenance, adjustments and principal aspects of repair.

For tools and supplies to perform the repair and adjustment jobs outlined in these pages, it is suggested to have available the following:

- Screw Drivers with 3/32, 1/8, 3/16, 1/4 and 3/8 blade widths
- Allen Hexagon Socket Wrenches 2.5mm and 4mm
- 12 point Box Wrenches 7mm, 8mm, 10mm, 11mm
- 3" C-clamp
- 320 grit Emery Cloth
- Rouge Cloth

It is thought to be advisable to briefly describe the operating mode of a plain drop feed lockstitch machine, so that the different operating cycles of the walking foot needle feed types can be appreciated.

On a plain drop feed lockstitch machine the material to be sewn is being transported past the needle after the needle leaves the material and rises to the highest point of its travel. The only machine component responsible for this feeding of the material is obviously the feed dog.

The stitching and material feeding cycle of the walking foot/needle feed machines are quite different. Close observation will show the following:

The feeding of the material occurs while the needle enters the feed dog on its forward or rearward travel and leaves the feed dog as it concludes the feeding cycle. Furthermore, these machines are equipped with *two* separate presser feet, either one within the other or one alongside the other. Turning the handwheel until the needle reaches its highest position and then lifting the presser feet, it can be observed that the center presser foot—the one directly behind or around the needle—rises

higher than the outside foot. This is an important fact to remember, because this presser foot is the one that does the walking. The second presser foot, the one that straddles or locates alongside the walking foot, only rises and drops. Observation will show that this second presser foot rises above the material when the walking foot moves in unison with the needle to feed the material and rests on the material to hold it in place, as the needle and the walking foot have risen out of the material in preparation for the next stitch.

As one becomes aware of these facts, it can readily be understood that all these elements of the walking-foot/needle-feed machine must cooperate in perfect synchronism. This synchronism accomplishes the positive feeding action of even the heaviest and most difficult-to-sew materials. Thus, there is no shifting of the individual plies of material as they are being sewn.

Now that the mode of operation of walking-foot/needle-feed machines has briefly been reviewed, some sort of foundation has been created for the explanation in detail of the important components of these machines, their adjustments, settings one relative to the other; their maintenance, repair and replacement. Careful attention to these writings will go a long way towards keeping these machines in their best operating condition.

*Author's Note:* While many references in this primer concern themselves with specific models of walking-foot/needle-feed machines, the basic mode of operation is the same for all makes of machines of this type. Consequently, the fundamentals of adjustment and maintenance apply equally to those makes. A careful analysis will point out their minor individual differences.

## Needles and Thread

First off, let us consider needles and thread or rather *thread and needles*, as the size of thread is the controlling factor. The type and size of thread is always determined by the weight of the material to be sewn and for machines of the walking foot/needle feed variety, being heavy-duty types, thread finer than cotton size 36 or similarly sized nylon or polyester threads are hardly ever employed. Threads of that size normally do not require needles thinner than size 16 (metric size 100).

To select the correct size of needle, thread a needle before inserting it into the machine and determine whether the thread easily passes through the needle's eye. If even a small effort should be required to move the needle along the thread, select the next larger size of needle. Needles for walking foot/needle feed machines are usually available in sizes 16 through 26 (metric sizes 100 to 230).

Also check the needle installed in the machine for blunt, broken or hooked points. Any of these defects may cause sewing problems.

Before inserting the needle into the needle bar, be certain to check the pertinent information in the instructions for that particular model of machine.

It is also imperative to take a careful look at the needle itself to determine which side has the long groove and which side has the short one (See Fig. 1). After this determination has been made, position the needle so that the side with the *short* groove is nearest to the point of the rotating hook or loop taker. This is an absolute **MUST**, as otherwise the machine, no matter how well adjusted, will not sew. Also be certain to push the needle upward into the needle bar as far as it will go and securely tighten the needle clamping screw. Be sure to use only needles of reliable quality.



LONG GROOVE



SHORT GROOVE

Fig. 1

Before concluding this chapter another word on the thread itself. Same must be smoothly finished and even in thickness without any knots, thickened areas or slubs. Also affecting the quality of the thread are its age, the way it has been stored and its exposure to heat, dirt and dust. Thread makers of repute are most emphatic in pointing out the effect of thread quality on sewing performance and often what is perceived as a machine problem, is resolved by using thread of a better quality.

Also be certain that the thickness of thread wound on the bobbin is equal to or thinner than the needle thread. In no case must the bobbin thread be thicker than the needle thread..

## Thread Tensions

Next in line for consideration is the *thread tension*. This is one aspect of machine sewing whose importance should be thoroughly understood, since it, above all, controls the quality of the seam.

Often it is thought that very tight tensions produce a good stitch, but this is not quite true, because an excessively tightly-tensioned stitch places a great deal of unwarranted stress on the thread. A rather loose tension is, of course, equally

undesirable. In a good lockstitch seam with correctly balanced upper and lower thread tensions the needle and bobbin threads are ideally twined midway through the material being sewn. Diagram 2A illustrates this condition. Note that both upper and lower threads should be drawn firmly and balanced as required and should never lie loosely along the surface of the material. Diagrams 2B and 2C show the appearance of seams where the upper thread (2B) or the lower thread (2C) is tensioned too tightly.

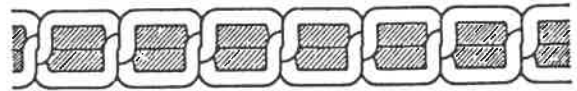


Fig. 2A

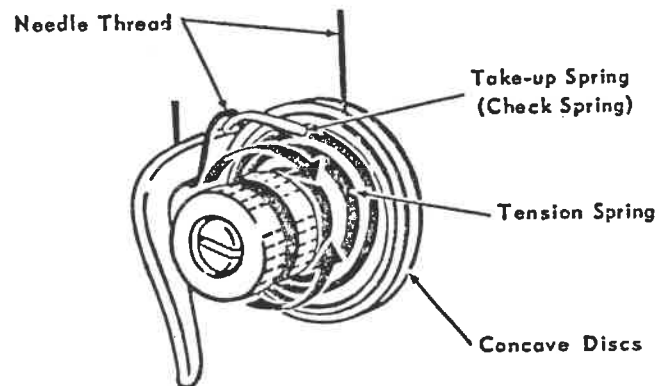


Fig. 2B



Fig. 2C

Three elements of the machine control the tension of the threads and the tightness of the stitch respectively. These are: (a) the needle thread tension device, (b) the bobbin case tension spring, and (c) the thread take-up spring. There are different configurations of the needle thread tension device and in the placement of the thread take-up spring.



NEEDLE THREAD TENSION ASSEMBLY

Fig 3

Illustration 3 pictures a tension device on which the thread take-up spring surrounds the tension discs. This is a rather simple type. Illustration 4 represents a tension assembly, where the thread tension device and the thread take-up spring are mounted separately.

There is no difference in the mode of their adjustment and in their respective effects on stitch quality. This latter type is one normally found on walking foot/needle feed sewing machines.

The take-up spring performs a very distinct function, exerting a tug upon the needle thread within the stitch, at the exact moment required to set the stitch. The tension of the take-up spring should just be sufficient to take up the slack of the needle thread until the eye of the needle on its downstroke reaches the material. To change the tension of the take-up spring of the type as shown in illustration 3, insert a screw driver of suitable size in the slot at the center of the tension nut and turn slightly clockwise to increase the tension and in the opposite direction to decrease same. The amount of tension required will vary with the type of thread being used.

Illustration 4 shows a tension device of the type usually found on heavy duty sewing machines. On this type of tension device the take-up spring action is adjusted by positioning the spring stop (18). Refer to illustrations figs. 4 and 5. Same is adjusted by loosening screw (19) and rotating the stop enough to allow the spring to hold slack out of the needle thread while the needle is descending. The tension of the take-up spring can be adjusted by loosening the set screw (19, Fig. 4) located in the arm casting behind the take-up spring device in a four-o'clock position. Rotate stud (13, Fig. 4) clockwise to increase spring tension and

counterclockwise to decrease same. The amount of tension may vary, depending on the type of thread being used. It is important to stress that any adjustments made on any member of the stitch tightening device must be made carefully and gradually. Always check for results before making further corrections or adjustments.

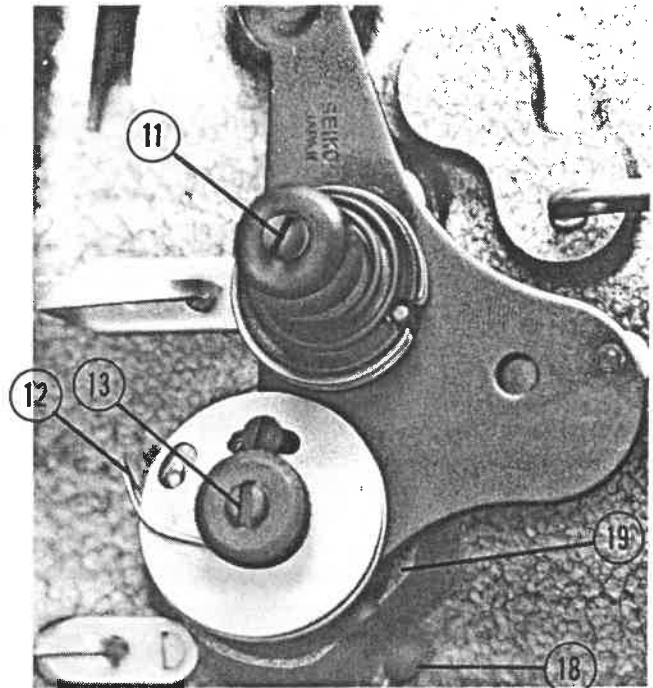
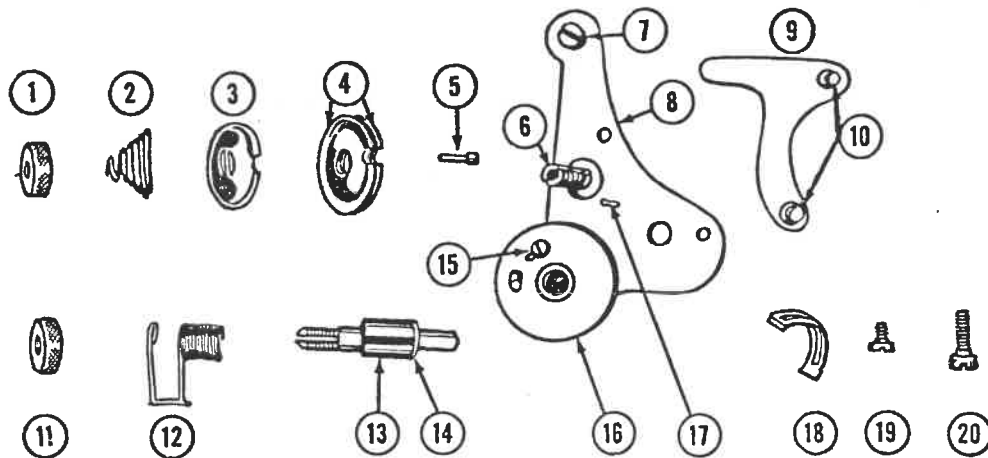


Fig. 4



REF.  
NO. :

- 1 Tension thumb nut
- 2 Tension spring
- 3 Tension release washer
- 4 Tension disks (two required)
- 5 Tension release plunger
- 6 Tension stud
- 7 Tension bracket screw
- 8 Tension bracket
- 9 Tension release lever
- 10 Tension release lever screw

REF.  
NO.

- 11 Thread controller stud thumb nut
- 12 Thread controller spring
- 13 Thread controller stud
- 14 Thread controller stud washer
- 15 Thread controller disk screw
- 16 Thread controller disk
- 17 Tension disk position pin
- 18 Thread controller spring stop
- 19 Thread controller spring stop screw
- 20 Thread controller stud setscrew

Fig. 5

# Trouble Shooting Guide

## General

This section contains abbreviated trouble-shooting information which can be of help in determining and removing the causes of trouble that may develop in the machine. When the troubles covered by this section develop, they can be conveniently tracked down and readily corrected by consulting the following listing:

### Specific Troubles—Their causes and correction.

#### a. *Needle breakage.*

- (1) Needle is loose in clamp. Tighten clamp screw.
- (2) Needle of incorrect class and variety is being used; compare needle with one of correct type.
- (3) Presser foot is loose or out of line. Straighten and tighten it.
- (4) Needle is too light for the fabric. Select the correct needle.
- (5) Operator is pulling on fabric. DO NOT assist machine in feeding material.

#### b. *Needle-Thread Breakage.*

- (1) Thread is too heavy for the needle. Insert thicker needle.
- (2) Right-twist thread is being used. ONLY LEFT twist thread must be employed.
- (3) Damp or defective thread is being used. Use dry, smooth thread.
- (4) Machine is incorrectly threaded; follow threading diagram for specific machine involved.
- (5) Needle is incorrectly set. Set the needle with the short groove closest to loop taker.
- (6) Upper tension is too tight; adjust for correct stitch balance.
- (7) Thread take-up spring is out of adjustment.
- (8) There is a sharp edge on the rotating loop taker, bobbin case or tension controller; smooth with finest emery cloth (320 grit) or oilstone and polish with rouge cloth.
- (9) Needle is rubbing against presser foot. Adjust and tighten the foot.
- (10) Needle is defective, blunted or bent at the point. Use a good, new needle.
- (11) Needle hole in feed dog is sharp-edged or burred. Smoothen offending areas.

#### c. *Bobbin-Thread Breakage.*

- (1) Defective or damp thread is being used. Use dry thread of correct size.
- (2) Bobbin case tension is too tight. Adjust to obtain well-balanced stitches as described under "Thread Tensions."
- (3) Bobbin case is incorrectly threaded.
- (4) Bobbin is wound too full to revolve freely. Take off thread to below the rim of the bobbin and adjust the bobbin winder to avoid winding bobbin with an excess of thread.

- (5) Rounds of thread on the bobbin are lapped over one another; unwind bobbin manually and rewind evenly and uniformly.
- (6) Bobbin case is sticky with gummy oil and/or lint. Clean the bobbin case and rotating loop taker with kerosene or naphtha and lubricate rotating loop taker with a few drops of oil.
- (7) There is a sharp edge on the rotating loop taker, bobbin case, bobbin or needle. Smoothen same as per in the foregoing chapter.
- (8) Bobbin sides may be bent, nicked or distorted and bobbin will not turn freely. Such bobbins should be discarded and replaced.

d. *Skipping Stitches.* If the needle thread fails to catch the bobbin thread, the machine will not sew or will leave skips in the stitches. To remedy this trouble, time the needle with the needle bar according to instructions.

e. *Drawing of Seam.* If the threads draw or pucker the seam, adjust the tensions.

f. *Stitches Uneven or Stitches Piled Up.* If the stitches pile up in one place, adjust the stitch length regulator for longer stitch. Also, if indicated, the presser foot pressure on the material should be increased. Check rise of teeth of feed dog above surface of needle plate. They should rise to the extent of their full depth.

g. *Feed Dog Striking Throat Plate.* If the feed dog strikes the throat plate, adjust the feed dog to rise above throat plate no further than the depth of the feed dog teeth. Also check travel of feed dog within slots in throat plate. Also observe whether, with machine set for longest stitch, the feed dog strikes either the front or the rear of the feed dog slots in the throat plate. The simplest remedy for this problem is a slight reduction in stitch length to avoid such striking. There is also the possibility of an accumulation of lint and debris from sewing between the feed dog and the underside of the throat plate. Remove throat plate from machine bed by loosening its screws and brush out from feed dog any foreign matter which may have become packed into its slots and between its teeth. Also, wipe clean the underside of the throat plate. Replace throat plate on machine bed, tightening its screws.

A more comprehensive coverage of "Causes and Solutions" can be found elsewhere in this volume. Please refer to Index.

# Basic Adjustments

a. *Timing the Rotating Loop Taker (also called Rotating Hook) with the needle (machines with vertical axis loop takers only).* The point of the rotating loop taker (rotating hook) rotates past the needle in close proximity, but without ever touching it. When the needle is on its upstroke the point of the hook passes across the center of

the needle about 1/16 inch (1.5mm) above the eye. To test the correct timing of the needle on machines with vertical axis hooks, turn the handwheel until the take-up lever is at its highest point. The timing arrow (Fig. 6) on the shaft collar must line up with the timing mark on the bushing and the point of the hook must cross the center of the needle as just described. If it should now be determined that the machine requires re-timing, proceed as follows:

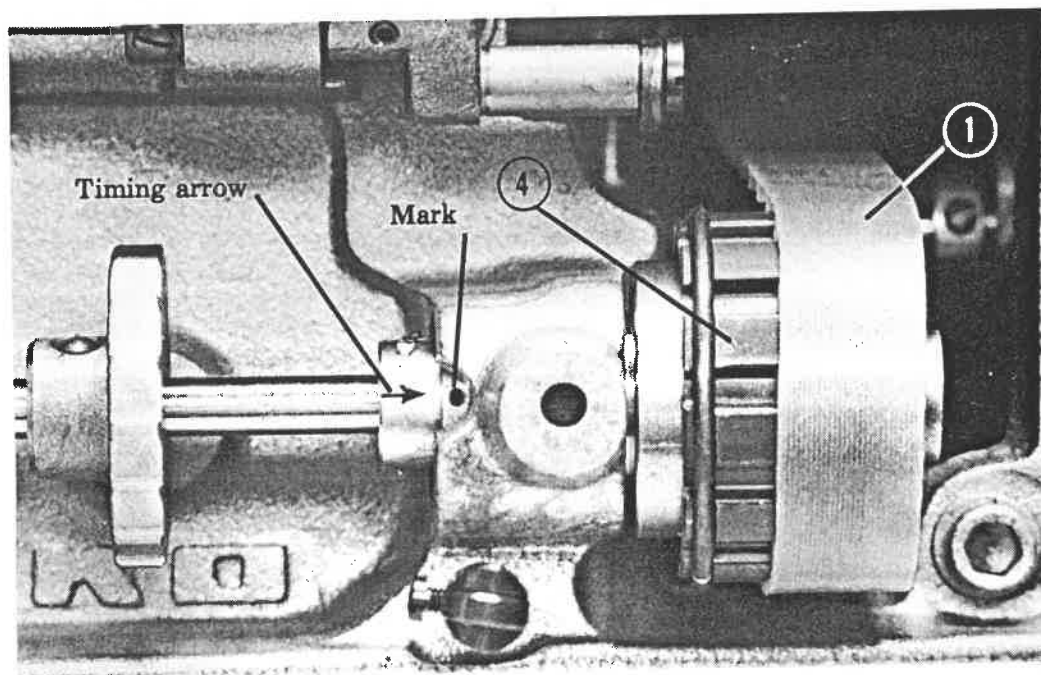
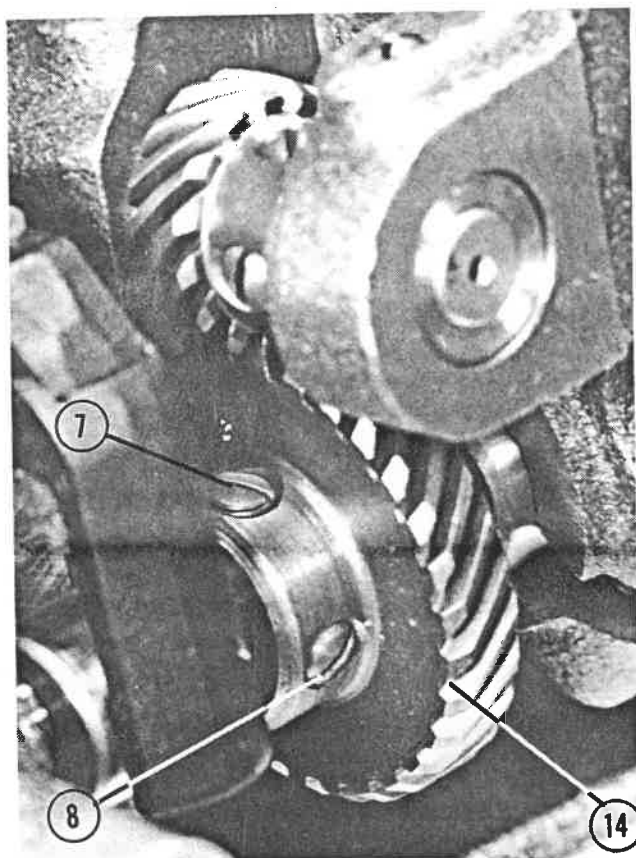


Fig. 6



- (1) See that the needle is set up into the needle bar as far up as it will go.
- (2) Remove the throat plate to get a good view of the needle.
- (3) Remove the arm shaft connection belt to disconnect the needle mechanism from the hook driving shaft and safety clutch pulley. (For arm shaft connection belt removal, see separate chapter.)
- (4) Turn the balance wheel towards you until the needle bar has descended to its lowest position and rises 3/32" (2.5mm). At this moment in time the hook point must cross the center of the needle approximately 1/16" (1.5mm) above the eye in the needle.
- (5) Turn the lower shaft by hand until the two timing marks are matched, as explained above. During the remainder of the timing operation, keep these marks so matched.
- (6) Loosen 2 or 3 turns the two screws (7 and 8, Fig. 7) in the hub of the hook driving gear (14). Be careful to keep the position screw (7) in the groove cut into the driving shaft.
- (7) Tap the hook driving gear (14) along the shaft. If the hook is too slow, tap the gear to the right; if the hook is too fast, tap the gear to the left.

Fig. 7

- (8) When the hook point crosses the needle at a spot  $1/16$ " (1.5mm) above the eye of the needle, securely tighten the two screws (7 and 8) in the hub of the gear (14).
- (9) Be certain that the position screw (7) is in the groove in the shaft.
- (10) Make sure that the timing marks mentioned in (5) above are matched when the hook is correctly timed. Then replace the arm shaft connection belt.

b. *Timing the Rotating Loop Taker-Hook*-(machines with *horizontal* axis loop takers only).

First, observe that needle bar is correctly set by referring to the instructions in a following chapter (page 8). To determine whether the hook is correctly timed, first remove from machine presser feet, throat plate, slide plate, feed dog, bobbin case and the position finger (P) for the bobbin case holder (Fig. 8). Insert a new needle into the needle bar, turn over handwheel until the needle bar is about to rise from its lowest point. Allow needle bar to rise  $3/32$ " (2.5mm) from this lowest position. At this juncture the point of the rotating loop taker should cross the center of the needle  $1/16$ " (2.5mm) above the eye.

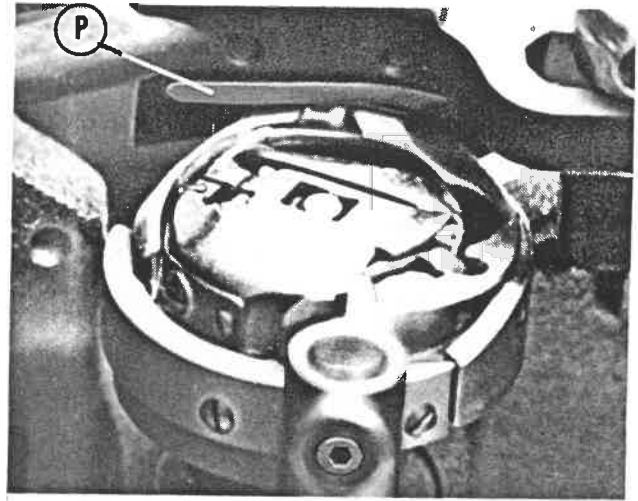


Fig. 8

If the timing of the rotating loop taker (hook) should be incorrect, loosen the three set screws (S) (Fig. 9) in the left hand hub of the safety clutch assembly and turn it on its shaft to bring the point of the loop taker into the correct timing. Tighten set screws (S) and re-check that the setting has not been disturbed.

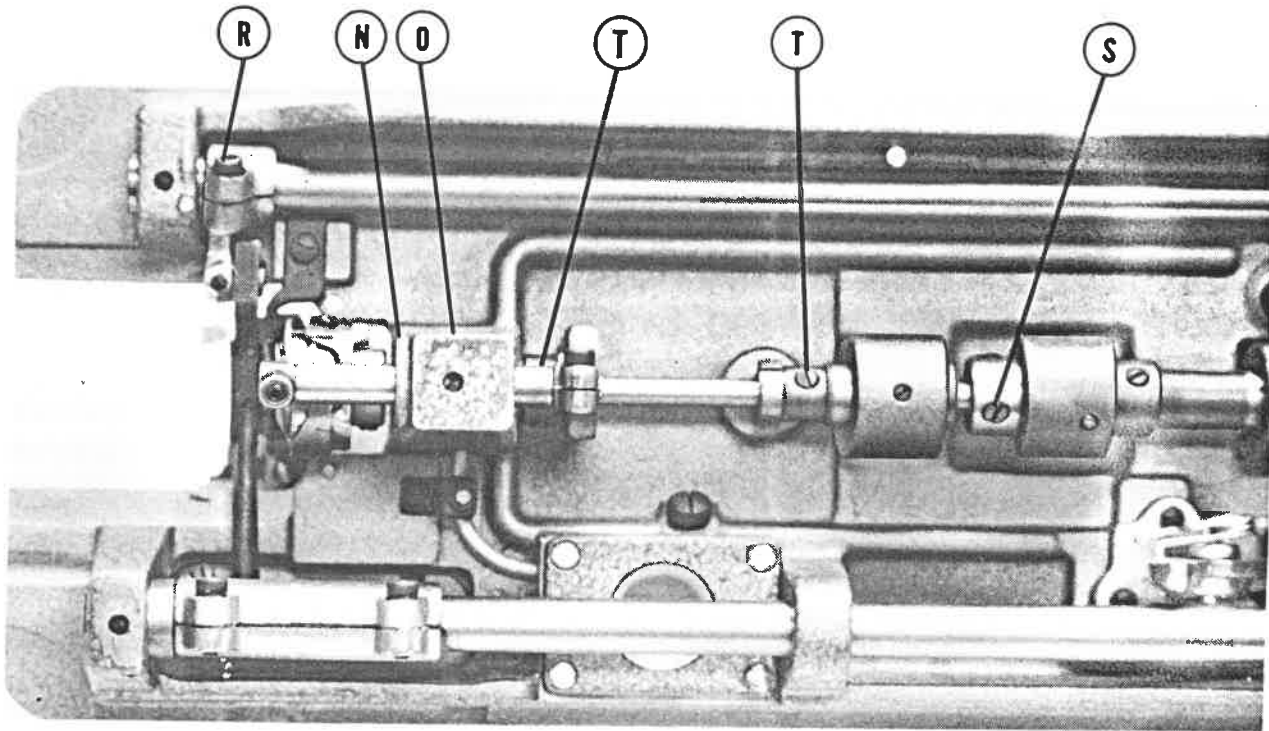


Fig. 9

The point of the hook should pass the needle as closely as possible without actually touching it. This is equal to about the thickness of a piece of ordinary note paper. The hook should be placed on the shaft as far in as it will go. If it is necessary to move the hook sidewise, proceed as follows:

- a. Loosen set screws S about one turn (See Fig. 9).
- b. Loosen set screws T approximately to the same degree.

- c. Loosen set screw O, which locks into place bushing N.
- d. Lightly tap bushing N with hook assembly and connected shafts to the right or to the left, as may be required, and check for correct clearance between needle and point of rotating loop taker (hook).
- e. Tighten all set screws and recheck timing of hook.

## Raising or Lowering the Needle Bar

See that the correct type of needle is inserted into the needle bar and make sure that it is placed as far up into the bar as it will go. Adjust stitch length to approximately 8 stitches per inch (3mm stitch). Take off throat plate, also feed dog, if necessary, so that the rotating loop taker (hook) becomes visible. Also remove face plate from arm of machine to expose the needle bar mechanism. Turn handwheel until needle bar reaches its lowest point, when the needle bar pinch screw (P, Fig. 10) will become visible behind the notch near the lower end of the needle bar frame. Loosen this pinch screw and raise or lower needle bar as required. The needle bar is in correct position when, after it has risen  $3/32$ " (2.5mm) from its lowest point the point of rotary loop taker passes the center of the needle  $1/16$ " (1.5mm) above the needle's eye. Tighten pinch screw after the needle bar is adjusted and replace all parts previously removed from machine.

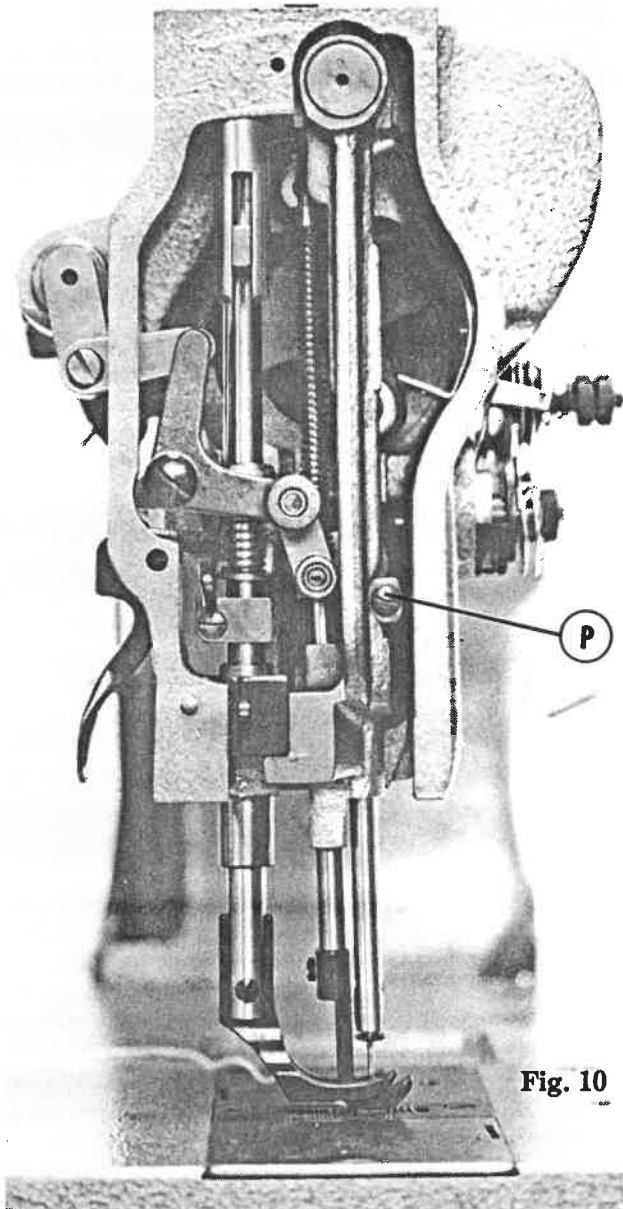


Fig. 10

## Replacing the Arm Shaft Belt

Force belt (1, Fig. 6) to be replaced off the lower belt pulley (4) by turning the handwheel and pushing the belt outward at the same time. Then remove handwheel. Loosen arm shaft bearing sleeve set screw at rear of arm and after opening of Arm Top Cover, pull out bearing from handwheel side. Now draw up Arm Shaft Belt through opening in top of arm, pulling its end through the space previously occupied by the bearing.

### *Important Note:*

If it is desired to re-use the belt just removed or when installing a new belt, be careful not to pinch or crease it, as this will cause the steel wire reinforcements inside the belt to become distorted and thus to make the belt useless.

After installing the belt, replace arm shaft bearing and handwheel and tighten all set screws securely. Slip belt on to upper belt pulley and turn handwheel toward you until take-up lever reaches its highest position. Make sure arm shaft remains in this position and turn hook shaft (Lower Shaft) manually until the timing arrow on the shaft collar and the timing mark on the bushing (Fig. 6) are aligned. Make sure that arm shaft and hook shaft are held as described and carefully slip belt onto belt pulley "4." This will assure that needle bar and feed motion are timed properly.

## Safety Clutch

When the machines are subjected to unusual strain, such as may occur when loose or tangled threads get caught inside the rotating loop taker, a safety clutching device goes into action to protect the various components of the mechanism from serious damage.

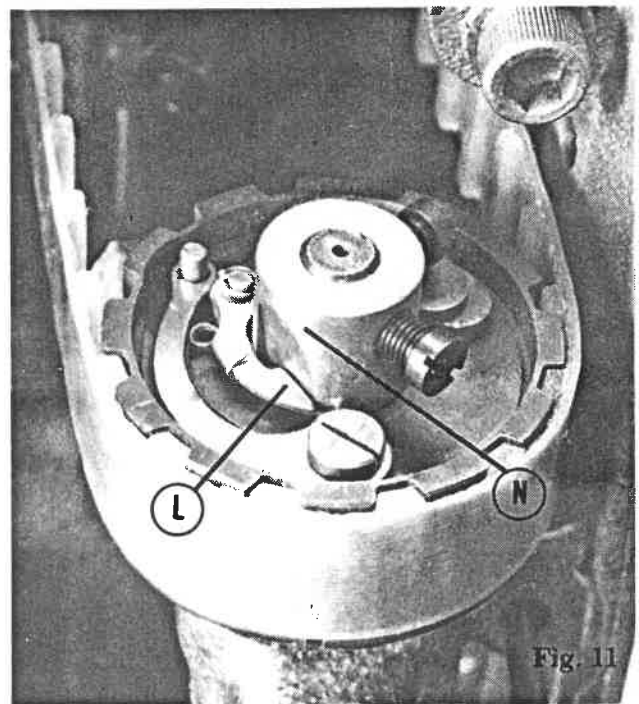


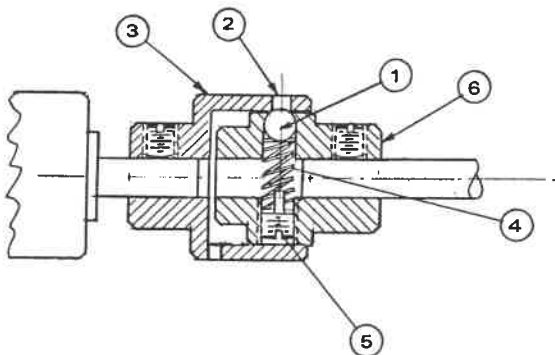
Fig. 11

- a. On machines with *vertical axis loop takers (hooks)* the safety clutching device is the type as seen in Fig. 11, where the arrow points to the locking latch ("L"). Undue strain will cause this latch to rise out of the notch in the belt pulley hub, thereby stopping rotation of the loop taker.

The locking latch "L" may also be lifted out of its notch manually, if it should become necessary to raise the needle without moving the rotating loop taker, as may be needed due to a clogged condition of the machine. To do this, a screw driver can be used to lift the latch, turning the machine handwheel to disengage the clutch from the hook driving shaft.

To re-engage the clutch, proceed as follows: On the machine bed locate the right hand one of the two buttons, depress same and, at the same time, turn the handwheel backward. The plunger will hold the hook shaft until the locking latch "L" reaches the notch "N" in the collar (Fig. 11) and drops into it. This maneuver will re-engage the clutch without disturbing the timing of the sewing mechanism. Release button.

- b. On machines with *horizontal axis loop takers* the safety clutching mechanism is of a different design and is adjustable as far as the release force is concerned. Fig. 12 shows a detail of this clutch.



Sectional View of Safety Clutch Device

Fig. 12

To re-engage clutch, depress button at center of bed plate and turn handwheel until it is noticed that ball (1) has dropped into bore (2) (Fig. 12). This will automatically reset the rotating loop taker for correct timing.

If it is desired to disengage the clutch manually, turn handwheel until bore (2) in cup (3) comes into view. Depress button at center of machine bed for plunger to engage ratchet on hook shaft. Maintain force on handwheel and keep plunger engaged. At the same time, use a small screw driver to depress ball (1). Ball will disengage from bore in cup.

To adjust pressure of spring (4) carefully continue turning handwheel until hook shaft with clutch body (6) make about a half turn. This will bring into view at bore (2) the slot of the adjustment screw (5), which can now be adjusted. Make certain that adjustment screw does *not* ever extend above surface of clutch body.

## Adjustment of the Height of the Feed Dog

The maximum height to which the feed dog should rise above the surface of the throat plate equals the depth of the teeth. Before adjusting to the correct height, remove all lint or foreign matter which may have accumulated between feed dog and throat plate and proceed as follows:

- a. On machines with vertical axis rotating loop taker (hook), loosen the feed lifting eccentric fork screw (1, Fig. 13) and raise or lower the feed bar fork (2) as needed so that the feed dog in its highest position rises the height of a tooth above the throat plate. Be sure to again tighten feed fork screw.

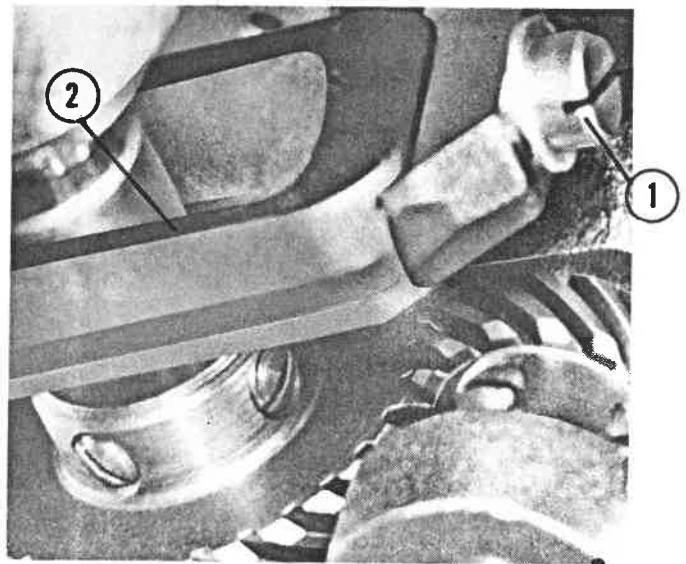


Fig. 13

- b. On machines with horizontal axis loop takers (hooks), the feed dog may be raised or lowered by loosening clamp screw "R" (Fig. 9) in the feed lifting crank. Tap crank to position feed dog as stated (see preceding paragraph) and tighten clamp screw.

## Adjusting the Bobbin Case Opener and/or Thread Release Finger

- a. *Machines with vertical axis loop taker (hook).*

The bobbin case opener (L, Fig. 14) is operated by an eccentric attached to the hook shaft. It strikes the triangular projection "R" on the bobbin case, turning it slightly, thereby making an opening between the square projection "J" and the grooved stop at the underside of the throat plate to allow passage of the thread.

The bobbin case opener "L" can be adjusted after loosening screw "M" by sliding it back and forth.

This adjustment should be made so that the opening between the lever and the edge of the bobbin case is just perceptible when the bobbin case lever has opened the bobbin case all the way.

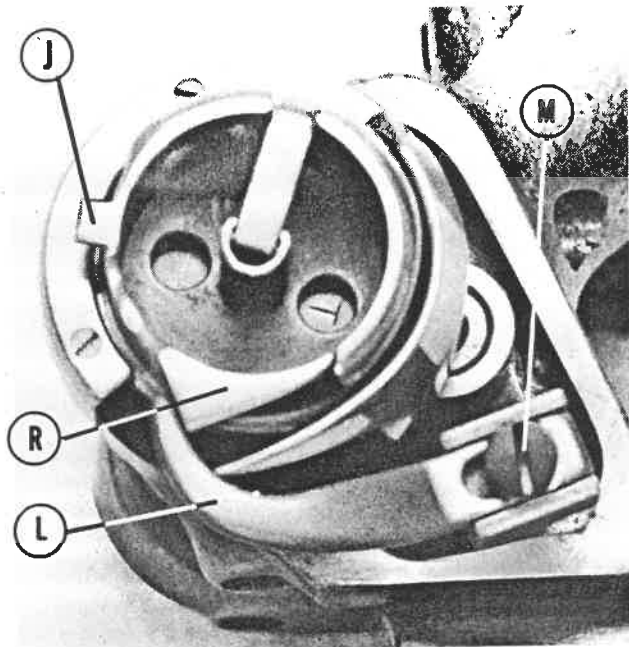


Fig. 14

**b. Machines with horizontal axis loop taker (hook).**

On machines of this type a separately adjustable cam "C" attached to the hook shaft operates the thread release finger. It is timed correctly when, facing the rotating loop taker with its hook point in a 9 o'clock position, the cam is positioned in its fork as shown in Fig. 15. For re-positioning of the cam, loosen the two set screws in its hub, tightening them after adjustments have been made as just described.

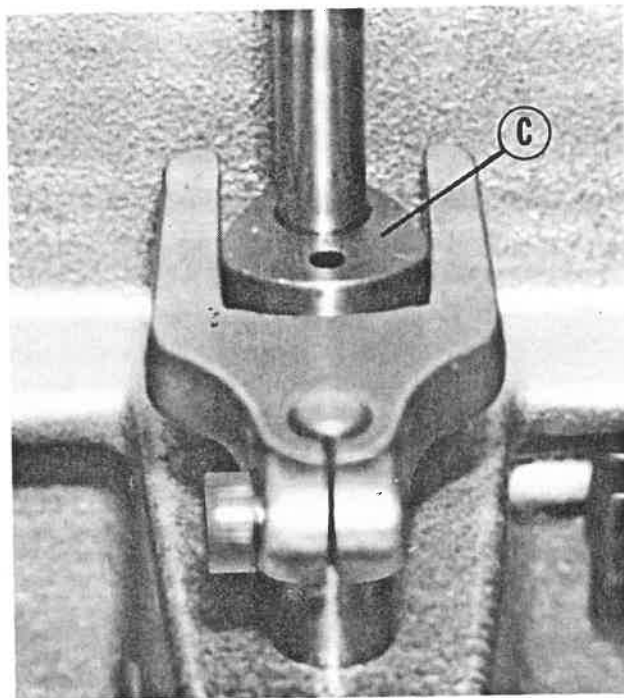


Fig. 15

As for the thread release finger "F", same must slightly nudge the bobbin case holder as the take-up lever completes its up-stroke, to allow the loop of the upper thread to pass freely between the bobbin case retaining finger and the notch "N" at upper portion of the bobbin case holder (Fig. 16.)

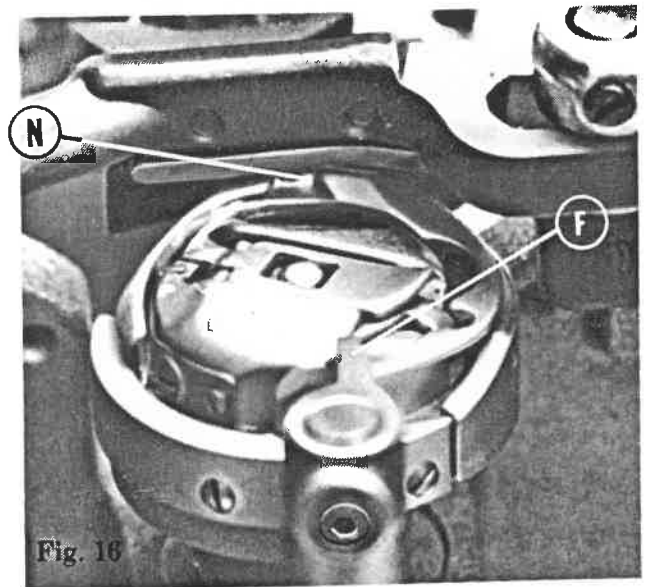


Fig. 16

The clearance between the bobbin case retaining finger and the sides of this notch should be on the order of 0.012" to 0.015" (0.3-0.4mm). Same should be adjusted by turning the thread release finger "F" on its shaft after loosening the set screw at its underside. Tighten set screw upon making the required adjustment.

## Setting the Needle Guard on the Sewing Hook

**a. Machines with Vertical Axis Loop Taker (hook)**

The function of the needle guard (B, Fig. 17), which is attached to the bottom of the sewing hook, is to prevent the point of the hook from striking the needle, should same be deflected as it passes through the material.

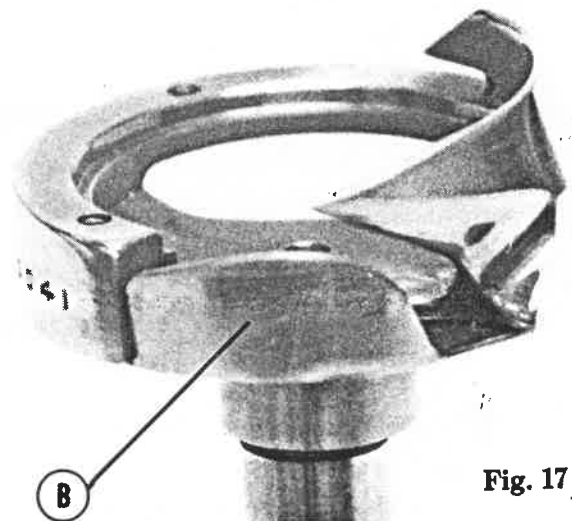


Fig. 17

To prevent the needle from striking the hook point, this guard can be bent with a small round-nose plier. Do not bend it outwardly so much that it will deflect the needle from its usual course.

b. *Machines with Horizontal Axis Loop Taker (hook).*

The function of the needle guard (Fig. 18) on the bobbin case holder is likewise to prevent the hook point from coming into contact with the needle at loop-taking time in case the needle is deflected sidewise toward the hook point.

When the needle guard is correctly related to the needle, it will deflect the needle very slightly to the left as the needle approaches its lowest position. It may sometimes be necessary to string out the needle guard, as shown in Fig. 19 to provide additional clearance for the needle.

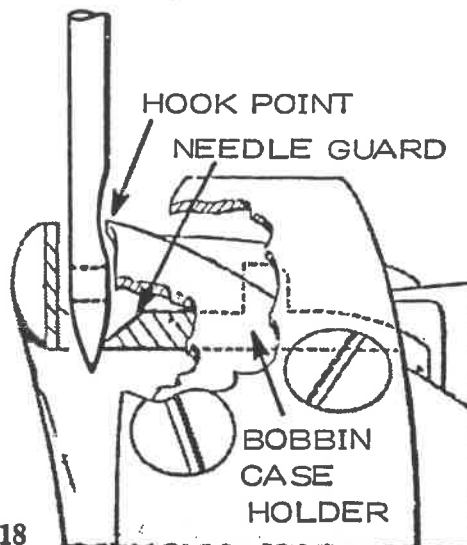


Fig. 18

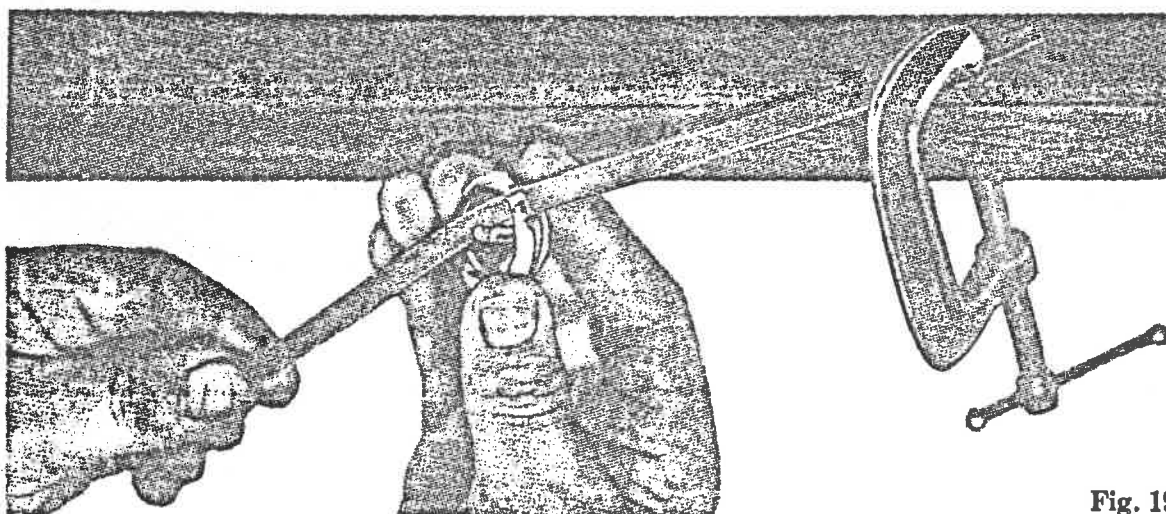


Fig. 19

(For details on this, refer to a following paragraph.) Before doing that, the machine should be properly adjusted as previously described. Check the settings in the following order:

1. See that needle bar is set at its correct height. See page 8.
2. Make sure that sewing hook is accurately timed. See pages 6 and 7.
3. See that clearance between sewing hook point and needle is correct. See page 7.
4. Rotate bobbin case holder to its normal position and replace position finger.
5. Check position of bobbin case holder position finger (Fig. 20). The clearance between position finger and bobbin case holder should be just sufficient to allow a thickness of thread to pass through easily. Normal setting calls for approximately .020 inch (0.5mm) clearance, as shown in Fig. 20. The tip of the position finger should also be level with the top of the bobbin case holder.

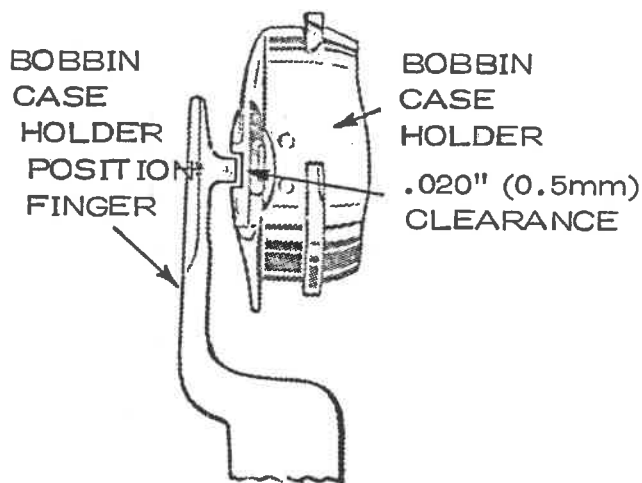


Fig. 20

When it is necessary to provide more clearance for the needle, remove bobbin case holder from hook and remove a slight amount of metal from needle guard, by using a 1/8 inch (3mm) wide strip of very fine emery cloth (about No. 320), holding one end of the emery cloth in a vise and rubbing the edge of the needle guard along the strip, as shown in Fig. 19. Extreme care must be

taken not to remove too much metal, as this will allow the hook point to rub against the needle, causing wear or damage, and thus necessitate replacing the hook and the bobbin case holder. Removing too much metal from guard can also expose the bobbin and permit the needle to strike it as shown in Fig. 21, and become damaged or broken and to also damage bobbin.

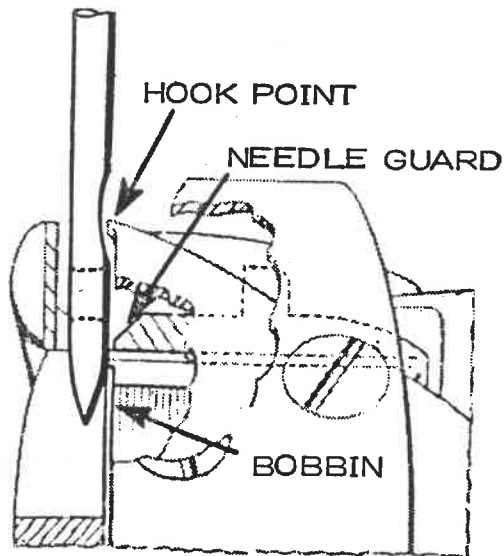


Fig. 21

Be sure to clean bobbin case holder thoroughly before replacing it.

## Adjusting the Height of the Alternating Presser Feet

### a. Clearance between outer presser foot and throat (needle) plate.

The maximum obtainable vertical clearance between the outer presser foot and the throat plate is  $23/64$ " (9.1mm). To adjust for this clearance, reduce the pressure of the presser foot spring by loosening screw (1, Fig. 22). Note that this screw can be either a screw with a large knurled head or a headless screw submerged in the arm of the machine. Then raise presser foot with presser foot lifter (2, Fig. 22) and loosen clamp screw (3) on lifting collar. Adjust presser bar vertically to obtain clearance as indicated above.

Recheck adjustment and regulate the presser foot pressure by tightening screw (1, Fig. 22).

### b. Adjustment of the center, (vibrating or lifting) presser foot.

If the lift of the outer presser foot should have been changed, the rise of the center presser foot must likewise be readjusted. For this purpose, raise the presser bar lifter (2, Fig. 22), turn hand-wheel and observe the rise and descent of the center presser foot, which should be about equal above and below the outside presser foot. To adjust, place stud with wing nut (4, Fig. 22) so that it is centered within its slot, then loosen hexagon screw (5) just carefully to allow arm (6) with its

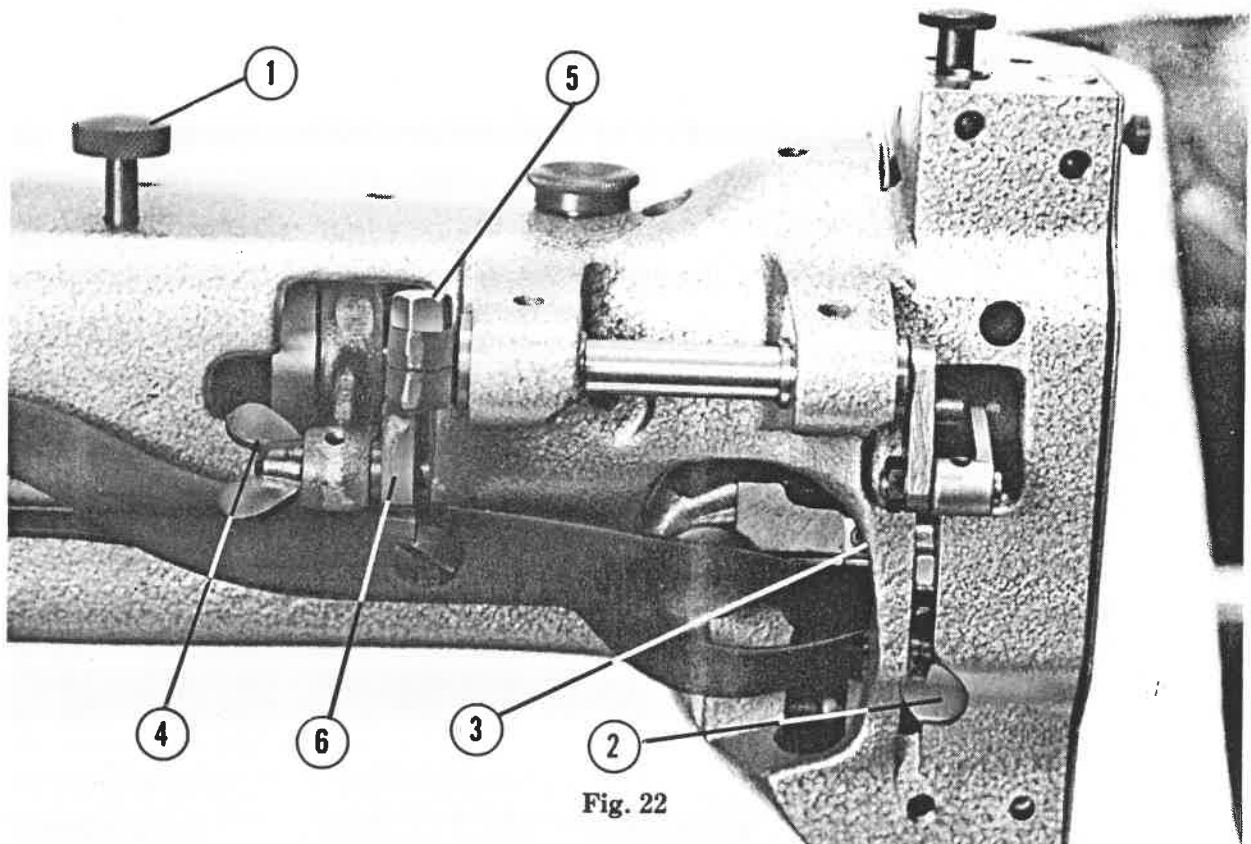


Fig. 22

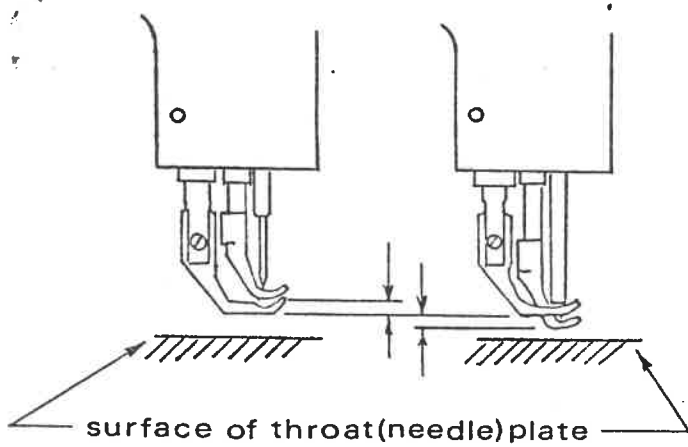


Fig. 23

shaft to be turned against resistance. Turn arm carefully for the center presser foot to rise and descend as described above and as shown in Fig. 23.

## Timing of the Center Presser Foot Movement

The correct timing of the center presser foot movement is established when, with the outer presser foot resting on the throat plate, the center (vibrating) presser foot and the needle reach the throat plate at the same instant.

If adjustment should be indicated, turn hand-wheel until two screws (7, Fig. 24) on feed lifting eccentric come into view. Loosen these two screws just sufficiently to permit the feed lifting eccentric to be turned on its shaft with some resistance. Position this eccentric so that, when the hand-wheel is turned, the needle and the center (vibrating) presser foot reach the surface of the

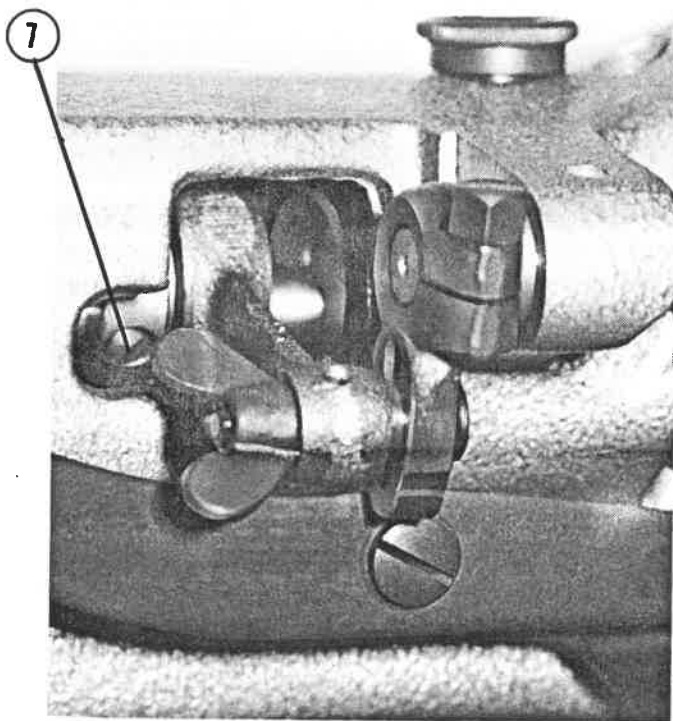


Fig. 24

throat plate at the same time. In fact, there is no harm if the center presser foot should reach the throat plate slightly ahead of the needle to assure that the plies of material are held in place and kept from shifting. Be sure to tighten screws (7) and recheck adjustment.

## Centralizing the Feed Dog

When set for the longest stitch, the feed dog must travel without striking the extreme ends of the feed dog slot in the throat plate, both in forward and reverse directions. Fig. 25 shows this requirement on a throat plate used on vertical axis loop taker machines.

Note that the location of the axis of the loop taker (hook) is in no way relevant to the movement of the feed dog and the same requirement applies equally to machines with horizontal axis loop takers (hooks)

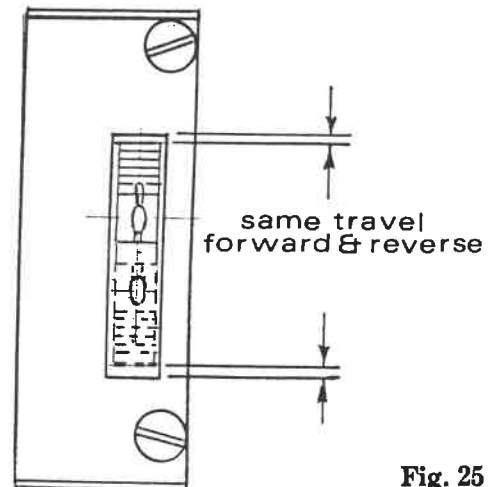


Fig. 25

To effect this adjustment on vertical axis loop taker (hook) machine, adjust machine for longest stitch, loosen clamping screws (C, Fig. 26) at the underside of the machine bed and adjust shaft (D) so that the feed dog ends its travel at the same distance from each end of the slot in the throat plate in both forward and reverse sewing directions. Recheck adjustment and securely tighten screws (C).

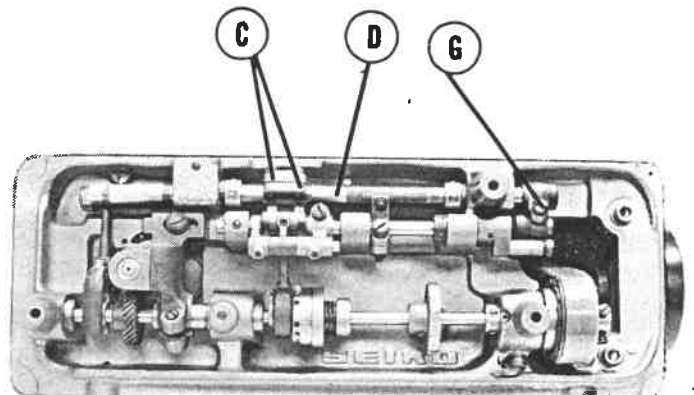
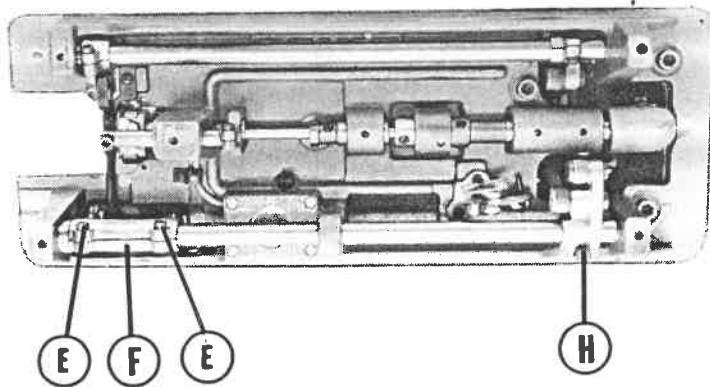


Fig. 26



**Fig. 27**

On machines with horizontal axis loop taker (hook), loosen clamp screws (E) on crank (F, Fig. 27) and rotate crank on its shaft to obtain feed dog travel as described in the preceding paragraph. Be certain to tighten clamp screws upon completion of adjustment.

## Centering the Needle within the Needle Hole

Insert a new needle into the needle bar and tighten needle set screw. Turn handwheel and watch needle enter needle hole in feed dog. Needle should pass through center of needle hole. To make adjustments, proceed as follows:

Set stitch length to 0 or shortest possible stitch and turn handwheel until needle is in a position immediately above the feed dog.

On machines with vertical axis loop takers (hooks), loosen clamp screw "G" (Fig. 26) and, while moving the handwheel, adjust needle bar frame until the needle is centered in the needle hole. Tighten clamp screw "G."

On machines with horizontal axis loop takers (hooks), proceed in same way except that clamp screw "H" (Fig. 27) fixes the position of the needle bar frame and hence that of the needle in the needle hole. Loosen this screw and, after properly positioning the needle within the needle hole, securely tighten clamp screw "H."

## Oiling and Maintenance

Like any other precision-made equipment, sewing machines require a certain degree of attention and care to preserve their continued operating efficiency and to minimize wear and tear.

First of all, keep the machine clean, both at its outside and its underside. At certain intervals, or whenever an accumulation of lint or debris from the sewn material is noticed, wipe the machine with a dry and clean soft rag. Using a ½" wide paint brush, clean the accumulated foreign matter from the underside of the machine bed by tilting the head back on its hinges. On occasion, remove the face plate from the left end of the head and brush out the mechanism exposed beneath the face plate. Replace face plate, tightening its screws.

Oiling should be done at least once a day, preferably at the end of the work day, particularly when working on material which may get soiled by oil. Wipe off excess oil before starting with sewing. If the sewing operation should be continuous throughout the work day, more frequent lubrication is indicated, particularly of the mainshaft bearings and the rotating hook mechanism. A few drops of oil is all that is required, as an excess will only run off and will have to be wiped away.

Use only clear sewing machine oil, not motor oil or any other substances.