

# Service Manual

**SINGER**  
INDUSTRIAL PRODUCTS

# 21G

146  
151  
157  
158  
351  
357  
358  
451  
457  
651  
657  
658

# USE **SINGER**\* OILS and LUBRICANTS

*They insure freedom from lubricating trouble and give  
longer life to sewing equipment*

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*The following are the correct lubricants for this machine:*

**TYPE A** – MANUFACTURING MACHINE OIL, LIGHT GRADE

*When an oil is desired which will produce a minimum of  
stain on fabrics, even after a long period of storage, use:*

**TYPE C** – MANUFACTURING MACHINE OIL, LIGHT GRADE

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## OTHER **SINGER**\* LUBRICANTS

**TYPE E** – THREAD LUBRICANT

For lubricating the needle thread of sewing machines for stitching  
fabrics or leather where a thread lubricant is required.

**TYPE F** – MOTOR OIL

For oil-lubricated motors and plain bearings in power tables and  
transmitters.

NOTE: All the above oils are available in 1 quart and 1 gallon  
tins and 5 gallon drums.

**GEAR LUBRICANT**

This specially prepared grease is recommended for gear lubrica-  
tion on manufacturing sewing machines.

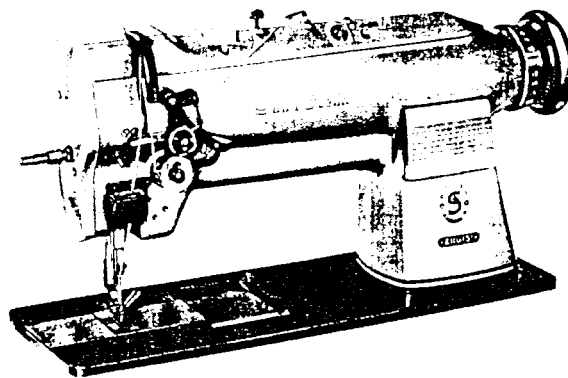
\* A Trademark of THE SINGER COMPANY

# **SINGER<sup>\*</sup>**

# **Service Manual**

**MACHINES**

**211G146, 211G151 AND 211G157,  
158, 351, 357, 358, 451, 457, 651, 657, 658**



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## DESCRIPTION OF MACHINES

The Singer 211G146, 211G151 and 211G157 are high speed, single needle, long arm, precision lockstitch machines, designed for top performance on a variety of medium to heavy weight fabrics.

### GENERAL FEATURES

Vertical axis hook with metered lubrication. Hook can be removed without disturbing hook shaft.

Safety clutch, adjustable to sewing conditions, to prevent hook damage during occasional strain.

Fully automatic lubrication to all moving parts from two reservoirs enclosed in the machine.

Thread lubricator reservoir, inside face plate, filled through oil hole without disturbing face plate.

Adjustable feed driving eccentric located on hook driving shaft, produces a uniform stitch length at all speeds.

Oil reservoir in hook saddle permits controlled lubrication to bobbin case, bobbin case opener mechanism and hook.

Arm shaft, hook shaft, and belt driven bed shaft are mounted in ball bearings at rear and in automatically lubricated plain bearings in front.

Plunger for changing length of stitch is on top surface of bed.

Needle bar and needle bar driving mechanism are lubricated automatically from oil reservoir in machine arm.

Sleeve type take-up.  
 Thread take-up guard.  
 Belt drive.  
 Knee lifter.  
 Needle bar stroke: 1-5/16 inches.  
 Bed: 18-3/4 inches long, 7 inches wide.  
 Space at right of needle: 10-1/2 inches.  
 Federal Stitch Type 301.

Combination of needle feed and drop feed prevents slipping of upper and lower plies of material during sewing, insuring uniform stitching and even plies.

Clearance under presser foot: 1/4 inch. (3/8 inch clearance available on order).

Maximum stitch length: 5 per inch.

## SPECIAL FEATURES

### 211G146 DROP FEED

Primarily for shoes and a variety of leather products.

Ball bearing roller presser.

Clearance under roller presser: 1/4 inch.

Maximum stitch length: 6 per inch.

### 211G151 COMPOUND FEED

Ideal for stitching coats, overalls, rainwear, work-clothes, sports outerwear and similar items.

### 211G157 COMPOUND FEED/REVERSE FEED

Similar to machine 211G151 with addition of feed reversing mechanism controlled by hand or foot. Direction of feed can be reversed at any time, and at any speed. Spring biased reverse lever resumes forward stitching position immediately, when hand or foot pressure is released.

Clearance under presser foot: 1/4 inch. (3/8 inch clearance available on order).

Maximum stitch length: 6 per inch.

The 211 G 158 machine is the same as the 211 G 157 machine, the only variation is the fact that a stitch length of approx. 10 mm can be obtained with this machine, depending on the material sewn.

The maximum speed recommended for this machine (211 G 158) is 1800 rpm.

The 211 G 351; 211 G 357; 211 G 358; 211 G 451; 211 G 457; 211 G 651; 211 G 657 and 211 G 658 machines are compound feed varieties within the machine class 211 G.

Machine	Features	Max. St. Length	Max. Speed
211 G 351	Large Vertical Axis Hook. All other features comply with 211 G 151 machine.	5 SPI = 5 mm	2,700 RPM
211 G 357	Large Vertical Axis Hook. All other features comply with 211 G 157 machine.	6 SPI = 4.2 mm	2,700 RPM
211 G 358	Large Vertical Axis Hook. All other features comply with 211 G 158 machine.	2½ SPI = 10 mm	1,800 RPM
211 G 451	Underbed Thread Trimmer with Thread Wiper. All other features comply with 211 G 151 machine.*	5 SPI = 5 mm	4,000 RPM
211 G 457	Underbed Thread Trimmer with Thread Wiper. All other features comply with 211 G 157 machine.*	6 SPI = 4.2 mm	4,000 RPM
211 G 651	Large Vertical Axis Hook; Underbed Thread Trimmer with Wiper. All other features comply with 211 G 151 machine.*	5 SPI = 5 mm	2,700 RPM
211 G 657	Large Vertical Axis Hook; Underbed Thread Trimmer with Wiper. All other features comply with 211 G 157 machine.*	6 SPI = 4.2 mm	2,700 RPM
211 G 658	Large Vertical Axis Hook; Underbed Thread Trimmer with Wiper. All other features comply with 211 G 158 machine.*	2½ SPI = 10 mm	1,800 RPM

For machines with UTT, Service Manual Form No. 30-349G should be used as supplementary literature.

\* these machines are not equipped with the automatic needle thread lubrication. The lubricating pad has to be soaked manually if needle thread is to be lubricated.

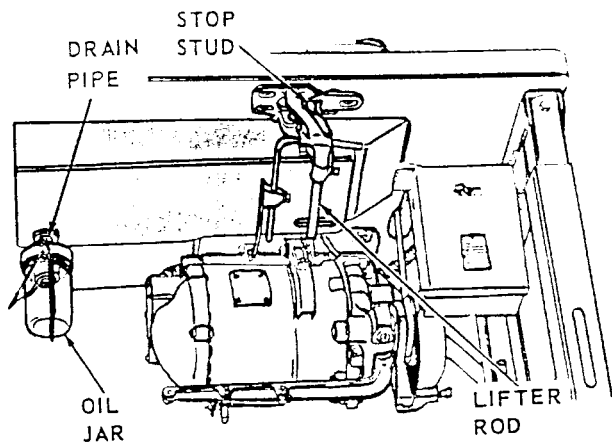


Fig. 2. Installation View

## INSTALLATION

Fasten drip pan to table with its left end even with left end of cut-out. Fasten knee lifter bracket in location shown in Fig. 2 Assemble it so that lifter rod does not strike drip pan. Screw slots in bracket provide necessary adjustment. Set stop-stud to stop the action of knee lifter as soon as presser foot is raised enough to trip hand lever. Screw drain pipe into drain hole in drippan and attach oil jar as shown.

## LUBRICATION

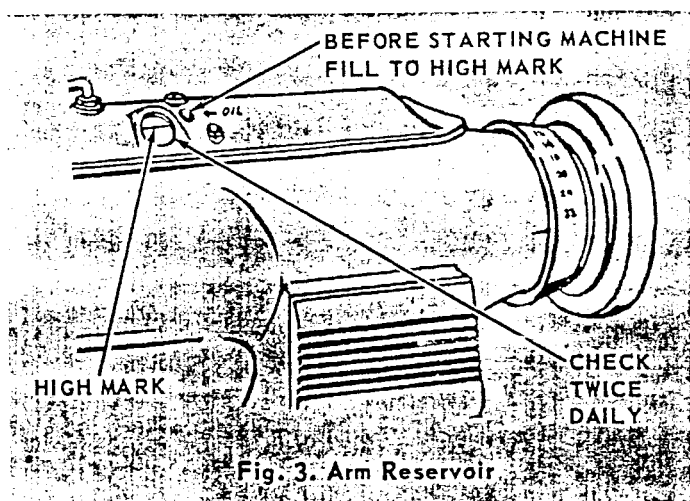


Fig. 3. Arm Reservoir

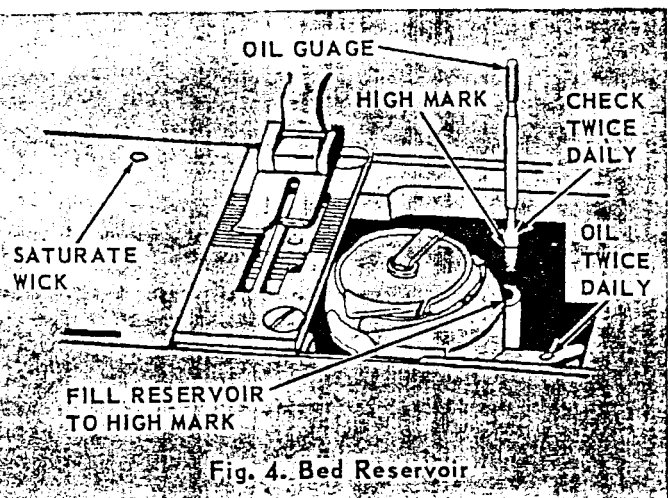


Fig. 4. Bed Reservoir

All moving parts are lubricated from two reservoirs enclosed in the machine.

Before starting the machine, all reservoirs should be filled and critical areas lubricated.

FILL THREAD LUBRICATOR RESERVOIR WITH SINGER\* THREAD LUBRICANT "TYPE E"

**ON**  
WHEN MACHINE IS RUNNING

**OFF**  
WHEN MACHINE IS IDLE

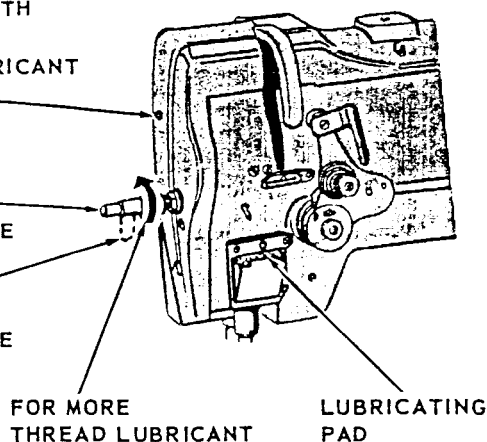


Fig. 5. Thread Lubrication

Use Singer Oil "Type A" or "Type C" for arm reservoir and hook saddle reservoir.

Fill machine arm reservoir to high mark on oil sight as indicated in Fig. 3.

The machine arm reservoir contains an oil vibrating pump which releases oil only when the machine is operating.

Remove oil gauge as shown in Fig. 4 and fill hook saddle reservoir to full mark on gauge. Lubricate hook gears and opener gears by applying a generous supply of oil to oil holes indicated in Fig. 4.

Use Singer Oil "Type E" for thread lubricator reservoir. Fill thread lubricator reservoir through oil hole in face plate as shown in Fig. 5. THREAD LUBRICATOR CONTROLLER MUST BE ON WHEN MACHINE IS OPERATING AND OFF WHEN MACHINE IS IDLE. To increase thread lubrication, turn controller in counterclockwise direction as shown in Fig. 5.

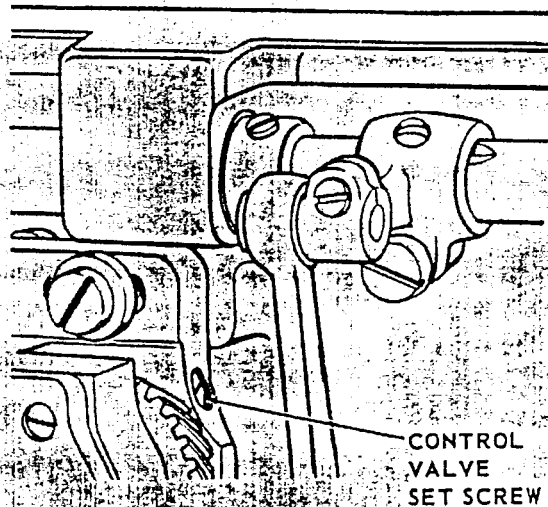


Fig. 6. Hook Lubrication (Step One)

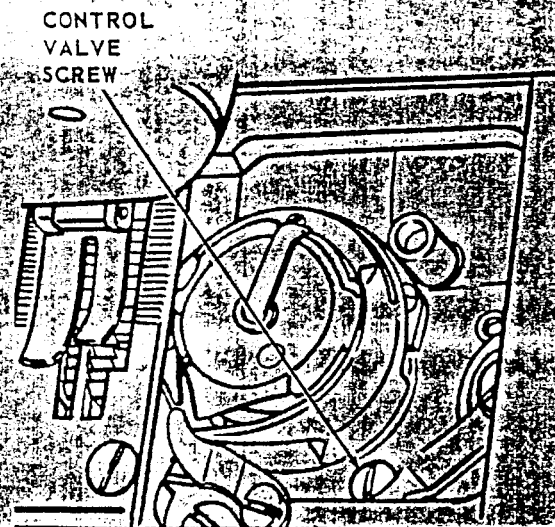


Fig. 7. Hook Lubrication (Step Two)

## HOOK LUBRICATION

The bobbin case raceway is lubricated by oil pumped from the hook saddle reservoir while the machine is operating. The amount of oil received by hook raceway is very important. To check this, first remove bobbin case. Then with the machine running, hold a small piece of white paper near the hook for about 10 seconds. A distinct spray of oil should be visible on the paper.

If there is no trace of oil or an excess of oil on the paper, proceed with the following steps:

1. Tip machine and loosen control valve set screw shown in Fig. 6 and return machine to upright position.
2. Turn control valve screw shown in Fig. 7 clockwise for more oil; counterclockwise for less oil. Re-tighten control valve set screw.

A short test run of at least a minute should be made between adjustments to insure uniform oil flow. After each adjustment of oil control valve screw, oil control valve set screw should be securely tightened.

## SPEED

Maximum speed for machine 211G146 is 3500 stitches per minute.

## SPEED

Maximum speed for machines 211G151 and 211G157 is 4000 stitches per minute.

Maximum efficient speed is dependent upon the nature of the operation, the ability of the operator and the type of material being sewn.

Never run a new machine at maximum speed immediately following a new installation. A speed of 500 stitches per minute less than maximum is recommended for the first 100 hours of operation.

## NEEDLES

For machine 211G146, use Singer Needles, Catalog 1740.

For Machines 211G151 and 211G157, use Singer Needles, Catalog 1901 for 1/4 inch clearance under presser foot and Catalog 3355 for 3/8 inch clearance.

Size of needle for a particular operation is determined by size of thread and type of material to be sewn.

Orders for needles should state quantity required, size number and catalog number.

For example:

100 Needles, Size 14, Catalog 1740

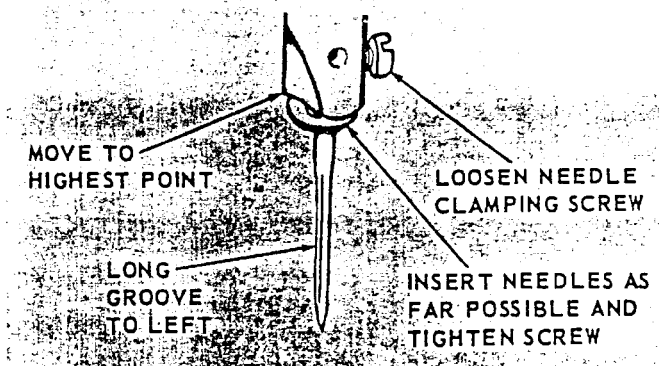


Fig. 8. Needle Setting

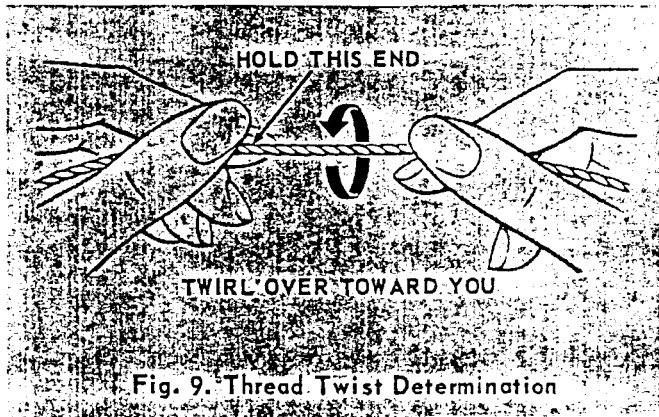


Fig. 9. Thread Twist Determination

### SETTING THE NEEDLE

1. Turn machine pulley over toward you until needle bar is at highest position as shown in Fig. 8.
2. Loosen needle clamping screw
3. Insert needle into needle bar to highest position, with long groove of needle to left of operator and eye of needle parallel to machine arm.
4. Tighten clamping screw.

### THREAD

Left twist thread should be used in needle.

Either left or right twist thread can be used in bobbin.

To determine thread twist, hold thread as shown in Fig. 9. With left hand holding one end of thread, twirl other end with thumb and forefinger of right hand over toward you. If left twist thread, strands will wind tighter. If right twist thread, strands will unwind or separate.

### UPPER THREADING

Turn machine pulley over toward you until needle bar is at highest position.

Pass thread through threading points as indicated

in Fig. 10.

Draw about 2 inches of thread through needle eye to start sewing.

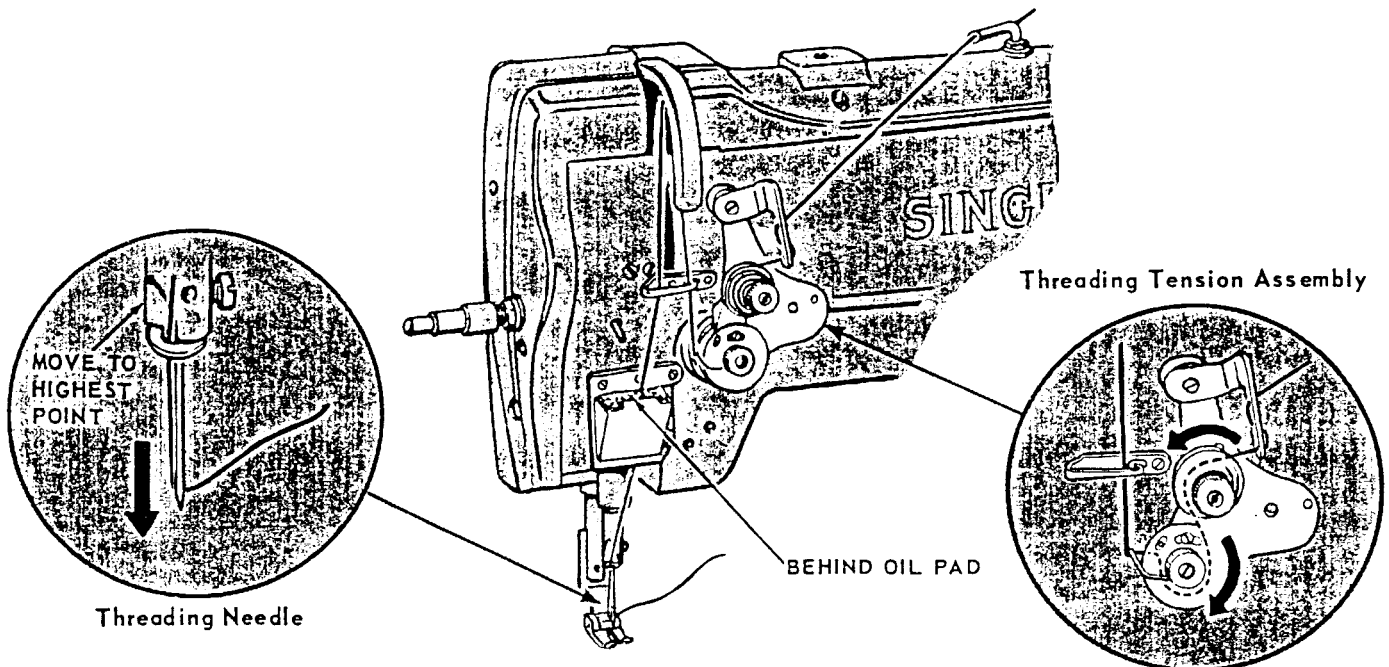


Fig. 10. Upper Threading

## LOWER THREADING

### BOBBIN REMOVAL

1. Open slide plate in bed of machine
2. Turn machine pulley over toward you until needle bar reaches highest position.
3. Raise bobbin latch and lift out bobbin as indicated in Fig. 11.

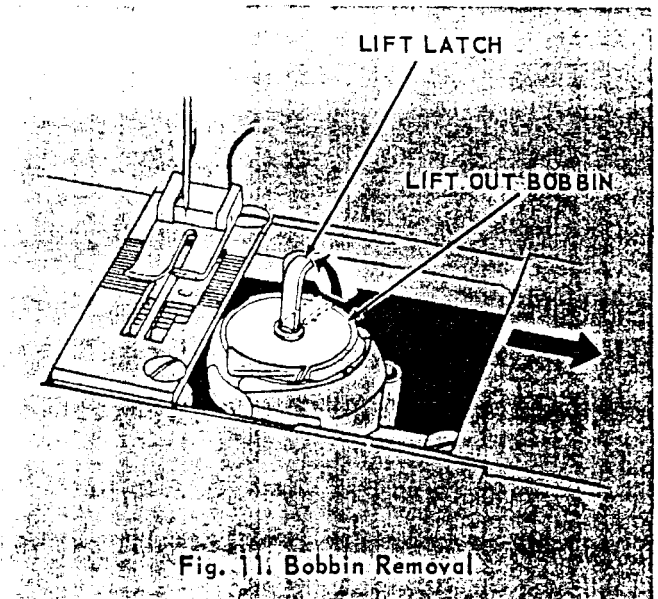


Fig. 11. Bobbin Removal

### BOBBIN WINDING

Attach bobbin winder to table with driving pulley in front of belt as shown in Fig. 12.

Securely place bobbin on bobbin winder spindle. Pass thread through thread guide, then around and between tension discs as shown. Wind thread clockwise around bobbin a few times as indicated in Fig. 12.

Move bobbin winder pulley over against machine belt and start machine.

The amount of thread to be wound on bobbin is regulated by screw B, Fig. 12. To wind more thread on bobbin, turn screw B inward. For less thread on bobbin, turn screw B outward. This screw should be regulated to stop bobbin winder spindle when thread on bobbin is 1/16 inch short of bobbin rim.

If thread winds unevenly on bobbin, loosen tension bracket screw A, Fig. 12, and move bracket to right or left to obtain even winding.

Adjusting knurled nut C, Fig. 12, regulates tension of thread being wound on bobbin. For fine thread, use light tension.

Bobbins may be wound while machine is stitching.

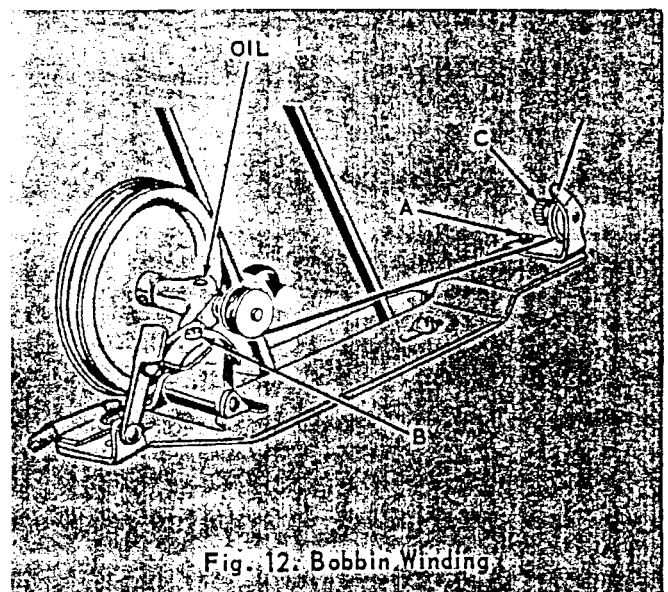


Fig. 12. Bobbin Winding

### BOBBIN REPLACEMENT

Place bobbin on center stud with thread wound in counterclockwise direction as shown in Fig. 13. Draw about 2 or 3 inches of thread from bobbin.

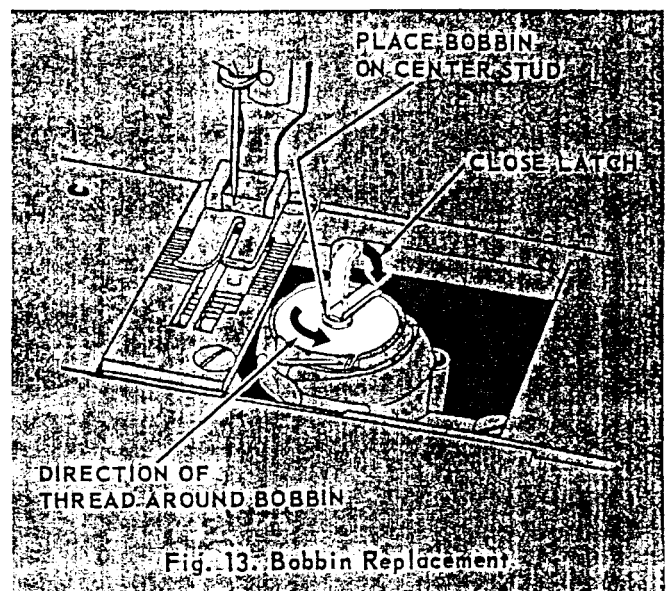


Fig. 13. Bobbin Replacement

## THREADING BOBBIN CASE

Draw thread through slot in edge of bobbin case as shown in Fig. 14, then to the left and under projection as shown in Fig. 15, leaving about two inches

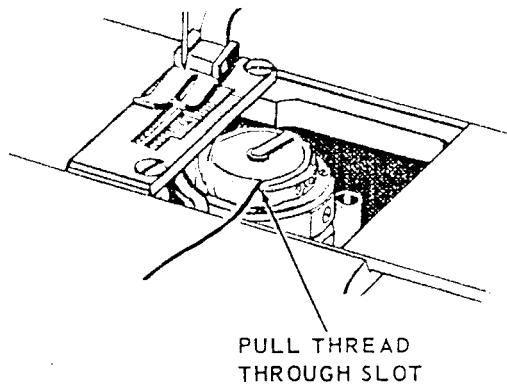


Fig. 14. Bobbin Threading (Step One)

of thread above the slide to start sewing. Close slide, leaving just enough space for thread to pass freely.

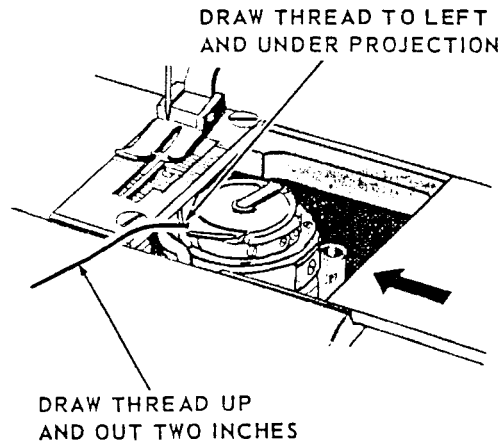


Fig. 15. Bobbin Threading (Step Two)

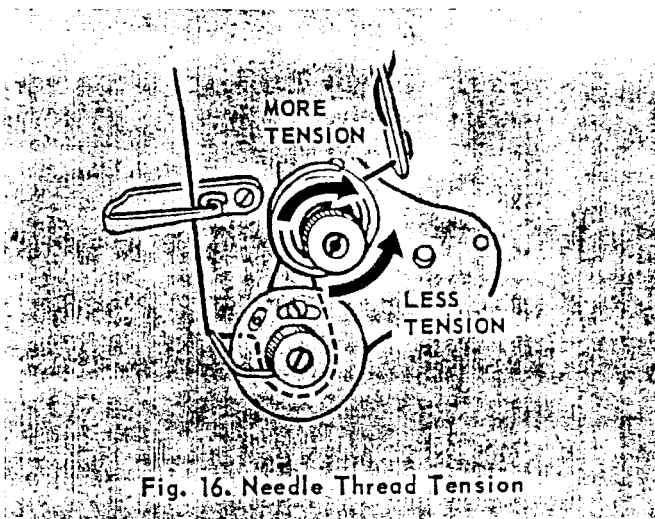


Fig. 16. Needle Thread Tension

### THREAD TENSIONS

Tension on thread should be as light as possible yet sufficient to correctly set stitches in material.

### NEEDLE THREAD TENSION

Regulate needle thread tension only when presser foot is down. To increase tension, turn thumb nut shown in Fig. 16, clockwise. To decrease tension turn this thumb nut counterclockwise.

### BOBBIN THREAD TENSION

Bobbin thread tension is regulated by the screw nearest to the center of tension spring on the outside of the bobbin case shown in Fig. 17. Turn machine pulley slowly until screw is accessible. To increase tension, turn screw inward. To decrease tension, turn screw outward.

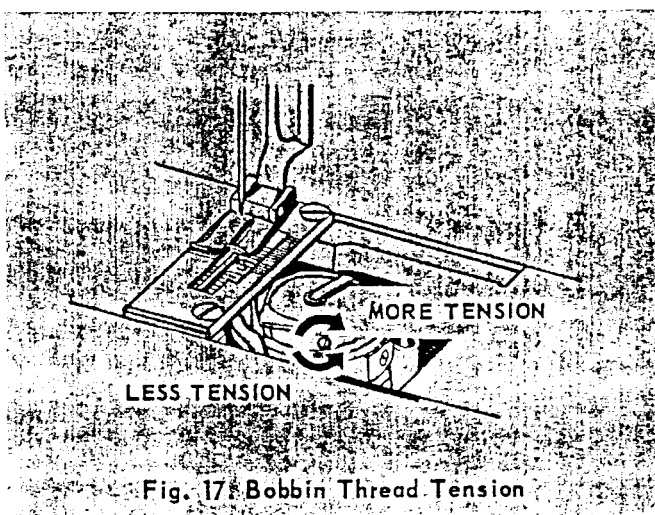


Fig. 17. Bobbin Thread Tension

### THREAD CONTROLLER

The thread controller should draw up slack thread before needle point enters fabric, to prevent needle from penetrating thread.

To adjust thread controller, loosen set screws A and B, shown in Fig. 18. Turn thread controller spring stop counterclockwise for more controller action on thread or clockwise for less action. Tighten set screws A and B.

Thread controller action TENSION should be increased for heavy thread and decreased for light thread.

To adjust thread controller action tension, loosen set screws B and C shown in Fig. 18. Turn tension stud slightly counterclockwise for more tension or clockwise for less tension. Tighten set screws B and C.

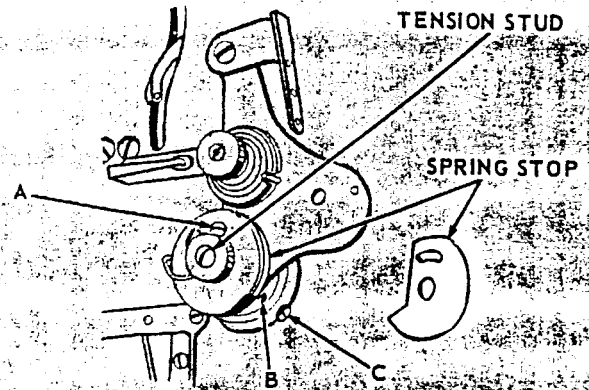


Fig. 18. Thread Controller Adjustment

### STITCH LENGTH REGULATION

1. With machine OFF, depress button shown in Fig. 19 on bed surface. NEVER DEPRESS BUTTON WHEN MACHINE IS ON.
2. Turn machine pulley over toward you slowly until button drops (snaps) into position.
3. Turn machine pulley in direction (+) when a longer stitch is desired (less SPI) and in direction (-) when a shorter stitch is desired (more SPI).
4. Release button. NEVER START MACHINE UNTIL BUTTON IS RELEASED.

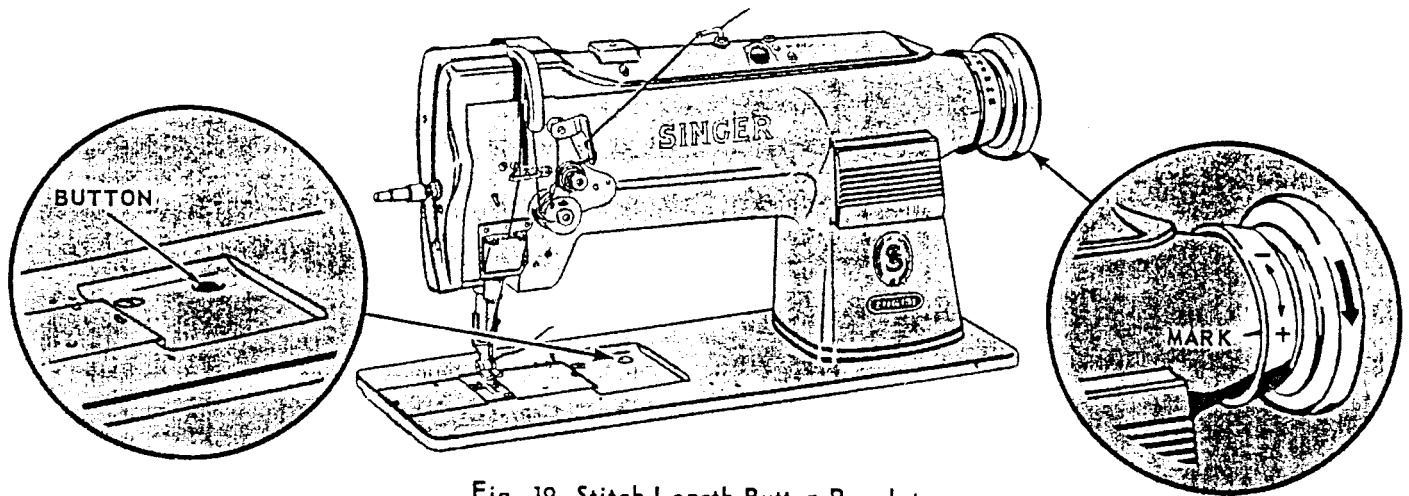


Fig. 19. Stitch Length Button Regulator

### PRESSURE ON MATERIAL

Pressure of roller presser or presser foot on material should be as light as possible while being sufficient to insure correct feeding.

Pressure is regulated by screw shown in Fig. 20 at rear of machine arm. Turn screw downward to increase pressure or upward to decrease pressure.

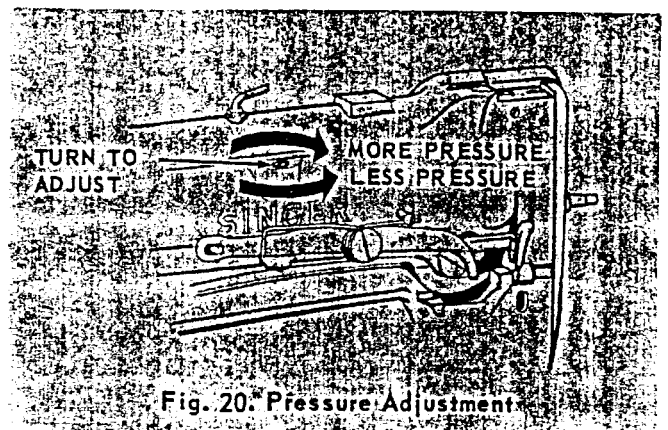


Fig. 20. Pressure Adjustment

## ADJUSTMENTS

### SETTING LOWER NEEDLE BAR BUSHING (211G146)

The correct gauge distance from throat plate seat to bottom of needle bar bushing is 2.738 inches, as indicated in Fig. 21.

To adjust needle bar bushing, loosen bushing set screw shown in Fig. 21 and set bushing at correct distance from throat plate seat. Re-tighten bushing set screw.

### SETTING NEEDLE BAR HEIGHT (211G146)

Remove face plate, slide plate and throat plate.

When needle bar is at lowest position of its cycle, the correct gauge distance from throat plate seat to needle stop in needle bar is .984 inches, as indicated in Fig. 22.

Needle bar is correctly set when, at the lowest position of its cycle, the upper timing mark is level with bottom edge of needle bar bushing.

If needle bar is not correctly set, loosen needle bar clamping screw shown in Fig. 22 and correct needle bar position. Re-tighten needle bar clamping screw.

### SETTING NEEDLE BAR (211G151 AND 211G157)

When needle bar is at lowest position of its cycle, the correct gauge distance from throat plate seat to needle stop in needle bar is .973 inches, as indicated in Fig. 23.

Needle bar is correctly set when, at the lowest position of its cycle, the upper timing mark is just visible at lower edge of needle bar frame as shown in Fig. 23.

If needle bar is not correctly set, loosen needle bar connecting stud pinch screw shown in Fig. 23 and correct needle bar position. Re-tighten needle bar connecting stud pinch screw.

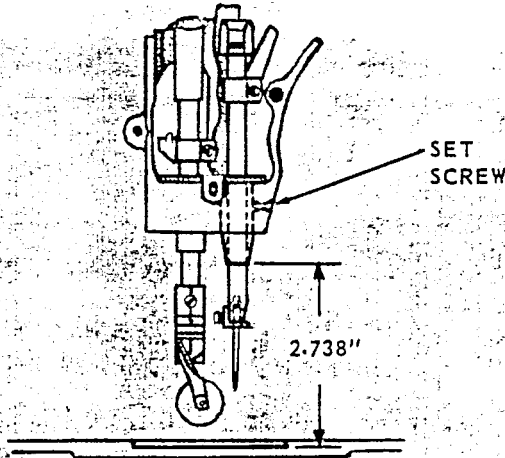


Fig. 21. Needle Bar Bushing Adjustment

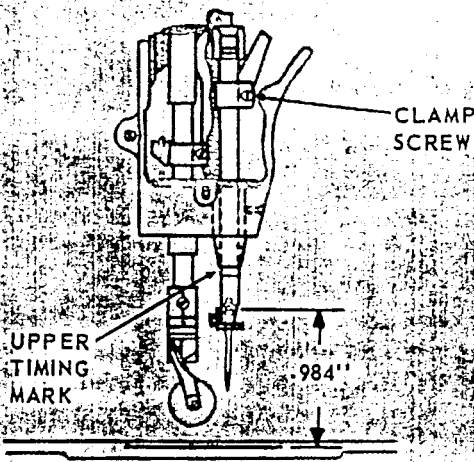


Fig. 22. Needle Bar Height Adjustment

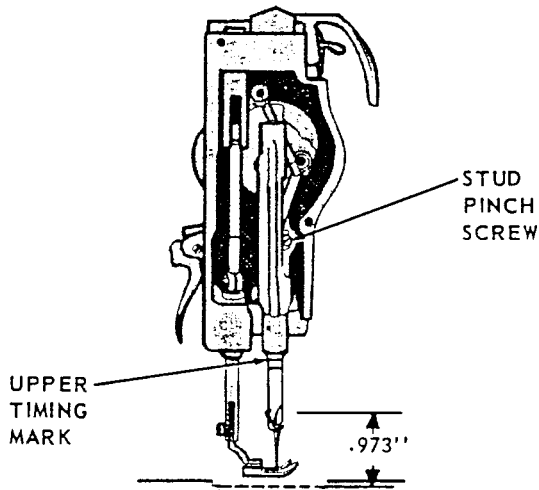


Fig. 23. Needle Bar Adjustment

## DISTANCE OF NEEDLE BAR FROM PRESSER BAR (211G151 AND 211G157)

The distance between needle bar and presser bar (after regulating stitch length so that there is no feed movement) should be  $17/32$  inch as shown in Fig. 24.

If the distance between needle bar and presser bar is more or less than  $17/32$  inch, first turn machine pulley over toward you until needle bar is at highest position. Remove cover plate from front of machine arm after removing screw (directly behind cover plate) in rear of machine. Loosen needle bar frame clamp screw shown in Fig. 25. Move needle bar frame forward or backward to correct its position. Re-tighten clamp screw.

Distance between needle bar and presser bar should be  $37/64$ " (14.68 mm) in the case of 211 G 158 machines.

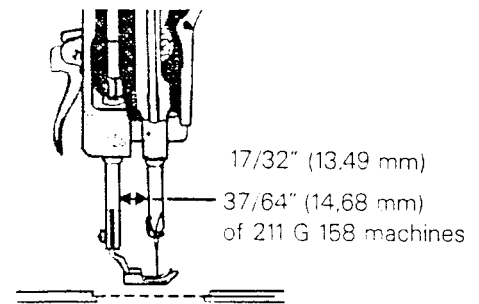


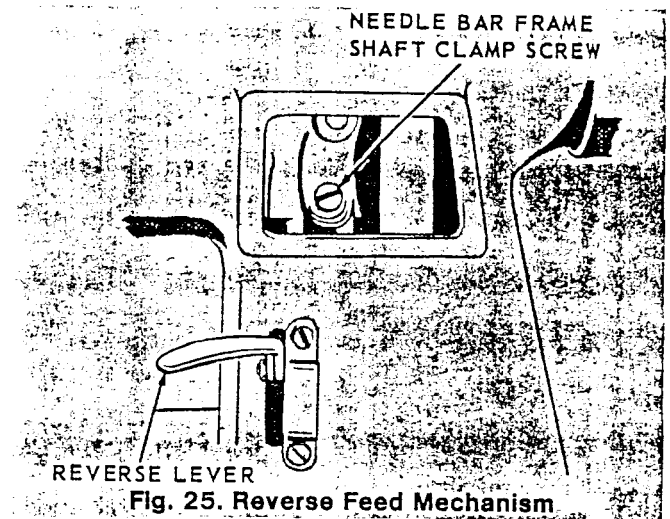
Fig. 24. Distance Between Needle Bar and Presser Bar

## REVERSE FEED MECHANISM (211G157)

To reverse feed direction by hand, push reverse lever completely down in order to have same stitch length as in forward stitching position.

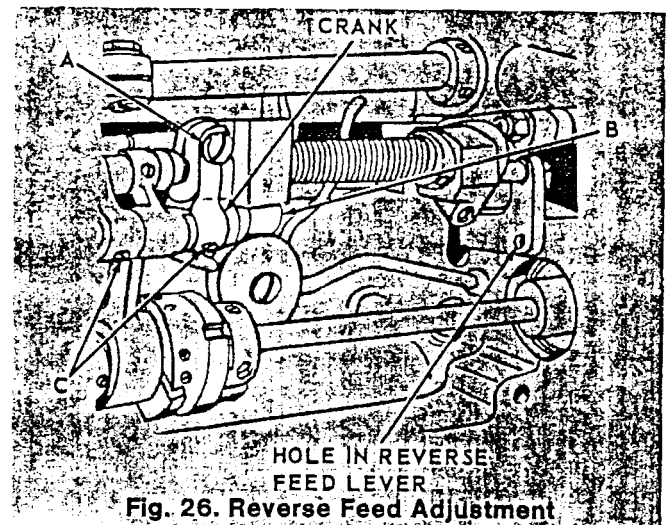
To reverse the feed with foot treadle, the foot treadle chain should be connected to hole in reverse feed lever shown in Fig. 26.

Release hand lever or foot treadle only when you wish to resume forward stitching.



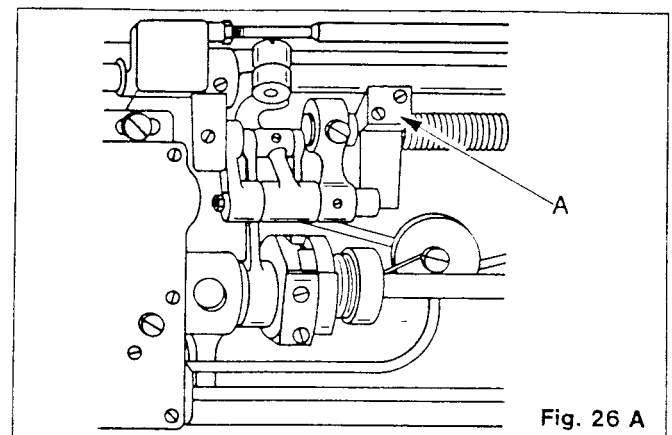
## ADJUSTING FEED REVERSING MECHANISM

Adjust stitch length to 5 stitches per inch. Loosen screw A and adjust crank shown in Fig. 26 so that needle will penetrate fabric 5 times in each inch of stitching. When you depress the reversing lever, the eccentric head of the bearing pin B should rest against the bearing block. Loosen set screws C and turn bearing pin B until the stitch length is the same in reverse feed as in forward feed. Tighten all screws.



## 211G158 only

The maximum stitch length of approx. **10 mm** is being limited by the Feed Reversing Shaft Crank Hinge Stud Stop „A“. Fig. 26A. In reverse feed the stitch length is only approx. 1/3 of the forward feed stitch length.



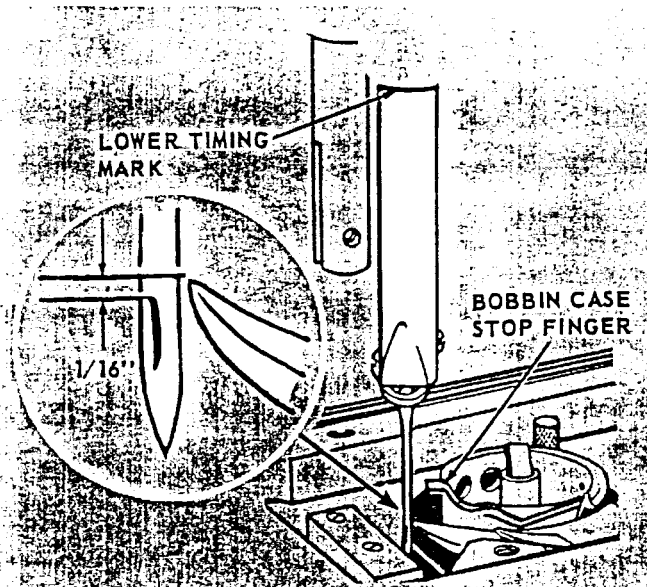


Fig. 27. Sewing Hook Height Adjustment (Step One)

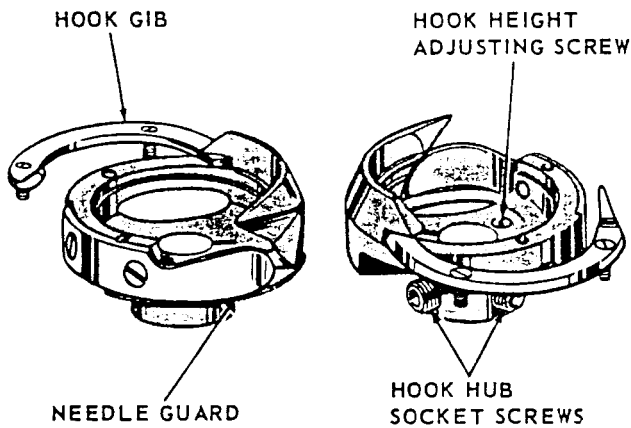


Fig. 28. Sewing Hook Height Adjustment (Step Two)

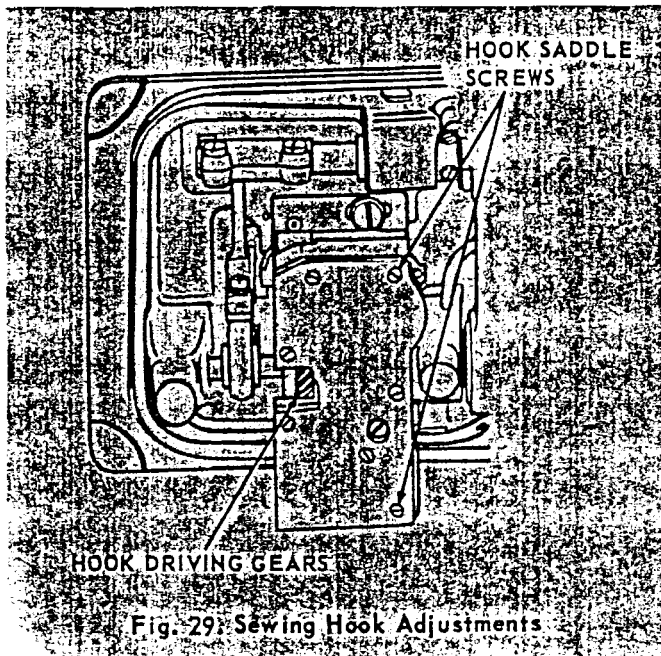


Fig. 29. Sewing Hook Adjustments

## ADJUSTMENT OF SEWING HOOK HEIGHT

When lower timing mark on needle bar is just visible at lower end of needle bar frame on upward stroke of needle, the hook should pass about 1/16 inch above upper edge of needle eye as shown in Fig. 27.

To adjust height of sewing hook, first fasten throat plate to bed of machine and place bobbin case stop finger in sewing position. Pass a .032 inch shim between bobbin case stop finger and throat plate. If shim is too tight or too loose, turn machine pulley over toward you so that the hook hub socket screws shown in Fig. 28 are accessible with a socket wrench. Loosen both screws and remove cloth washer from bobbin case. Turn bobbin case until one of the holes is in line with hook height adjusting screw. To raise hook, turn hook height adjusting screw downward. To lower hook, turn hook height adjusting screw up. Retighten socket screws and turn hook height adjusting screw again just enough to leave a light tension. Check sewing hook timing.

## ADJUSTMENT OF DISTANCE BETWEEN SEWING HOOK AND NEEDLE

To prevent hook point from dividing strands of thread, it should pass as near to the needle as possible without hitting it.

Turn machine pulley over toward you until sewing hook point is in the position nearest to needle. Tip machine and loosen hook saddle screws shown in Fig. 29. Adjust hook saddle until hook point is as close to needle as possible without hitting it. Retighten hook saddle screws **BE SURE HOOK DRIVING GEARS SHOWN IN FIG. 29 ARE CORRECTLY SET WITH RELATION TO FACE OF HOOK SADDLE. USE .008 INCH SHIM.**

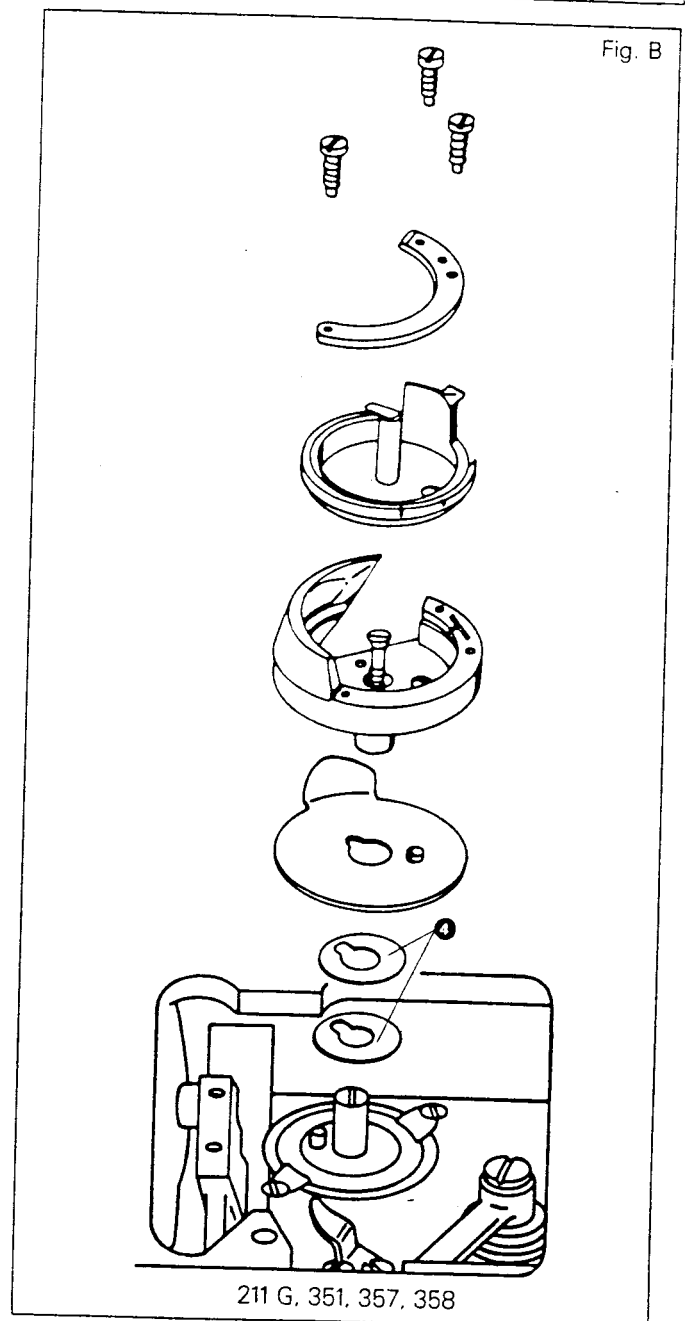
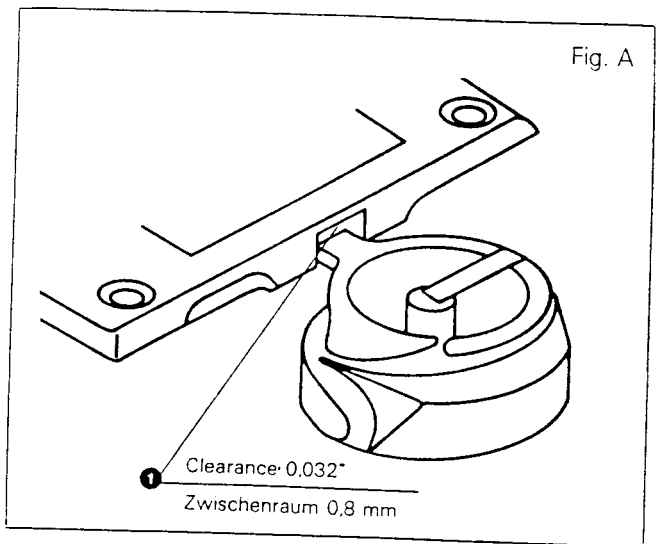
The function of the needle guard shown in Fig. 28 is to prevent hook point from striking needle, if needle is deflected after penetrating material. The needle guard can be bent with a pair of pliers, if necessary, but care should be taken to prevent guard from interfering with normal path of needle.

### Hook Height (Fig. A) 211 G 351, 357, 358

The height adjustment of the hook serves to achieve the proper clearance ❶ between the throat plate and the bobbin case stop.

### Adjustment (Figs. A and B)

1. Loosen and remove hook as instructed on page 14a.
2. Adjust hook height by adding or removing washers ❷. (Four washers can be added at the most!)
3. Replace and fasten hook as instructed on page 14a.
4. Check hook height in compliance with Fig. A thereby ensuring that the throat plate is properly seated.



## TIMING THE SEWING HOOK

Regulate stitch length so that there is no feeding motion.

Remove throat plate and turn machine pulley over toward you until lower timing mark on needle bar is just visible at lower edge of needle bar frame on upward stroke of needle. With needle in this position, sewing hook is correctly timed if hook point is at vertical centerline of needle blade.

If sewing hook is not correctly timed, loosen socket screws shown in Fig. 30 and turn to proper timing position specified above.

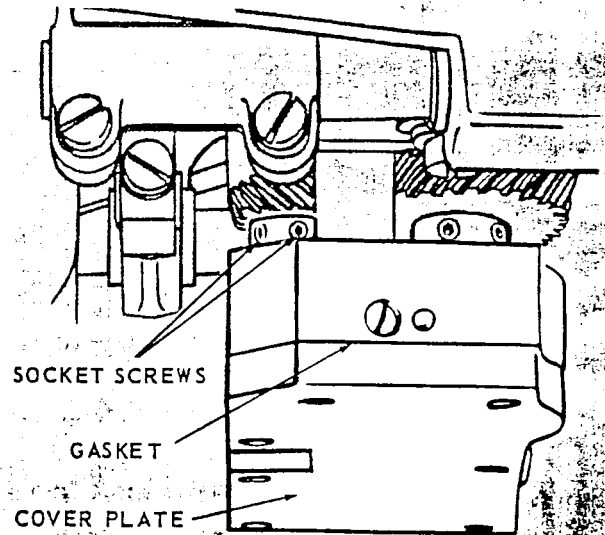


Fig. 30. Sewing Hook Timing Adjustment

## REMOVING BOBBIN CASE FROM SEWING HOOK

Remove hook gib screws, indicated in Fig. 31(a), from sewinghook. Lift off hook gib and remove bobbin case.

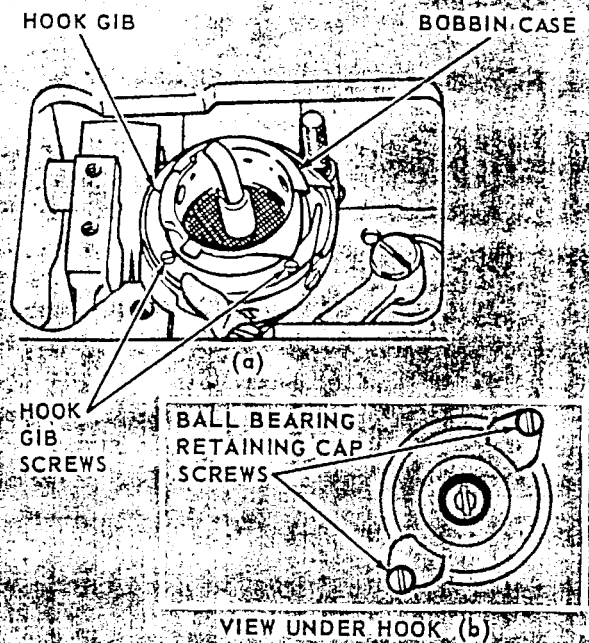


Fig. 31. Bobbin Case Removal

## REMOVING SEWING HOOK FROM MACHINE

Remove presser foot, throat plate and feed dog. Loosen hook hub socket screws shown in Fig. 32. Lift hook off end of shaft.

To remove hook shaft, first remove ball bearing retaining cap screws directly under hook shown in Fig. 31(b). Tip machine back and loosen hook shaft gear hub socket screws shown in Fig. 30. Lift out shaft from top end. If shaft does not lift out easily, loosen screws in cover plate of hook saddle just enough, at first, to permit the oil to drain out. Then remove cover plate completely, being careful not to damage the gasket. Tap the end of hook shaft.

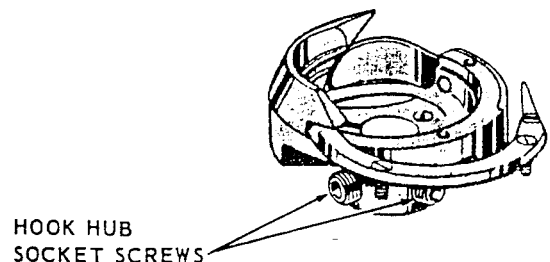


Fig. 32. Bobbin Case Removal

## REPLACING SEWING HOOK

**CAUTION:** The hook is equipped with a screw in the hub for adjusting the vertical position of the hook relative to the throat plate seat. This position is set with a gauge at the factory. WHEN REPLACING A HOOK, CARE MUST BE TAKEN TO SEE THAT THE BOBBIN CASE STOP FINGER, SHOWN IN FIG. 33, FITS CORRECTLY IN THE THROAT PLATE. For correct adjustment, see instructions concerning hook height adjustment on page 12.

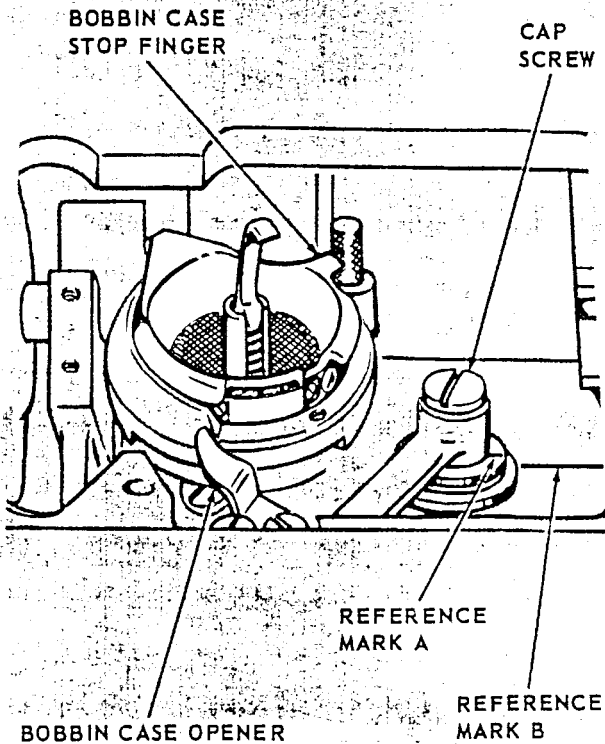


Fig. 33. Bobbin Case Opener Adjustment

## ADJUSTING BOBBIN CASE OPENER

The bobbin case opener, shown in Fig. 33, should be set so that it touches the bobbin case as lightly as possible and turns the bobbin case enough to make a sufficient opening for the free passage of thread between throat plate and bobbin case.

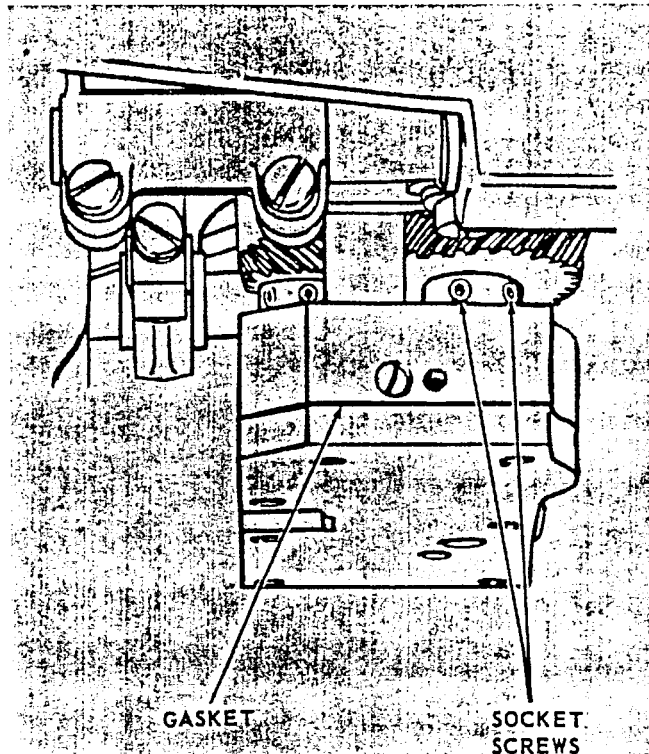


Fig. 34. Bobbin Case Opener Timing

## TIMING BOBBIN CASE OPENER

Turn machine pulley over toward you until lower timing mark on needle bar is even with edge of needle bar frame on upward stroke of needle. When needle bar is in this position, reference mark A should line up with reference mark B on hook saddle, as indicated in Fig. 33. If opener shaft is out of time, tip machine back and loosen socket screws shown in Fig. 34. Return machine to upright position and turn opener driving shaft with screw driver in cap screw shown in Fig. 33. Tighten socket screws in opener driving gear hub.

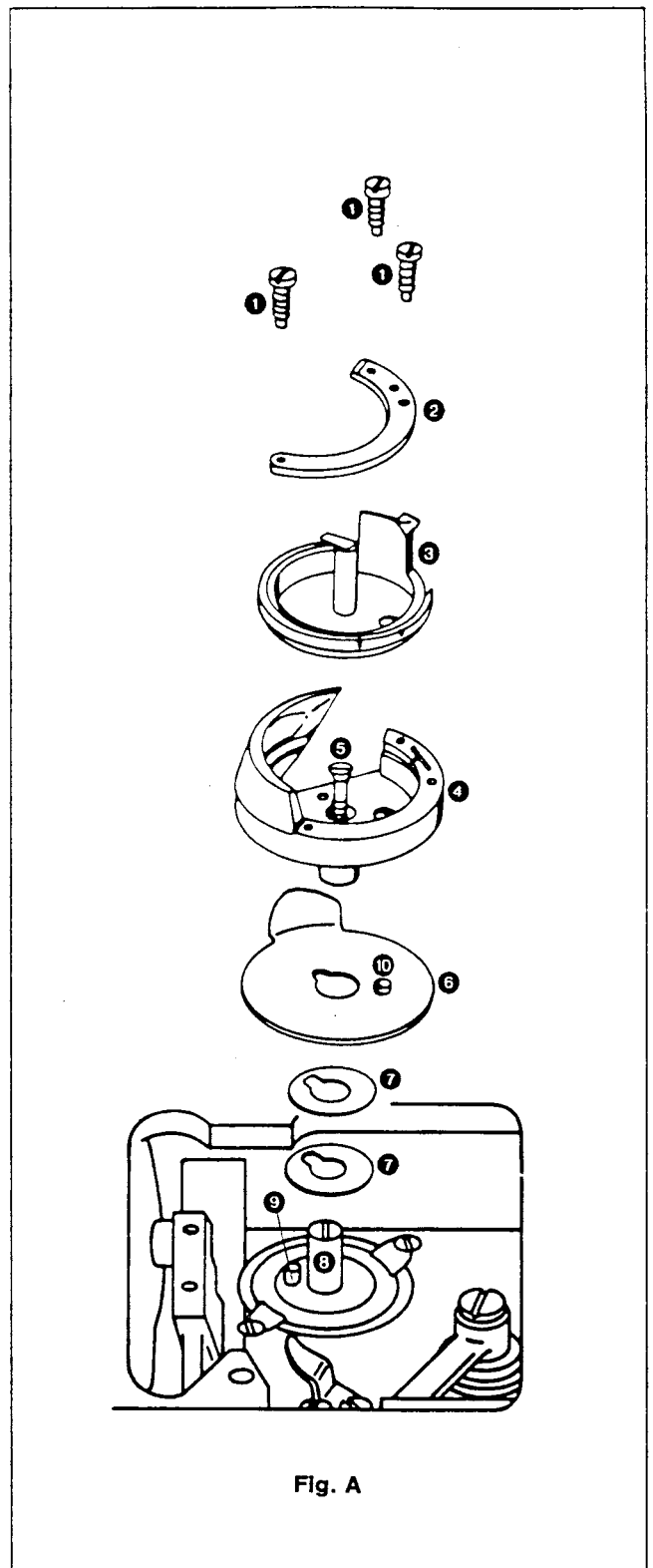
**Hook Fig. A (211 G 351, 357, 358)**

**Removal**

1. Remove presser feet, throat plate and feed dog.
2. Remove bobbin case and bobbin.
3. Turn out screws ① and remove hook gib ②.
4. Remove bobbin case base ③ from hook ④.
5. Turn out screw ⑤.
6. Remove hook ④ with needle guard ⑥ from machine.

**Replacement**

1. Check proper seat of disc ⑦ on the hook shaft ⑧.
2. Fasten needle guard ⑥ on the hook by placing its stop ⑩ into the appropriate hole of the hook ④.
3. Place needle guard ⑥ together with hook ④ onto the hook shaft ⑧ so that the pin ⑨ is seated in the appropriate hole of the hook.
4. Tighten screw ⑤.
5. Place bobbin case base into hook ④.
6. Replace hook gib and fasten with screws ①.
7. Replace bobbin case and bobbin.
8. Replace feed dog, throat plate and presser feet.



**Fig. A**

## FEED DOG ADJUSTMENT

Before adjusting feed dog, regulate stitch length for longest stitch. If feed dog is correctly adjusted, all teeth should rise evenly and completely above throat plate as shown in Fig. 35.

If adjustment is required, first remove throat plate, then tip machine back and turn machine pulley over toward you until feed dog is at its highest position. Loosen fork screw shown in Fig. 36 and raise or lower feed dog to correct position. Re-tighten fork screw.

When adjusting feed dog, make certain it does not strike sewing hook.

Feed dog should be set so that when needle is at lowest position of cycle, it will be slightly in front of center point of needle hole in feed dog. If needle is not correctly located in needle hole, tip machine back to loosen pinch screws shown in Fig. 36 and adjust feed dog to correct position. After securely re-tightening pinch screws, check for correct positions of needle bar and presser bar.

## FEED ECCENTRIC ADJUSTMENT

The feed eccentric is provided with a gib which can be adjusted to take up unnecessary play between feed eccentric and eccentric body. To adjust gib, first loosen two locking screws beside gib and turn in two adjusting screws in gib until all play is eliminated and eccentric fits snugly into slot of eccentric body. Securely tighten two locking screws.

The feed driving eccentric adjusting disc spring provides pressure against feed eccentric cam to prevent it from moving out of position while the machine is operating. The disc spring collar may be moved to right or left to adjust spring pressure. Normally, collar is set flush with hub of eccentric body.

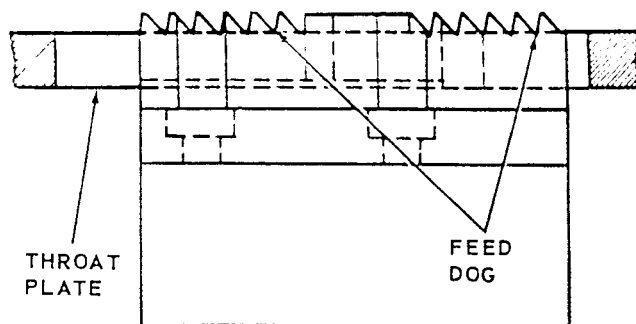


Fig. 35. Feed Dog and Throat Plate

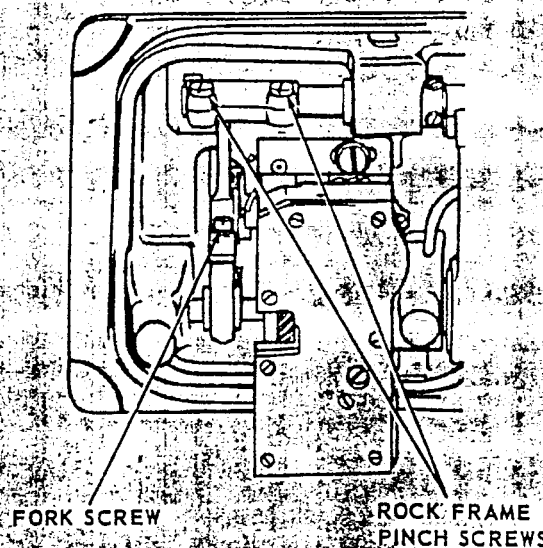


Fig. 36. Feed Adjustments

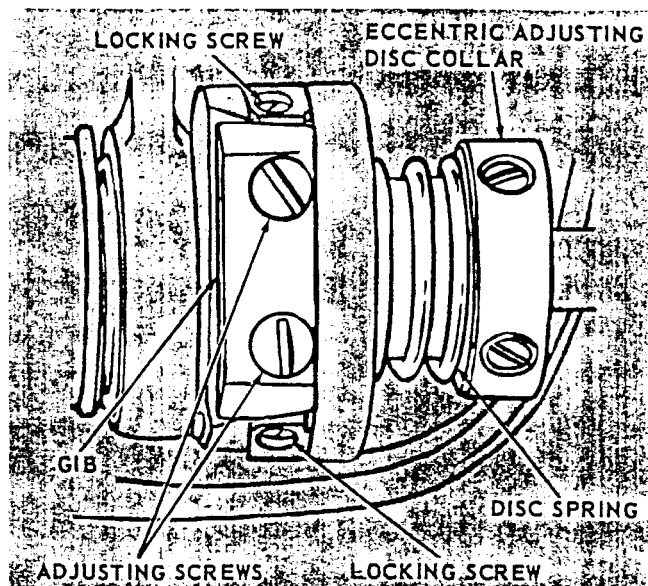


Fig. 37. Feed Eccentric Adjustment

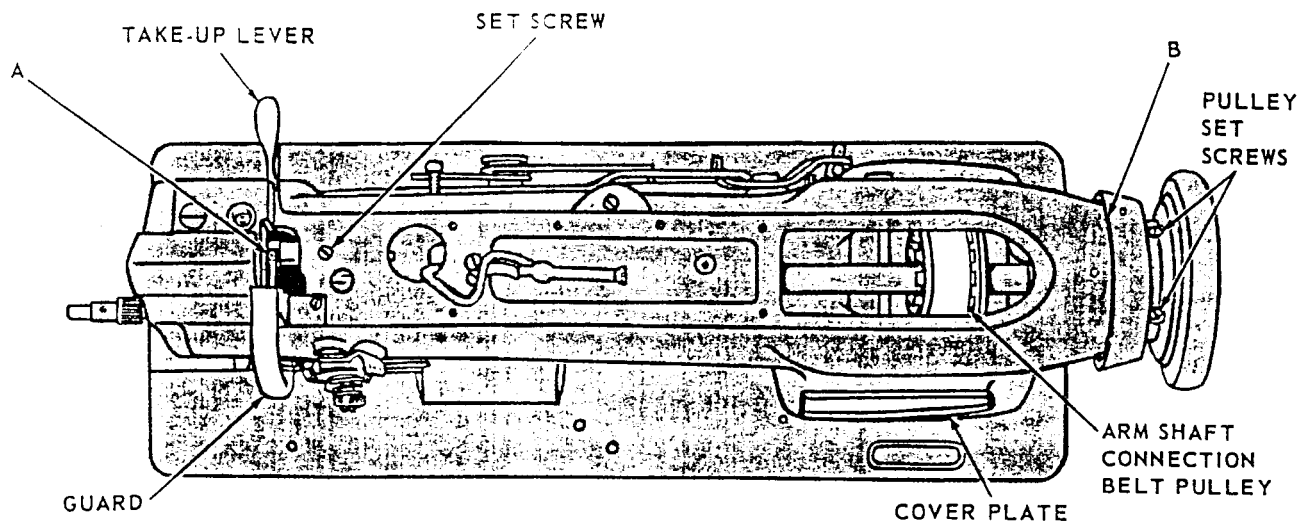


Fig. 38. Take-up Lever Removal

### REMOVAL OF TAKE-UP LEVER

Remove arm top cover and face plate. Loosen take-up lever hinge stud set screw shown in Fig. 38. Remove take-up lever hinge stud and take-up guard. Lift take-up lever out through slot A in top of arm shown in Fig. 38.

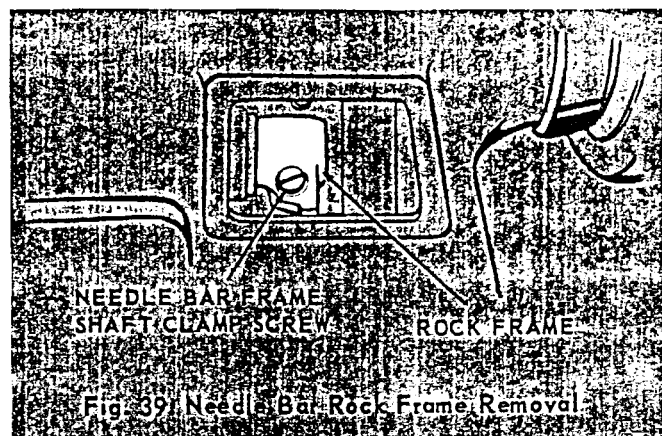


Fig. 39. Needle Bar Rock Frame Removal

### REMOVAL OF NEEDLE BAR ROCK FRAME

Remove face plate and arm top cover. Loosen take-up lever hinge stud set screw shown in Fig. 38. Extract take-up lever hinge stud, take-up guard and take-up lever. Remove cover from front of machine arm after removing a screw (directly behind cover plate) in rear of machine. Loosen needle bar frame shaft clamp screw shown in Fig. 39. Pull needle bar rock frame with its shaft from machine.

### REPLACEMENT OF ARM SHAFT CONNECTION BELT

Remove needle, to avoid damage, before proceeding to replace belt. Tip machine and slide belt off lower pulley shown in Fig. 40. Loosen two set screws in machine pulley and remove pulley and ball bearing. Lift belt up and draw it around arm shaft through space at B indicated in Fig. 38.

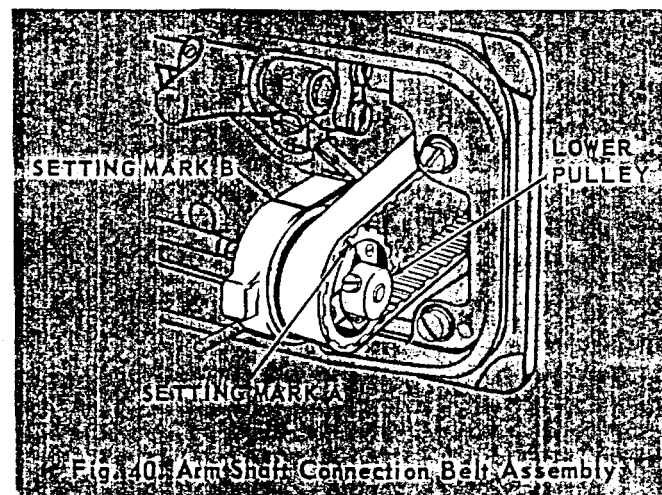


Fig. 40. Arm Shaft Connection Belt Assembly

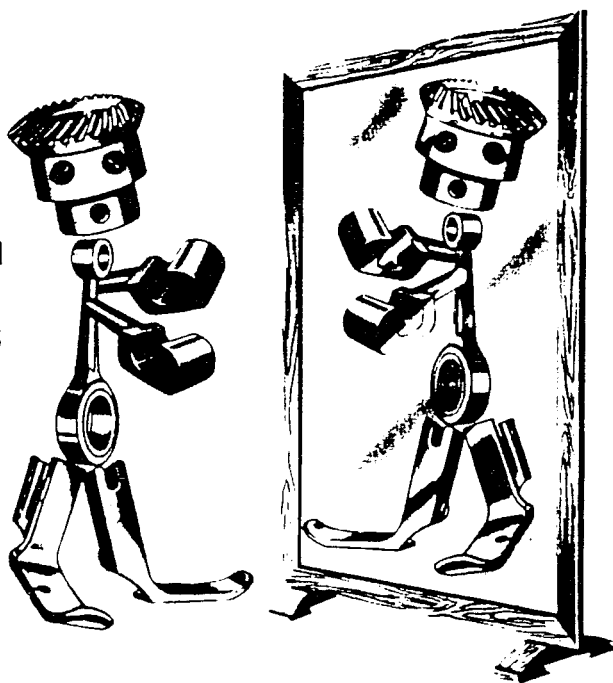
Replace belt through ball bearing space at B. After placing belt over arm shaft connection belt pulley, replace machine pulley with ball bearing. To remove all end play from shaft, tighten set screws in machine pulley and (holding needle bar crank in place) tap machine pulley into position with palm of hand. Tighten machine pulley set screws.

Turn machine pulley over toward you until thread take-up lever is at its highest position. Then turn hook driving shaft until the setting mark A on safety clutch is in line with setting mark B cut into machine bed as shown in Fig. 40. With both arm shaft and hook driving shaft in position, slip belt over lower pulley. This procedure should correctly time sewing hook with needle. Check timing as indicated on page 13.

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