

SERVICE MANUAL

AND

PARTS LIST

FOR

SINGER*

451K51

HIGH SPEED

SINGLE NEEDLE

LOCK STITCH

VERTICAL TRIMMER

MACHINE



Machine 451K51

THE SINGER COMPANY

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CONTENTS

	Page		Page
DESCRIPTION	3	TIMING AND ADJUSTING	15-22
SETTING UP	4	REMOVAL AND REPLACEMENT OF	
LUBRICATION	5, 6	PRINCIPAL ASSEMBLIES	23-26
INFORMATION FOR OPERATOR	7-14	PARTS CHART	28, 29
		PARTS LIST	30, 31

INDEX

	Page		Page
Alignment		Locking Feed Driving Eccentric	22
Arm Shaft with Hook Driving Shaft	15	Loop Lift	15
Arm Shaft	15, 25, 26	Machine Pulley	3, 5, 14, 25
Arm Shaft Connection Belt	3, 25	Machine Rest Pin	4, 14
Arm Shaft Connection Belt Pulley	25, 26	Machine Storage	5
Automatic Lubrication	6	Needle	7
Ball Bearings and Needle Bearings	15, 25, 26	Needle Bar and Bushing	15-17, 26
Bobbin	7	Needle Bar Connection Link	26
Bobbin Case	8-10, 14	Needle Bar to Presser Foot, Clearance and	
Bobbin Case Holder	16, 18, 23	Alignment	20
Bobbin Case Holder Needle Guard	16, 18	Needle Bearings	3, 15
Bobbin Case Slide	14	Needle Beakage, Prevention	7, 14, 18
Bobbin Thread	7, 9	Needle to Hook Clearance	17
Bobbin Thread Tension	10	Needle Guard	16, 18
Bobbin Winder	5, 8	Needle Threading	7
Broken Thread	7, 12	Needle Thread Tension	10, 18, 19
Carefree Operation Hints	14	Needle Thread Tension Releaser	10, 20
Centralisation of Feed Dog	21	Oil Reservoir	3, 5, 25
Change of Stitch Length	11, 22	Oil Shield (Hook)	6
Check-Spring	18, 19	Oil Wick (Hook)	6
Cleaning	5, 12, 20, 24	Pendant Link Feed Mechanism	3
Connection Belt, Arm Shaft	3, 25	Perfect Stitch	10
Common Causes of Stitching Troubles	7	Position Finger	6, 17
Cover Guard (Take-up)	12, 16	Preliminary Inspection	15
Daily Care	5	Preparation for Sewing	9
Damaged Needles	7	Presser Bar and Bushing	20
Damaged Parts	14	Presser Foot	11, 14, 15, 19, 20
Dimensions of Machine	3	Pressure of Presser Foot	11, 22
Drawing Up Bobbin Thread	9	Prevention of Unauthorised Change of	
Drip Pan, Installation	4	Stitch Length	22
Face Plate, Removal and Replacement	19	Puckering	21
Feed Dog	15, 21, 22	Pulley (Arm Shaft Connection Belt)	25, 26
Feed Driving Eccentric Gib	22	Pulley, Machine	3, 5, 14, 25
Feed Driving and Reversing Mechanism	22	Removing Broken Thread	12
Feed Driving Eccentric	22	Rest Pin	4, 14
Feed Driving Eccentric Adjusting Disc	22	Reverse Feed	3, 11, 19, 22
Feed Mechanism (Pendant Link)	3, 16, 21, 22	Reversing Lever Stop Pin	22
Feed Movement, Description	21	Rock Shafts	24
Feed Reversing Lever Stop Pin	22	Rotary Take-up (See "Take-up")	
Formation of Stitch	10	Sewing Hook (See "Hook")	
Fraying of Material	7	Speed	3, 14
Gib (Feed Driving Eccentric)	22	Setting the Needle	7
Hints for Carefree Operation	14	Specifications	15
Hook		Spillage of Bobbin Thread	8
Clearance to Needle	17	Starting to Sew	12
Description	3	Stitch Formation	10
Lubrication	6	Stitch Length	3, 11, 22
Removal and Replacement	23	Stitch Regulator	3, 11
Stringing	18	Stitching Troubles, Causes	7
Timing	17	Stringing the Needle Guard (Hook)	18
Hook Driving Shaft	15, 25	Superfinish	14
Hook Oil Shield, Installation	6	Tacking	3, 11, 19
Hook Oil Wick	6	Take-up	3, 15, 19
Hook Section	23	Take-up Cover Guard	12, 16
Knee Lifter	3, 4, 14	Tension Devices	3
Knee Lifter Rod Spring	22	Tension Releaser (Needle Thread)	20
Knives		Threading	7, 9
Aligning Upper Knife to Lower Knife	13	Thread Beakage	7, 12
Eliminating Side Movement of Knife (Upper)		Thread Cutters	3, 12
Holder Bracket	13	Thread Tensions	10, 19
Replacing Knives	14	Trimmer	
Setting Lower and Upper Knives to		Adjusting	12
Correct Height	13	Changing Trimming Margin	12
Length of Stitch	3, 11, 22	Disengaging	12
Light Fixture Mounting Seat	3	Turning a Corner	12
		V-Belt	3
		Wearing Checks	6, 15, 20, 21
		Winding the Bobbin	8

DESCRIPTION

Machine 451K51, for stitching and trimming light and medium weight fabrics.

Lock stitch (Stitch Type #301)

Single needle, Catalogue 1361 (88x9)

Socket-type needle bar

Short arm, flat bed

Drop feed. Pendant link feeding mechanism with reinforced feed bar insures level feed motion and uniform stitch length at all speeds.

- Reverse feed, hand operated, with spring return to forward stitch. Performs precise tacking and strong seam reinforcing with minimum thread breakage.

- Maximum stitch length, 6 to the inch forward and 7 to the inch in reverse.

Vertical Trimmer. Trims 1/8 to 5/16 inch to the right of seam as desired.

Special fittings for trimming 3/32 inch from the line of stitching can be furnished if specified on order. Unless otherwise ordered machine will be fitted to trim 1/8 inch to right of seam. The upper knife may be thrown out of action at will for straight stitching. Upper knife stroke 9/64 inch.

Modified, single rotary take-up maintains constant thread control to meet hook requirements. Easy to thread. Simple to adjust.

Long point rotary sewing hook on horizontal axis (belt driven); automatic lubrication can be regulated.

One oil reservoir and three easily accessible oil holes serve all principal bearings in machine.

Rotary tension and pre-tension devices achieve precise thread control throughout speed range of stitching with all types of natural and synthetic threads and materials of light and medium weight—permitting lightest tensions for perfect “wash and wear” sewing.

Tension guard, mounted on face plate, protects rotary tension from broken threads, lint and other hazards.

Two thread cutters; One, on face plate, prevents wrapping of broken thread around rotary take-up. The other, on rear of thread guard, removes excess broken thread from take-up.

Durable, steel - reinforced, rubber driving belt 270926, from arm shaft to hook driving shaft, is readily accessible when rear arm cover is removed.

Large rim, aluminium machine pulley 276445, for 3/8 inch V-belt, is designed for safety. Outside diameter of belt groove, 2.9 inches. Effective diameter for 5/16 inch round leather belt, 2-3/8 inches.

Tapped hole and seat in rear of arm provided for mounting a light fixture.

Compact stitch length mechanism is easy to read and to set.

Enclosed knee lifter rod and connection to knee lifter 228710.

Needle bar stroke, 1-9/64 (1.140) inches.

Presser bar lift (capacity of machine), 9/32 (.281) inch.

Bed dimensions: Length, 15-11/16 inches. Width 7 inches. Working space at right of needle, 8 inches.

Double shielded ball bearings at both ends of arm shaft and at pulley end of hook driving shaft.

Needle bearings for feed driving and feed lifting connections and for needle bar connecting link.

Nylon insert bearings for feed driving rock shaft and feed lifting rock shaft.

Controlled pressure lubricated bearings on hook shaft.

TOP OF MACHINE PULLEY TURNS OVER FROM THE OPERATOR.

CAUTION

Do not start machine until it has been thoroughly oiled, as instructed on pages 4, 5 and 6.

SPEED

Maximum speed recommended is 5000 stitches per minute, with these exceptions . . .

- Run a new machine at a more moderate speed the first few days.

- A machine that has been idle, for a long period of time, should be run slower than maximum speed for the first few minutes to allow time for oil to reach the moving parts. Check principal bearing points for freedom of movement and adequate lubrication before running machine at top speed.

- Reduce speed of machine when sewing closely woven or treated material.

Maximum efficient speed is dependent upon the nature of the operation, the ability of the operator and the type of thread and material in use.

Never force machine beyond its maximum efficient speed for the work being accomplished. Disregard of this precaution could result in considerable damage to machine.

SETTING UP

DRIP PAN

Position drip pan on underside of table, as shown in Fig. 2, with its right end even with right inside edge of machine cut-out in table.

Using four 3/4 inch wire nails, fasten drip pan low enough in table cut-out to avoid interference with rock lever rod (shown in Fig. 2).

KNEE LIFTER

Using three 7/8 inch wood screws (shown at 1, Fig. 2) fasten rock lever bracket 2 to underside of table. Locate bracket 2 so that rock lever rod can rise and fall through hole provided for it in drip pan without striking edge of hole.

Locate rock lever extension 3 to hold rock lever rod equidistant from front and rear edges of hole in drip pan. Make certain that platform at top end of rod will be directly under knee lifting rod A, Fig. 5, page 5, in machine; then securely tighten clamp screw 4.

Raise rock lever rod 5 to bring its platform just below knee lifting rod in machine, when at rest. Make certain platform is turned as shown in Fig. 2 and securely tighten clamping screw 6.

Knee plate 7 may be raised, lowered or turned to suit the requirements of the operator, after loosening clamping screw 8. Knee plate arm 9 may also be moved toward the left or right and toward front or rear, as required after loosening clamping screw 10. Tighten both screws 8 and 10 securely when correct position is obtained.

Set stop stud 11 to stop the action of the knee lifter as soon as knee lifter raises presser foot high enough to trip hand lifter on machine. Securely tighten clamping screw 12.

MACHINE HEAD

Machine head should rest upon cushioning pads in four corners of cut-out in table. Machine is not fastened. Machine hinges must not be required to support head except when machine is tilted back upon machine rest pin on table.

BELT GUARD

NOTE: Belt Guard 106505 is supplied with the machine only when requested on order.

Remove arm side cover screw and fit belt guard bracket 1, Fig. 3 with long hinge screw 2. Insert belt guard support 3, into bracket 1, and belt guard 4, as illustrated. Adjust belt guard so that it just clears the machine pulley, then tighten the Allen screws in the bracket and belt guard with the special key.

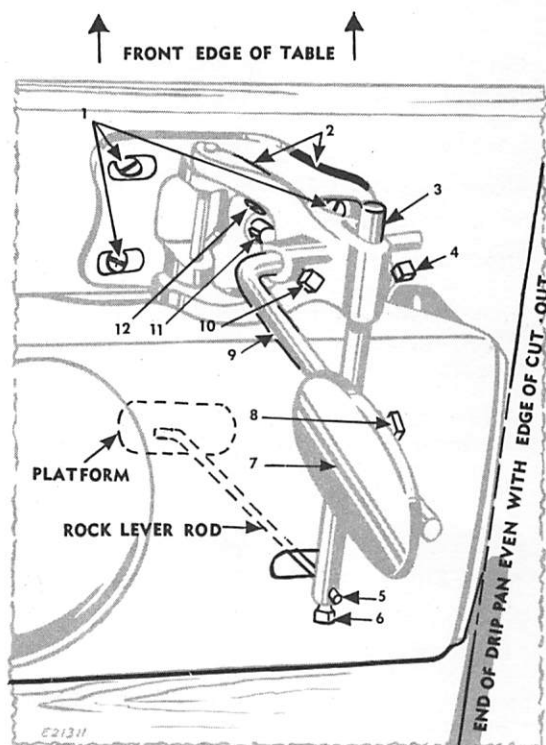


Fig. 2. Drip Pan and Knee Lifter beneath the Table

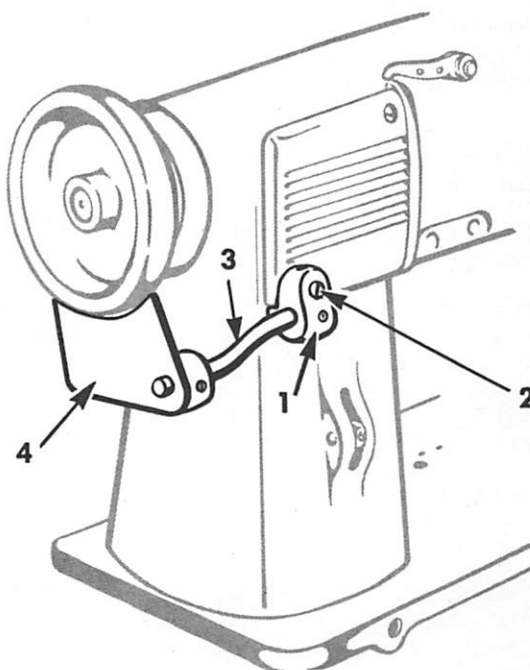


Fig. 3. Belt Guard in Position

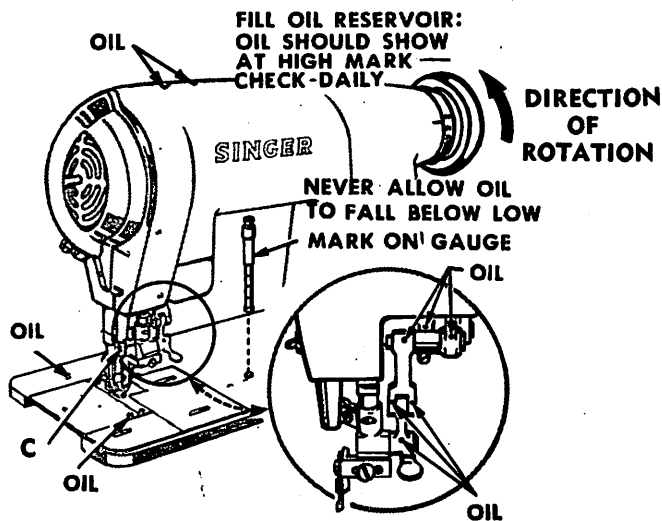


Fig. 4. Oil Reservoir and other Oiling Points on Machine

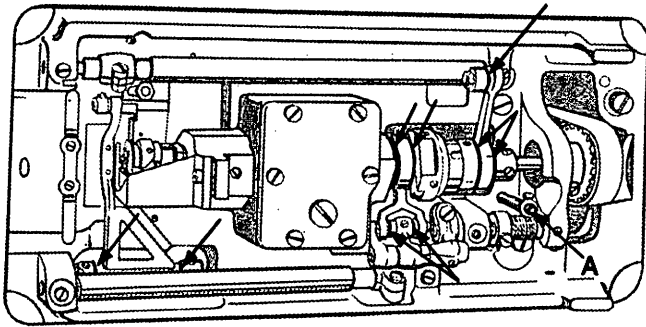


Fig. 5. Priming Points beneath Machine Bed

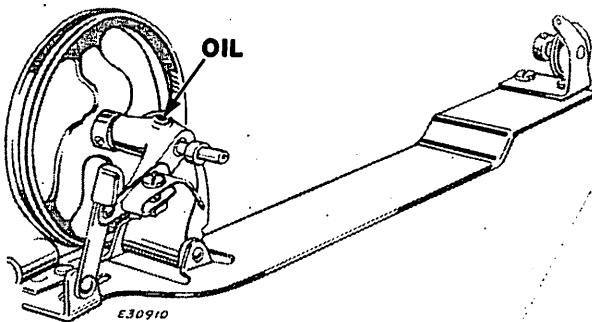


Fig. 6. Bobbin Winder Lubrication

MACHINE PULLEY

When machine is in operation, machine pulley always must turn over away from the operator, as shown in Fig. 4.

CAUTION: Do not start the machine, not even to test the speed, until it has been thoroughly oiled as instructed below.

LUBRICATION AND CLEANING

Use **SINGER* OIL "TYPE A" or "TYPE C"**. See inside front cover of this book for description of these oils. Keep machine clean and well oiled at all times.

OIL RESERVOIR

Fill by lifting out oil gauge and applying oil to hole in machine bed, as instructed in Fig. 4. Reservoir supplies oil to sewing hook race, to eccentrics and to front bushing on hook driving shaft.

DAILY CARE

Apply a few drops of oil to the four oil holes shown in Fig. 4.

Check oil level in reservoir before starting machine. Add oil, when necessary to maintain level at **HIGH** mark. Never allow oil level to drop below lower mark on gauge.

Occasionally remove the cover for the trimmer driving crank and apply oil to the oiling points shown in the insert Fig. 4. Always clean the cover before replacing it.

AFTER INSTALLATION

New machines and machines installed after several weeks of idleness should be primed before using. Residual lubricant may have congealed or disappeared entirely.

Apply a few drops of oil to priming points shown in Fig. 5, beneath machine bed.

Oil hook assembly by hand. Check oil flow and adjust when necessary, as instructed below and on page 6. Proceed with "DAILY CARE" as instructed above.

BOBBIN WINDER

Apply a few drops of oil daily, or more often when necessary, to oil wick in bobbin winder frame as indicated in Fig. 6.

CLEANING

Remove all lint and abrasive matter from around hook and from between feed rows on underside of throat plate.

Remove dirt from clean-out hole C, Fig. 4 in needle bar, pushing shank of a needle through hole. Wipe off all excess oil from areas of machine that may come in contact with material to be sewn.

Machines not in use should be kept well oiled, clean, dry and covered.

HOOK LUBRICATION

Rotary sewing hook is automatically lubricated. Flow of oil is regulated by turning screw N, Fig. 9, as instructed below.

HOOK LUBRICATION TEST AND ADJUSTMENT

Thread machine, as instructed on pages 7 and 9.

Sew about three yards of scrap material.

Remove material. Pay no attention at this time to stitching quality or amount of oil spray.

Remove bed slide E, Fig. 8.

Run machine for approximately one minute to establish a uniform rate of flow. Without stopping machine, hold a piece of white paper underneath hook for 15 seconds without moving paper during interval.

Remove paper and inspect: There should be a pattern of three sprays (two light lines on outside and one heavier, wider line in centre) as shown in Fig. 7.

If there is no trace of oil or an excess of oil on test paper

Remove needle, bobbin and bobbin case from machine.

Remove screw R and position finger S, Fig. 8. Loosen two screws D and remove sewing hook B, Fig. 8 from hook driving shaft, as instructed on page 23.

Loosen filter screw O, Fig. 9 and check oil wick complete 276062 (see Fig. 9.) Oil wick should be replaced whenever it has become clogged by lint or dirt from oil.

An excess of oil sometimes indicates that oil wick 202423 has become detached from filter screw O, Fig. 9 or that filter screw is not securely tightened. Repair or replace as required.

Inspect all oil passages in shaft and bushing to see that they have not become clogged with lint or dirt. Just plain dirt can prevent oil from reaching its objective.

The hook shaft bushing K, Fig. 9 contains the regulating screw N, Fig. 9 for controlling the oil flow.

Turning in screw N, increases amount of oil supplied to hook, as indicated by arrow and word "MORE" on end of bushing.

Backing screw N out, decreases amount supplied, as indicated by arrow and word "LESS".

Normal adjustment is accomplished by turning screw N in all the way, then backing it out again about 2-1/2 turns. Less than 2-1/2 turns may be required if continuous runs are being made or material with considerable sizing is being stitched.

To test oil flow while hook is removed from machine, hold test paper under end of hook shaft (with machine running at full speed) for 15 seconds. Oil streak should then be about 1/16 inch wide.

When correct flow is obtained, replace sewing hook and position-finger, as instructed on page 23.

Make certain oil shield U is in place as shown in Fig. 9. It is provided to prevent excess oil from reaching underside of throat plate.

Re-test oil flow as instructed above. When hook up and stitching is satisfactory, replace all parts removed earlier.

Fig. 7. Approximate Spray Pattern

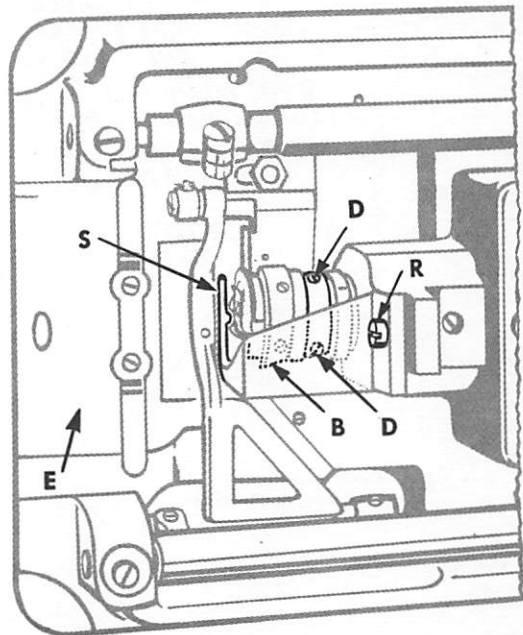


Fig. 8. Rotary Sewing Hook

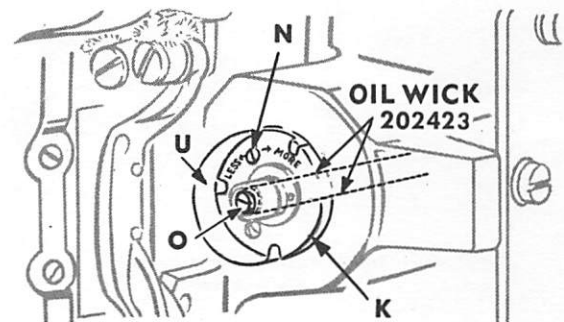


Fig. 9. Adjusting Oil Flow to Hook

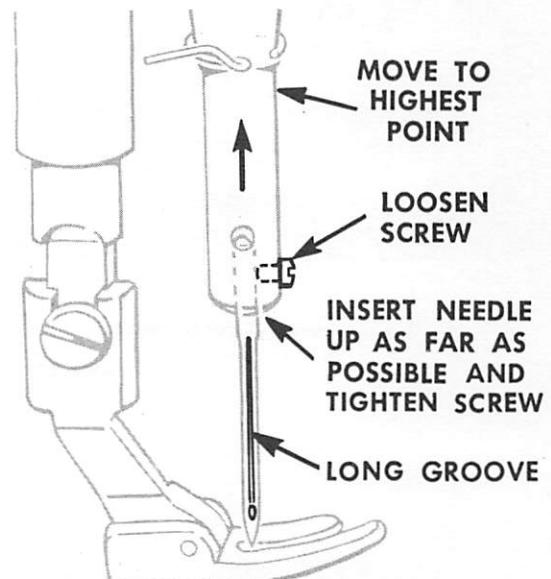


Fig. 10. Setting Needle

NEEDLES

Use SINGER* needles, Catalogue 1361 (88x9) made in a variety of sizes.

These needles have a nickel finish but may be supplied with chromium finish when so ordered.

Chrome plating of sizes 9 and smaller is not recommended.

ORDERS FOR NEEDLES should specify Quantity required, Size number and Catalogue number.

Examples . . .

"100 Size 16, Catalogue 1361 (88x9) Needles"

Size of the needle to be used should be determined by type of material being sewn and by size of thread which must pass freely through the eye of needle.

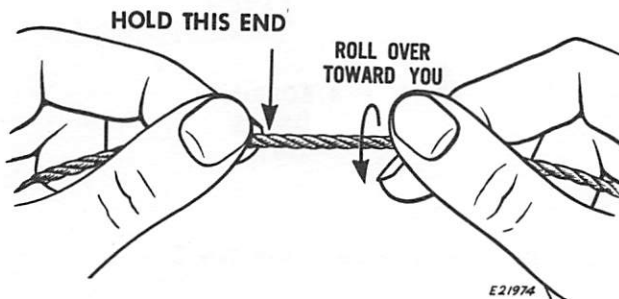


Fig. 11. How to Determine Thread Twist

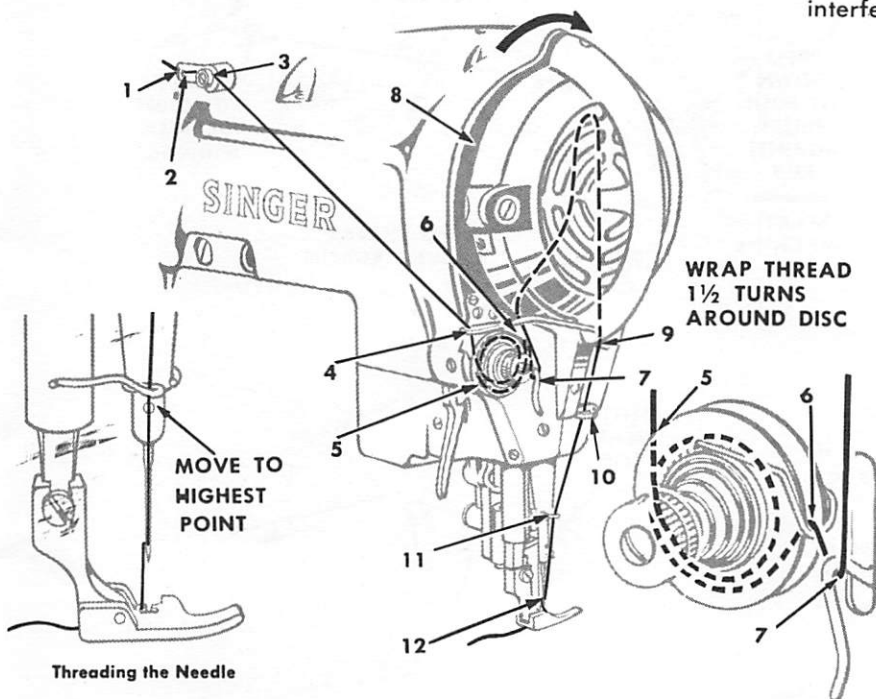


Fig. 12. Upper Threading Completed

TO SET THE NEEDLE

Turn machine pulley over away from you until needle bar is at its highest point, as shown in Fig. 10, page 6.

Loosen needle clamping screw. Remove old needle and insert new needle up into needle bar as far as it will go.

Make certain that single continuous groove of needle faces away from hook (toward the left end of machine, as shown in Fig. 10, page 6) with eye of needle directly in line with arm of machine.

Securely tighten clamping screw.

CHECK NEEDLE OFTEN TO MAKE SURE THESE DEFECTS ARE NOT PRESENT . . .

- **Wrong needle** for thread and material in use—a cause of thread breakage.
- **Bent needle, clogged needle eye** or dirty needle groove—causes of skipped stitches.
- **Hook or burr on needle point**—cause of picking or fraying of material.
- **Incorrect setting of needle**—a cause of needle breakage.

THREAD

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

Hold thread as shown in Fig. 11. Twirl thread over toward you between thumb and forefinger of right hand; if left twist, strands will wind tighter; if right twist, strands will unwind or separate.

Rough or uneven thread, or thread which passes with difficulty through the eye of the needle, will interfere with successful use of machine.

UPPER THREADING

Turn machine pulley away from you until needle is at its highest position.

Pass thread from unwinder, through threading points #1 through #12 in order shown in Fig. 12.

When you have become accustomed to threading this machine, thread can be passed from threading point #4 to needle with a single continuous motion.

Thread needle from left to right.

Leave about three inches of thread behind the presser foot, as shown in Fig. 12 with which to start sewing.

TO REMOVE BOBBIN

Turn machine pulley over away from you until needle moves up to its highest point, as shown in Fig. 12, Page 7.

Reach beneath bed of machine with left hand and remove bobbin case from sewing hook, as instructed in Fig. 13.

While latch is kept open, bobbin will be retained in bobbin case.

To remove bobbin from bobbin case, release latch and turn open end of bobbin case downward. Bobbin will drop out, as shown in Fig. 14.

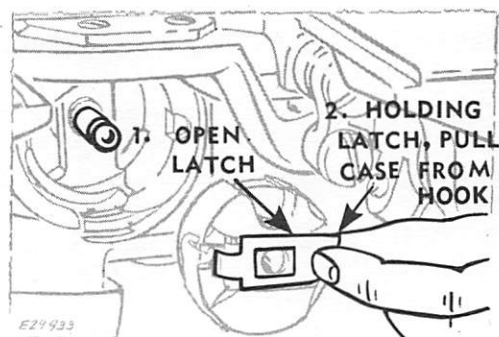


Fig. 13. Removing Bobbin Case from Sewing Hook



Fig. 14. Removing Bobbin from Case

TO INSTALL BOBBIN WINDER

Bobbin winder should be fastened to table with its driving pulley approximately 1/4 inch in front of machine belt, as shown in Fig. 15. Pulley will then make firm contact with machine belt when thumb latch is pressed down. Pulley will be released from contact with belt when sufficient thread has been wound upon bobbin.

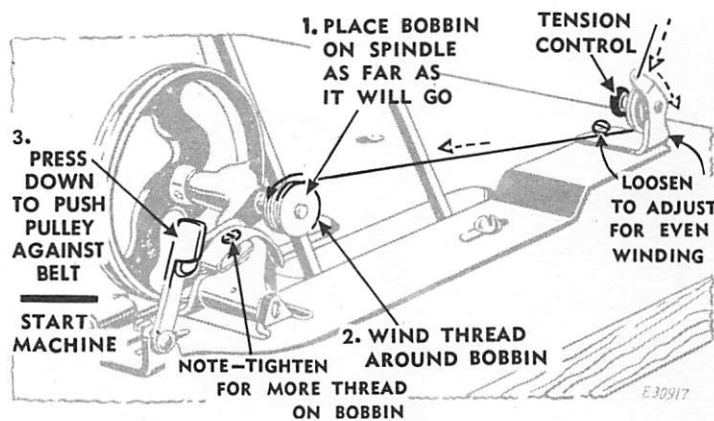


Fig. 15. Winding Bobbin

TO WIND BOBBIN

Place bobbin on spindle, pushing it on as far as it will go and pass thread through threading points, as shown above.

Wind end of thread around bobbin a few times in direction shown in Fig. 15. Press down on thumb latch, pushing driving pulley against belt, as shown in Fig. 15.

Start machine.

Bobbin can be wound while machine is stitching.

TO AVOID SPILLAGE: Regulate bobbin winder to stop automatically when bobbin is wound approximately 1/16 inch short of bobbin rim.

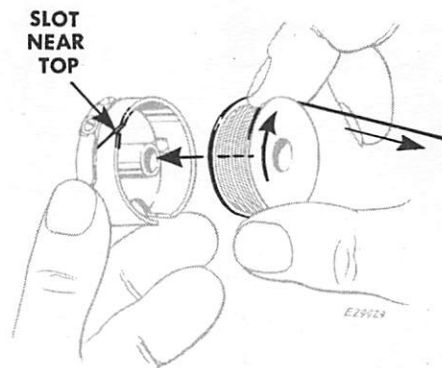


Fig. 16. Placing Bobbin in Bobbin Case

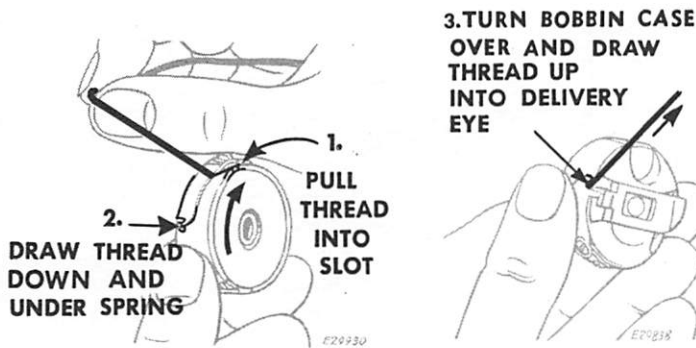


Fig. 17. Pulling Thread into the Slot

Fig. 18. Drawing Thread Under Tension Spring

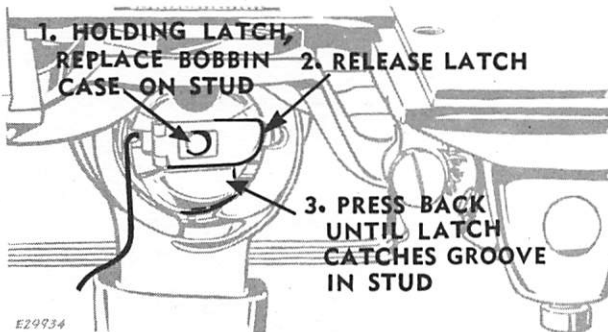


Fig. 19. Bobbin Case Threaded and Replaced

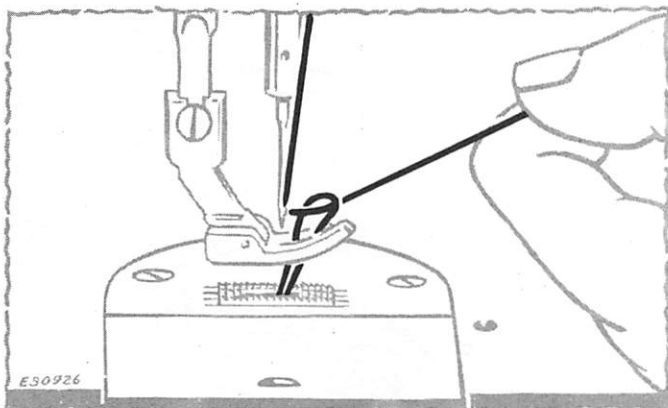


Fig. 20. Drawing Up Bobbin Thread

TO THREAD BOBBIN CASE

Hold bobbin so that thread will unwind in the direction shown in Fig. 16, Page 8.

Hold bobbin case as shown in Fig. 16, Page 8 and place bobbin into it.

Pull thread into slot 1, Fig. 17 and under tension spring 2, Fig. 17.

Draw thread into delivery eye at end of tension spring, as shown at 3, Fig. 18.

TO REPLACE BOBBIN CASE

1. After threading bobbin case, grasp latch between thumb and first finger of left hand and place bobbin case on centre stud of bobbin case holder, as shown in Fig. 19.
2. Release latch.
3. Press bobbin case back until latch catches groove near end of stud.

Allow about three inches of thread to hang free.

TO PREPARE FOR SEWING

(See Fig. 20)

- Hold slack end of needle thread loosely and turn machine pulley over away from you until needle moves down and up again to its highest point, catching bobbin thread.

- Draw up needle thread; bobbin thread will come up with it through hole in throat plate, as shown in Fig. 20.

- Lay both threads back under presser foot.
- Close bed slide.

Always keep bed slide closed when machine is in operation.

THREAD TENSION

For ordinary stitching, tension on needle and bobbin threads should be balanced with needle and bobbin threads locked in centre of thickness of material as shown in Fig. 21.

When there is too much tension on needle thread or not enough on bobbin thread, needle thread cannot be pulled down into material, as required. Poor stitching results. Needle thread lies on top of material as shown in Fig. 22.

When there is too much tension on bobbin thread and not enough on needle thread, you get the reverse of the condition shown in Fig. 22. The stitching is just as poor. Bobbin thread lies on bottom of material as shown in Fig. 23.

NEEDLE THREAD TENSION SETTING FOR GENERAL PURPOSES

When machines leave the factory, the needle thread tension thumb nut is set to a position for sewing most light and medium threads without adjustment.

Should this setting be lost, the minimum tension at which the machine will sew a medium thread should be established.

At this setting a variety of threads can be sewn.

TO REGULATE BOBBIN THREAD TENSION

For average sewing, tension on bobbin thread should be **very light**.

To regulate tension on bobbin thread, remove bobbin case and turn screw in tension spring, as instructed in Fig. 24.

When once the tension on bobbin thread has been correctly adjusted for ordinary stitching, required stitch can usually be obtained thereafter to suit the work in process by varying tension on needle thread only.

TO REGULATE NEEDLE THREAD TENSION

Before the initial needle thread tension adjustment, obtain the correct tension on bobbin thread, as instructed above.

Tension on needle thread should be just enough to set stitch correctly in material.

Regulate needle thread tension only when presser foot is down. Needle thread tension is automatically released when presser foot is raised.

Having lowered presser foot, turn thumb nut at front of tension discs, as instructed in Fig. 25.

PRE-TENSION SETTING

The purpose of this tension is to ensure that the needle thread grips the rotary tension wheel.

Insufficient pre-tension will cause looping or thread breakage with heavy materials and thread. Excessive pre-tension will make it impossible to get a sufficiently light needle thread tension when using very light threads.

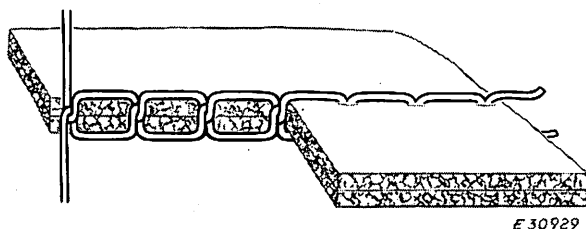


Fig. 21. Perfect Stitch

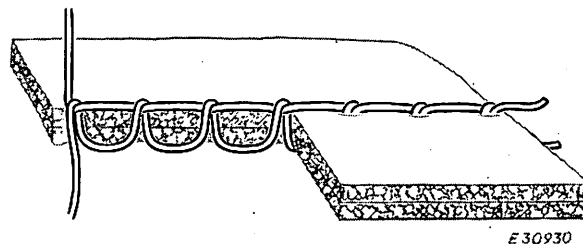


Fig. 22. Needle Thread Tension Too Tight

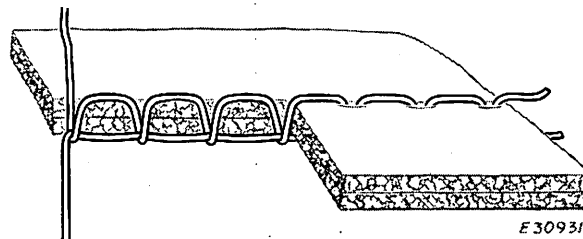


Fig. 23. Needle Thread Tension Too Loose

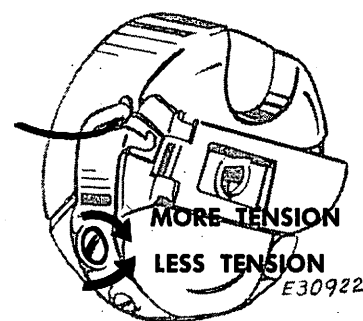


Fig. 24. Regulating Bobbin Thread Tension

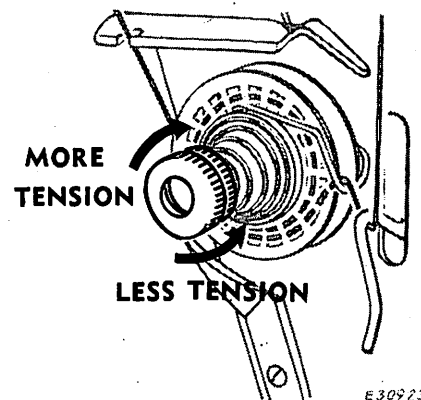


Fig. 25. Regulating Needle Thread Tension

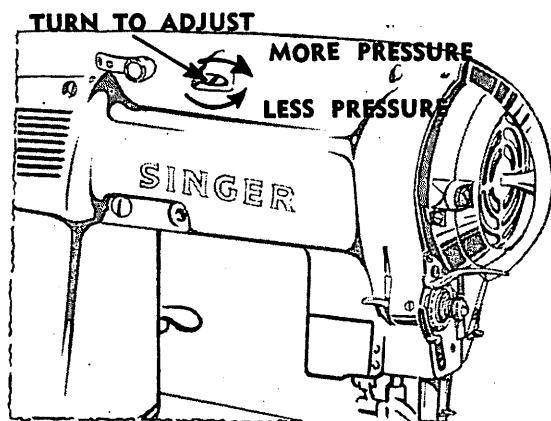


Fig. 26. Regulating Pressure on the Material

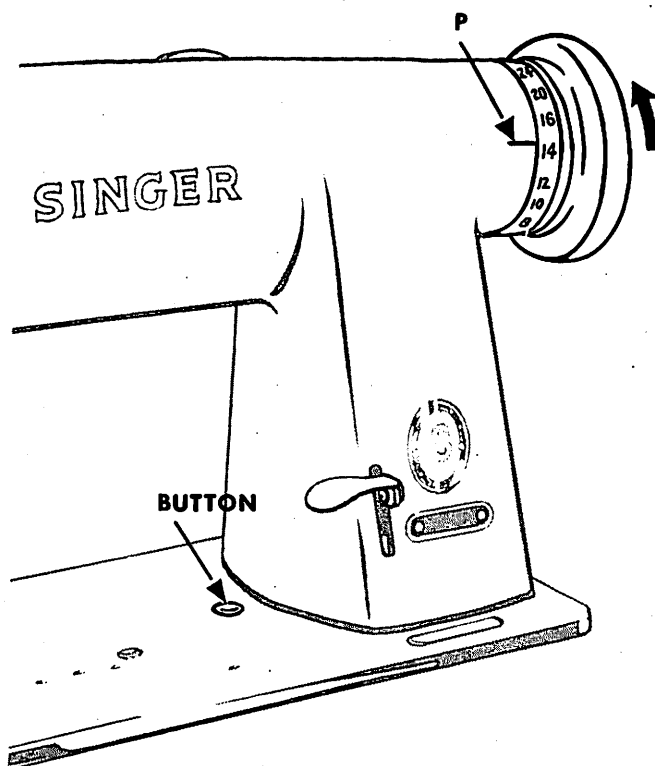


Fig. 27. Regulating Stitch Length

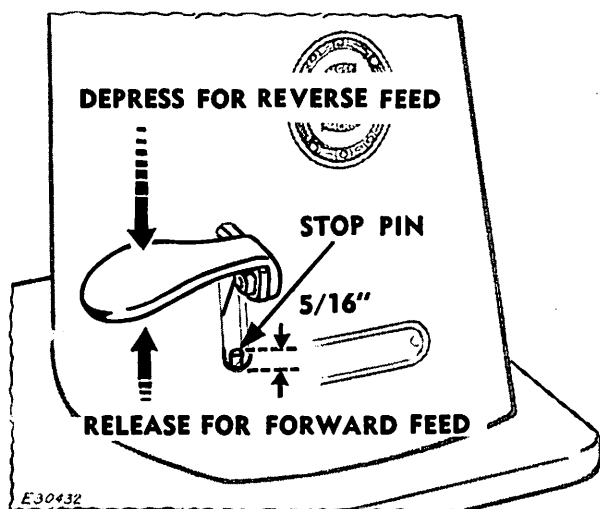


Fig. 28. Feed Reversing Lever

TO REGULATE PRESSURE OF PRESSER FOOT ON MATERIAL

Correct presser foot pressure helps feed work efficiently. You can regulate amount of pressure exerted, by means of screw on top of arm, as shown in Fig. 26.

Pressure on material should be as light as possible, while sufficient to insure correct feeding.

To increase pressure turn this screw downward (clockwise).

To reduce pressure turn this screw upward (anti-clockwise).

Do not completely release pressure on presser foot otherwise the ball bearing on the top of the presser bar may be displaced.

Pressure is correct when work moves steadily and smoothly without stalling.

TO REGULATE THE LENGTH OF STITCH

Maximum length of stitch: 6 to the inch.

To change the length of stitch . . .

- STOP machine
- Depress button in machine bed as instructed in Fig. 27 and
- Turn machine pulley over away from you slowly . . .
- Until button drops (clicks).
- Then turn machine pulley, until number indicating desired stitch length is opposite mark P, Fig. 27 on arm, and release button.

Never depress button while machine is running. Make certain that button is disengaged before starting machine.

TO REVERSE THE FEED

(See instructions in Fig. 28)

Simply depress feed-reversing lever shown in Fig. 28, as far as it will go.

Feeding in reverse continues only as long as lever is held in depressed position.

Forward feeding is resumed upon release of lever.

Direction of feed can be reversed at any point in a seam while machine is in operation, without disturbing the work. Back tacking is therefore readily accomplished and ends of seams are easily fastened.

For adjustment of stop pin, shown in Fig. 28, see instructions at bottom of page 22.

TO START SEWING

- Move needle bar to top of its stroke.
- Place material beneath presser foot. Lower presser foot.
- Start to sew, turning machine pulley over away from you.

TO TURN A CORNER

- Stop machine when needle is rising but before it is out of material.
- Raise presser foot.
- Turn material for next line of stitching, using needle as a pivot.
- Lower presser foot.
- Resume sewing.

TO REMOVE THE WORK

- Stop machine when needle bar has just started to descend. In this position upper thread will be free of the sewing hook and take-up will not unthread needle when machine is started.
- Raise presser foot.
- Draw work toward rear until it is clear of needle.
- Cut threads close to material.

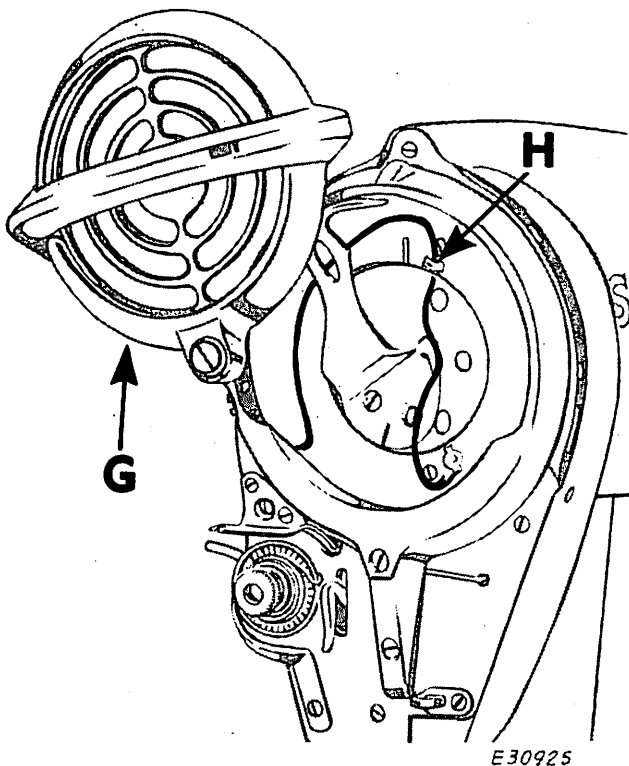


Fig. 29. Removing broken needle thread from rotary take-up

TO REMOVE BROKEN NEEDLE THREAD FROM ROTARY TAKE-UP

If needle thread breaks at operating speeds, an extra piece may be found in take-up which is visible through grille G, Fig. 29.

Open grille G as shown in Fig. 29 and remove thread.

Close grille G and rethread.

When removing end of thread from take-up care should be taken to avoid injury from thread cutter H, Fig. 29.

TO AVOID THREAD BREAKAGE

1. Remove sharp edges from thread-contact surfaces of all thread handling parts.
2. Check needle and thread as instructed on page 7.
3. Thread machine correctly, as instructed on pages 7 and 9.
4. Make certain machine is set for lightest tensions possible, without loss of thread control.
5. Keep machine clean and well oiled, at all times.

TO DISENGAGE TRIMMER

To disengage trimmer, turn up lever A4, Fig. 31, Page 13, as far as it will go. To re-engage trimmer turn down lever.

TO ADJUST THE TRIMMER

The trimming margin is determined by the throat plate used. It can be adjusted approximately $\frac{1}{32}$ inch for each throat plate by adjustment of lower and upper knives. Throat plates can be furnished for $\frac{3}{32}$ inch to $\frac{5}{16}$ inch trimming margins as follows :—

- # 270646 from $\frac{1}{8}$ inch to $\frac{5}{32}$ inch
- # 270647 from $\frac{3}{16}$ inch to $\frac{7}{32}$ inch
- # 270648 from $\frac{1}{4}$ inch to $\frac{9}{32}$ inch
- # 270649 for $\frac{5}{16}$ inch
- # 270700 for $\frac{3}{32}$ inch using feed dog #270694

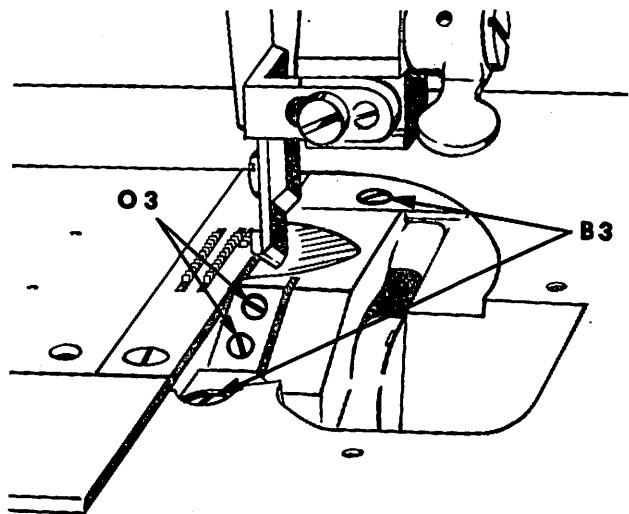


Fig. 30. To change the trimming margin

TO CHANGE TRIMMING MARGIN

Loosen bracket clamp screw E4, Fig. 31, Page 13 and move bracket to right. Remove throat plate and presser foot. Loosen lower knife bracket clamping screws B3, Fig. 30 and move bracket to right to allow insertion of throat plate for desired trimming margin. Then set lower knife bracket for required trimming margin

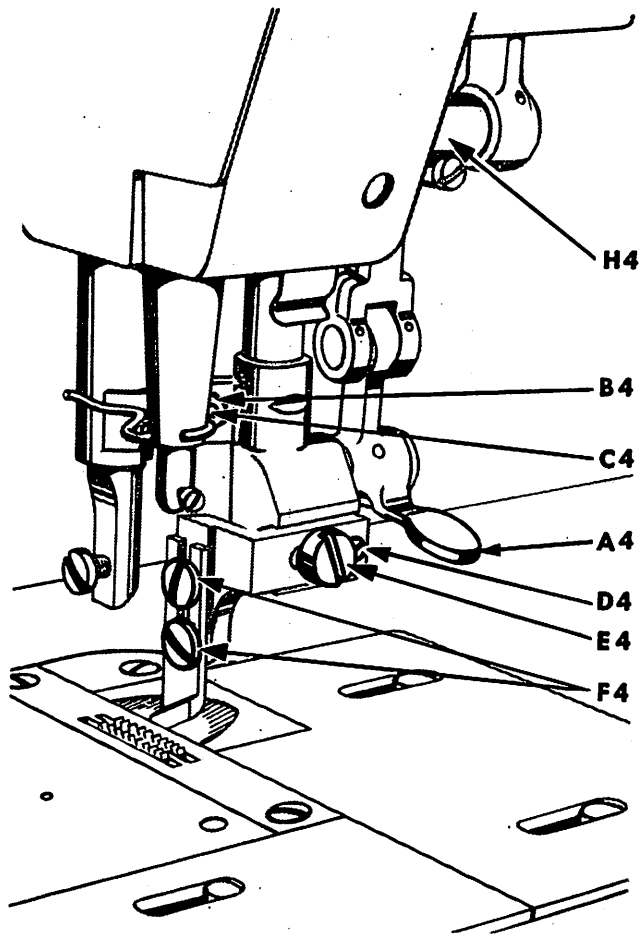


Fig. 31. Adjustment of lower and upper knives

within recommended range of throat plate being used and firmly tighten clamping screws B3. With lever A4, Fig. 31, at its lowest position, turn machine pulley so that knife is about half-way on its downward stroke. Move bracket until upper knife just contacts lower knife (excessive contact pressure must be avoided or cutting edges will chip during operation), then firmly tighten clamp screw E4. After knives are set, fasten presser foot in machine for desired trimming margin.

TO SET LOWER AND UPPER KNIVES TO CORRECT HEIGHT

The lower knife's cutting edge should be set level with top of throat plate. To make this adjustment loosen two lower bracket pinch screws O3, Fig. 30, Page 12, and move knife to correct height, then firmly tighten two pinch screws.

To set upper knife to correct height, see that lever A4, Fig. 31, is at its lowest position, turn machine pulley until knife is at top of its stroke. Now loosen screws F4, Fig. 31 and position upper knife so that bevelled edge at its lowest point is just beneath cutting edge of the lower knife then firmly tighten screws F4.

CAUTION.—Do not set knife too low, as point will strike lower knife bracket.

TO ALIGN UPPER KNIFE TO LOWER KNIFE

Should upper knife not be parallel to lower knife and gape at forward end of their cutting edges, turn machine pulley until knife is at lowest point of its stroke, then loosen screw E4, Fig. 31 and holding knife holder firmly in its seating, turn screw D4, Fig. 31 over to right until correct alignment of the two cutting edges has been obtained. Tighten screw E4 and check alignment of cutting edges.

TO ELIMINATE SIDE MOVEMENT OF KNIFE (UPPER) HOLDER BRACKET

In the event of wear taking place between presser bar bushing and forked portion of knife (upper) holder bracket, loosen nut B4, Fig. 31 and tighten screw C4, Fig. 31 until all play has been eliminated. Tighten nut B4. When making this adjustment partially withdraw knife driving link hinge stud H4, Fig. 31, disengaging knife driving link (upper half) in order to ascertain that knife (upper) holder bracket moves freely on its guides.

CAUTION: Do not attempt to resharpen the knives with ordinary grinding wheels as these edges are made of "Tungsten Carbide" material. It is recommended that worn knives be replaced with new Upper Knife 270619 and new Lower Knife 270616 to obtain best trimming results.

Be careful to set the knives properly to insure perfect trimming and prevent chipping of the cutting edges.

15 HINTS FOR CAREFREE OPERATION

1. Oil machine regularly. Inadequate lubrication is the surest way to rapid deterioration of moving parts.
2. Don't apply oil to hook through holes in throat plate. Keep machine clean.
3. Occasionally remove accumulation of lint and abrasive matter from around hook from between feed rows on underside of throat plate.
4. Make certain that when machine is in operation, machine pulley always turns over away from operator.
5. Always use needle that corresponds in size to thread in use.
6. To avoid rapid wear of feeding surfaces on feed dog and presser foot, do not run machine with presser foot resting on feed dog without some fabric under presser foot.
7. Do not run machine when both bobbin case and needle are threaded unless there is material under presser foot.
8. Keep slide over bobbin case closed when machine is in operation.
9. Never run machine with take-up cover open.
10. To avoid damaging needle, do not try to help machine by pulling fabric. Machine feeds the work without assistance.
11. Do not press knee lifter lever while machine is in operation, as this might prevent the work from feeding properly.
12. **NEVER TOUCH STITCH REGULATOR BUTTON WHEN MACHINE IS RUNNING.**
13. Use machine rest-pin on table to support machine when working beneath machine bed.
14. Reduce speed of machine when sewing closely woven or treated fabrics.
15. Never force machine beyond its maximum efficient speed for the work being accomplished.

Machines of Class 451 K are made with extreme precision in machining and assembly and "Super-finish" process provides microscopically smooth bearing surfaces. Therefore, utmost care should be taken not to permit any misalignment of parts. Any scratches or nicks on bearing surfaces caused by careless assembly or handling of parts might render a machine incapable of the long, trouble-free service for which it was designed.

NOTE: The instructions on the following pages are for Service Representatives.

To insure correct timing and avoid unnecessary repetition, these instructions should be followed in the order given.

SPECIFICATIONS

The following gauge distances should be of help to adjusters.

- Height of presser foot above throat plate $9/32$ inch.
- Needle bar stroke $1-9/64$ inches.
- Distance from centre-line of needle to point of hook .015 inch.
- Distance from centre-line of needle to face of hook shaft bushing .910 to .912 inch.
- Rise of needle bar from lowest position to position where hook point reaches centre of needle (LOOP LIFT) .085 inch.
- Height of feed dog above throat plate, .0415 to .0445 inch.
- Clearance between retaining portion of bobbin case holder position finger and bobbin case holder, .020 to .024 inch.
- Clearance between bobbin case holder and side edges of bobbin case position finger, .020 to .024 inch.

Certain conditions of sewing may necessitate variations from these settings.

BALL BEARING AND NEEDLE BEARING NOTES

There are three ball bearings and four needle bearings in this machine. With reasonable care these bearings should enjoy a long and trouble-free life.

Follow oiling instructions given on pages 5 and 6, carefully.

When handling bearings outside of machine, care should be taken to see that no foreign matter gets into these bearings.

Ball bearings on forward end of arm shaft and rear end of hook driving shaft are forced fitted into their correct position at factory and should not be removed except for replacement.

When replacing ball bearings, make certain that shielded side is always out (on less protected side) and that they form a tight fit on their respective shafts.

Ball bearing on machine pulley is also a forced fit.

The four needle bearings should receive same care as ball bearings and should not be removed from their respective housings except for replacement. Needle bearings should be replaced by pressing on numbered end of outside shell.

Any pressure on unnumbered end may distort shell and crank bearings.

After installation, care should be taken to see that needle bearings roll freely in their respective housings.

PRELIMINARY INSPECTION

Before any unnecessary time and effort is spent making major adjustments or installations, check following conditions of machine performance.

1. Sample of work currently produced on this machine.
2. Needle and thread in use. (See page 7.)
3. Threading. (See pages 7 and 9.)
4. Speed of machine. (See page 3.)
5. Lubrication condition. (See pages 5 and 6.)

Before checking and adjusting a machine that has been idle for some time, check for hardened oil or grease between moving parts. Dip machine in Varsol or a similar cleaning compound and remove all hardened lubricant. Then oil machine completely as instructed on pages 5 and 6.

After a machine has had considerable use, check for worn out parts, loose-fitting shaft, eccentrics, forks and links, bent needle bar, presser bar and needle, damaged hook, throat plate, presser foot and feed dog. Replace all parts showing wear with **SINGER*** parts for top-performance.

TO TIME THE MACHINE

Timing the machine consists of first adjusting the radial position of sewing hook with relation to movement of needle bar and needle thread take-up, so that loop of thread cast out by needle will be correctly taken by point of hook at proper time for desired stitch formation. Check-spring and feed are then timed to synchronize their motions with needle and hook movements.

Timing instructions below and on pages 16 through 19 should be followed in exact order given for efficient results.

1. TO TIME THE ROTARY TAKE-UP AND ARM SHAFT WITH HOOK DRIVING SHAFT

Take-up and other parts on these shafts are correctly timed when their locating screws are in shaft splines provided for them.

These locating screws have a cone-shaped point and are the first screws to appear when shafts are revolved in their normal direction of rotation.

Arm shaft and hook driving shaft (with their components) are in time with each other, for average sewing, when timing mark **E2**, Fig. 32, page 16, on take-up is in line with mark **F2**, Fig. 32 on face plate, at same time that mark **G2**, Fig. 33, page 16, is in line with timing mark **H2**, Fig. 33 on feed lifting connection.

To adjust for average sewing conditions, loosen the two pulley screws **A2**, Fig. 33; align timing marks **E2** and **F2**, Fig. 32 and turn shaft **B2**, Fig. 33 as required to align arrow **G2** with mark **H2**, Fig. 33.

Securely tighten screws **A2**.

2. SETTING NEEDLE BAR AT CORRECT HEIGHT

Turn machine pulley over away from you until timing mark **E2**, Fig. 32 on take-up is in line with mark **F2**, Fig. 32 on face plate.

Needle bar should then be at its highest position and lower timing mark **M2**, Fig. 32 on needle bar should be just visible below lower end of needle bar bushing.

To set needle bar at correct height, remove two screws **Z2** and rotary take-up guard **N2**, Fig. 32 and loosen needle bar connecting stud pinch screw **L2**, Fig. 34, through hole in face plate. Move needle bar to correct height and securely tighten screw **L2**.

3. TO SET NEEDLE BAR AT CORRECT HEIGHT WITHOUT USE OF TIMING MARK

(when needle bar bushing has been disturbed)

Turn machine pulley over away from you until needle bar is at bottom of its stroke.

Loosen screw **L2**, Fig. 34.

Raise or lower needle bar as required to bring eye of needle just above needle guard of bobbin case holder, as shown in Fig. 35, allowing freedom for needle thread.

Securely tighten screw **L2**.

Figures 36 and 37 illustrate opposite extremes of incorrect settings of needle bar in relation to needle guard on bobbin case holder.

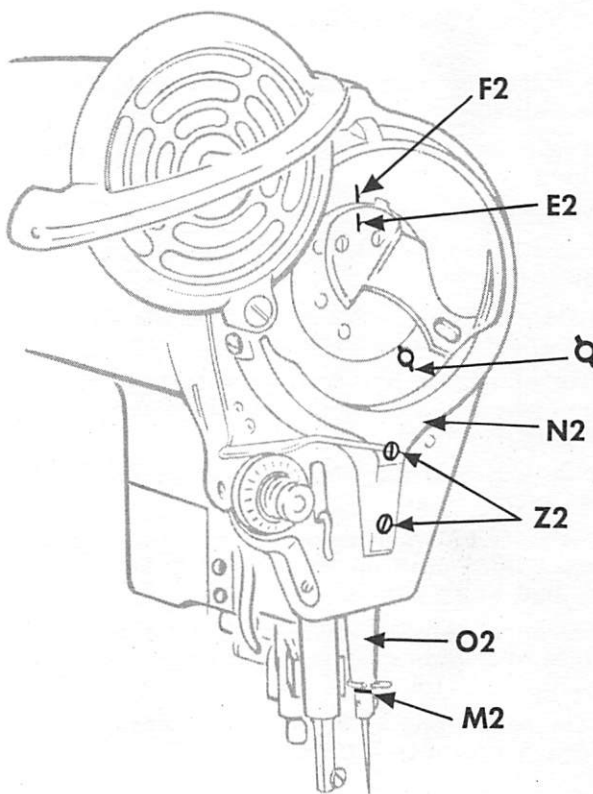


Fig. 32 Timing Mark on Take-up

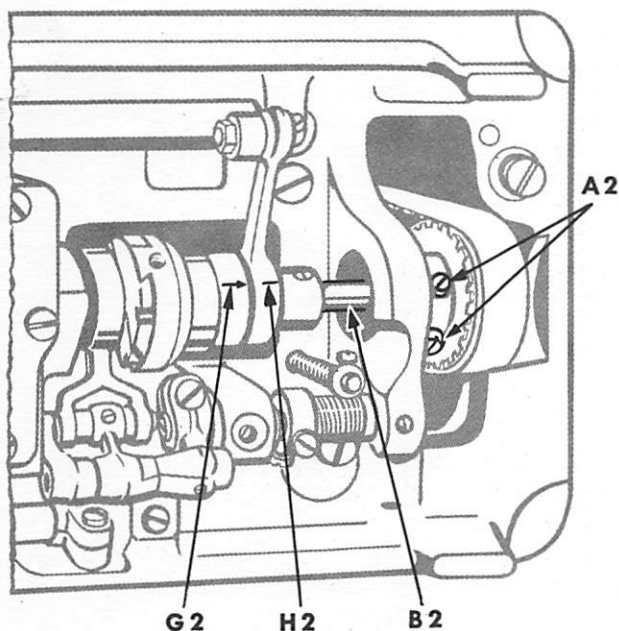


Fig. 33 Timing Mark on Feed Lifting Connection

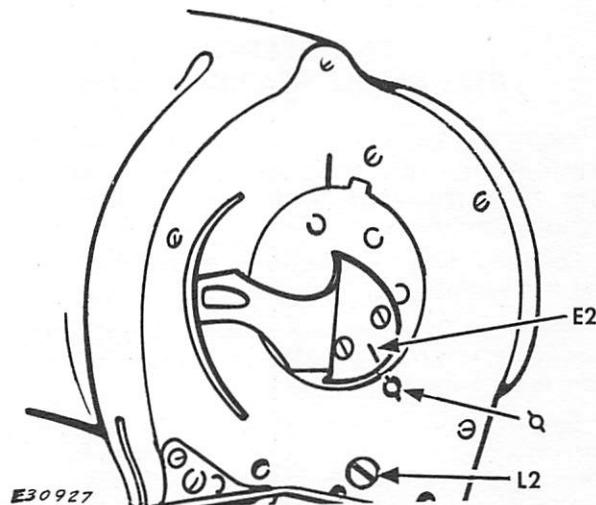


Fig. 34 Needle Bar Setting

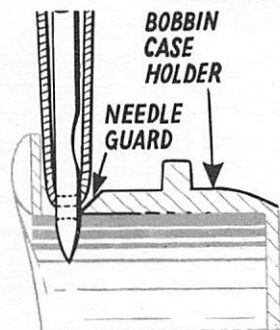


Fig. 35 Correct Height of Needle when at Bottom of Stroke

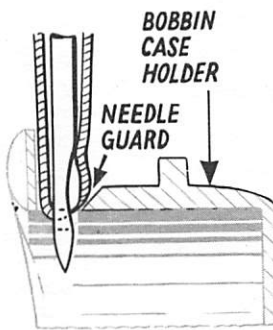


Fig. 36 Needle Too Low when at Bottom of Stroke

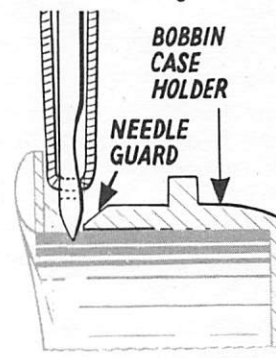


Fig. 37 Needle Too High when at Bottom of Stroke

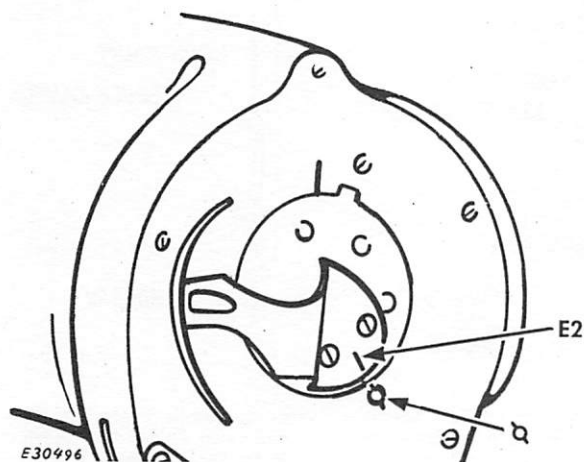


Fig. 38. Timing Marks for Hook

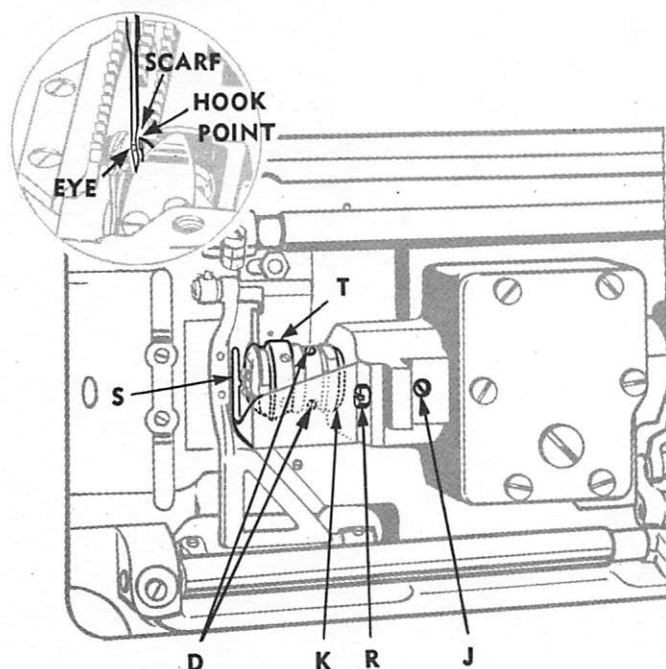


Fig. 39. Setting the Hook

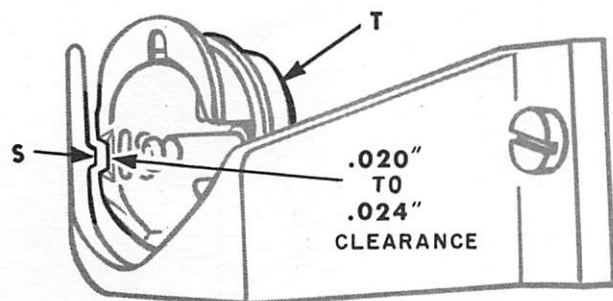


Fig. 40. Bobbin Case Holder Position Finger

4. TO RESET NEEDLE BAR BUSHING

Remove face plate, as instructed on page 19.

Turn machine pulley over away from you until needle bar has reached its **highest** position.

Drive needle bar bushing **O2**, Fig. 32, page 16 up or down in casting as required to bring its lower end level with the **lower timing mark M2**, Fig. 32 on needle bar.

Replace face plate, as instructed on page 19.

5. TO TIME SEWING HOOK

Remove presser foot, slide plate, throat plate, bobbin case and feed dog.

Select a needle in good condition and set it in needle bar as instructed on page 7.

Turn machine pulley over away from you until needle bar has started to rise from its lowest position and timing mark **E2** on take-up is in line with mark **Q** on face plate, as shown in Fig. 38.

At this setting, point of sewing hook should be at centre of needle, as shown in inset in Fig. 39. Note that when sewing hook is correctly timed, hook point will be in centre of needle scarf and approximately 1/32 inch above needle eye.

To relocate radial position of hook and correct the timing, loosen two screws at **D**, Fig. 39 in hub of hook. Turn hook on its shaft, as required. Tighten two screws **D**.

6. CLEARANCE BETWEEN NEEDLE AND POINT OF HOOK

Point of hook should pass needle scarf as closely as possible without striking or deflecting needle. This is achieved by setting a clearance equal to about the thickness of a piece of note paper.

Hook body should always be located, on the shaft, by pressing it **all the way on the shaft**.

When it is necessary to move hook sideways in relation to needle, remove screw **R** and position finger **S**, Fig. 39.

Rotate bobbin case holder **T**, Fig. 39, almost a half-turn, so that needle will not contact needle guard on bobbin case holder.

Then, loosen set screw **J**, Fig. 39 on bushing **K** and move entire bushing and hook assembly together, as required; tapping bushing **K** away from needle (toward right) or prying bushing **K** with hook assembly closer to needle (toward left) with a screwdriver against bed casting.

When hook and bushing are in correct position in relation to needle, securely tighten screw **J**.

Recheck timing of hook, as instructed above.

Replace all parts removed earlier.

Check thread clearance for bobbin case holder position finger as instructed next.

7. TO SET CLEARANCE FOR BOBBIN CASE HOLDER POSITION FINGER

Clearance between position finger **S**, Fig. 40 and bobbin case holder, **T**, Fig. 40 should be just sufficient to allow thickness of thread to pass through easily. Normally this requires an .020 inch to .024 inch clearance, as shown in Fig. 40.

Bend finger **S** carefully to achieve this setting.

Make certain that top surface of finger **S** will be level with **top of bobbin case holder T**.

8. FUNCTION OF BOBBIN CASE HOLDER NEEDLE GUARD

Needle guard on bobbin case holder (see inset in Fig. 43) should prevent needle from contacting hook or bobbin at all times. In case needle tends to move sidewise toward hook point during the crucial loop-taking period, needle guard should deflect toward left (away from the hook) sufficiently to prevent disaster, as shown in Fig. 41.

When all settings are correct it is usually not necessary for needle guard to deflect needle at loop-taking time.

When large needles (Sizes 22 to 24) are used, needle guard may deflect needle too far toward left at the bottom of needle stroke and cause breakage of needle on bobbin case holder at base L, Fig. 43 of position finger slot.

This breakage can be avoided by stringing back needle guard, as instructed below, until needle does not deflect too far at the bottom of its stroke. Before doing this, check and adjust machine as described on pages 15 through 17, in exact order given.

9. TO STRING THE NEEDLE GUARD

When it becomes necessary to string the needle guard to provide more clearance for needle, remove bobbin case holder from hook as instructed on page 23.

Remove a slight amount of metal from needle guard, by using a 1/8 inch strip of very fine emery cloth (about #320), holding one end of the emery cloth in a vise and rubbing edge of needle guard along strip, as shown in Fig. 43.

Extreme care must be taken not to remove too much metal as this will allow hook point to rub needle, as shown in Fig. 42, causing wear or damage to needle, hook and bobbin case holder. Bobbin case holder may then have to be discarded and new one installed in its place.

Removing even more metal from guard can expose bobbin, permitting needle to strike it as shown in Fig. 42; damaging needle or bobbin. Broken or damaged parts should be replaced by parts in good condition.

Be sure to clean bobbin case holder thoroughly, before placing it back in hook as instructed on page 23.

10. TO SET CHECK-SPRING

Check-spring setting should be reviewed each time a different foot is applied to machine.

When machine is correctly timed, check-spring completes its downward movement and returns to rest just as point of needle on its downward stroke, reaches level of top surface of throat plate.

HEIGHT

Check-spring should be set in its assembly so that when it completes its action it will come to rest 1/4 inch above thread pull-off V, Figs. 44 and 46 (with presser foot resting on throat plate.)

To position check-spring, loosen screw Y, Fig. 44 and remove complete tension assembly. Loosen set screw N, Fig. 45. Turn thumb nut Q, Fig. 45 out toward slotted end of stud W, Fig. 45 to protect stud and (inserting screwdriver in slot of stud W) rotate stud and check-spring as required to position spring correctly in regulator X, Fig. 45. Securely tighten set screw N.

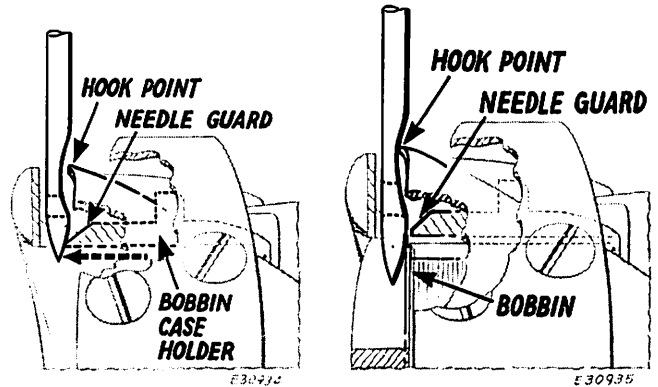


Fig. 41 Correct Relationship of Needle-Guard to Hook Point at Loop-taking Time

Fig. 42 Needle Contacting Hook Point and Bobbin (Too Much Metal Removed from Guard)

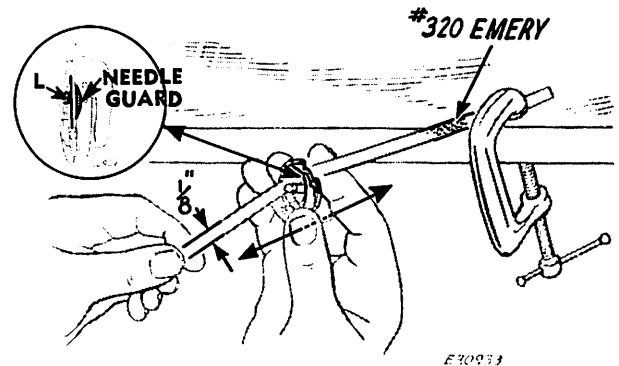


Fig. 43 Stringing the Needle Guard

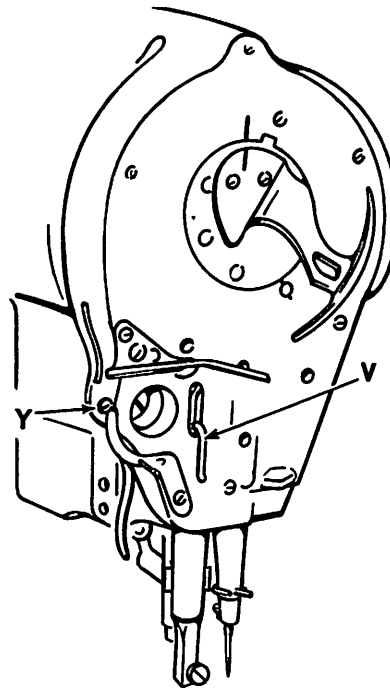


Fig. 44 Removing Check-Spring

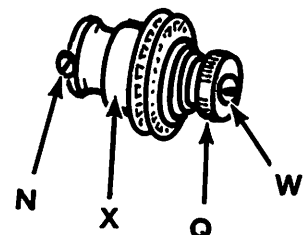


Fig. 45 Check-Spring Assembly Removed from Machine

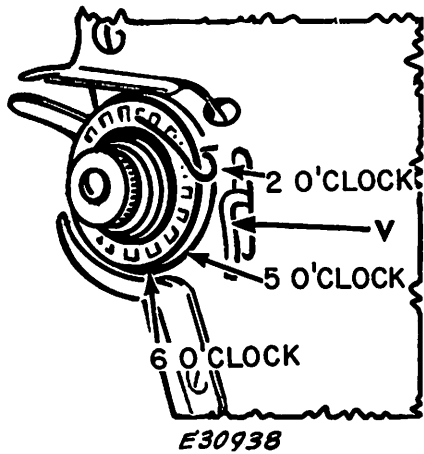


Fig. 46 Setting the Check-Spring

10. TO SET CHECK-SPRING (Cont'd)

Make certain that feed dog is below top surface of throat plate and that presser foot is resting on throat plate. Place complete assembly in machine so that check-spring loop (at rest) is in "2 o'clock" position, about 1/4 inch above thread pull-off V as shown in Fig. 46.

HEIGHT VARIATIONS

Under certain conditions of tacking it may be necessary to set check-spring higher than it is otherwise normally set.

TENSION

Tension of check-spring should be set so that when machine is sewing 16 stitches per inch at 5000 R.P.M., spring will overthrow beyond the "5 o'clock" position but not beyond the "6 o'clock" position. (See Fig. 46.)

To adjust tension, loosen screw Y, Fig. 47 and remove entire assembly. Loosen set screw N, Fig. 45, page 18 and, while holding regulator X, Fig. 45, turn stud over slightly toward left to increase tension or toward right to decrease tension. Tighten screw N, Fig. 45, and replace assembly in machine with spring at "2 o'clock" as shown in Fig. 46.

TENSION VARIATIONS

The required tension on check-spring may vary, depending upon the thread and material used. Heavier thread and bulkier material require more tension to ensure correct thread control.

TO REMOVE AND REPLACE FACE PLATE

REMOVAL

1. Remove the two screws Z2, Fig. 32, page 16 and take-up guard N2, Fig. 32.
2. Remove two screws Q2 and rotary take-up V2, Fig. 47.
3. Loosen screw Y, Fig. 47 and remove needle thread tension assembly.
4. Remove nine screws F, Fig. 47 and remove thread guide I, tension threading guide M and face plate P2, Fig. 47.

REPLACEMENT

1. Install face plate P2, guide M and guide I as shown in Fig. 47, fastening them to machine casting with nine screws F, Fig. 47.
2. Replace take-up V2 and two screws Q2, Fig. 47.
3. Replace needle thread tension assembly and securely tighten set screw Y, Fig. 47.
4. Inspect check-spring setting as instructed on page 18 and above.
5. Replace take-up guard N2, Fig. 32, page 16 and securely tighten two screws Z2, Fig. 32.

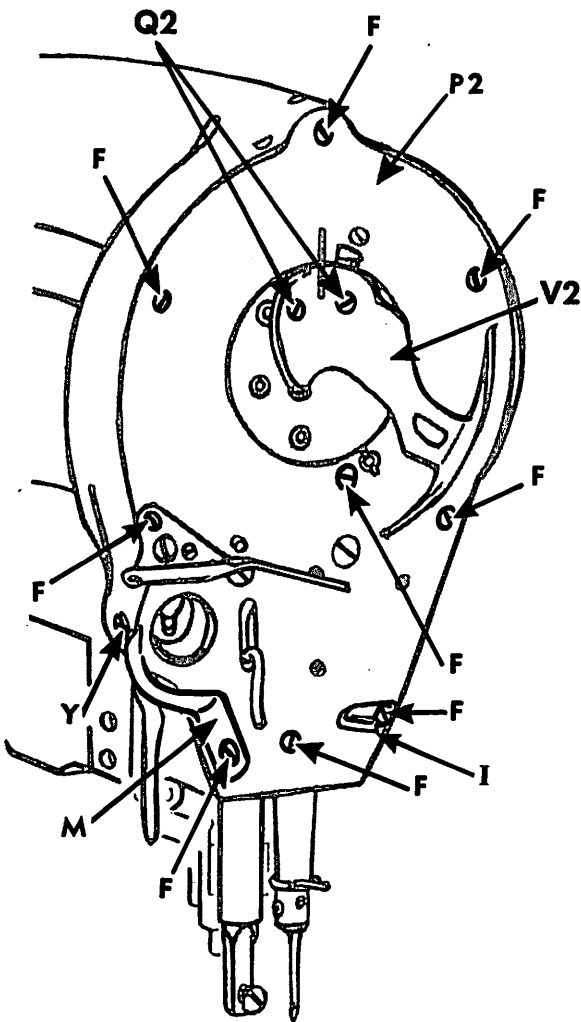


Fig. 47 Removing Face Plate

TO ADJUST THE NEEDLE THREAD TENSION RELEASER

Tension releaser J2, Fig. 48 automatically releases spring pressure on tension discs when presser bar is raised.

To adjust, loosen screw K2, Fig. 48.

To release tension earlier, raise releaser J2.

To release tension later, lower releaser J2.

When correct setting is obtained, securely tighten screw K2.

TO SET PRESSER BAR AT THE CORRECT HEIGHT

PREPARATION

Remove face plate, as instructed on page 19.

Remove slide plate.

Test presser bar for smooth, uniform motion. If presser bar tends to stick at any point, feeding will be adversely affected. Presser bar may need cleaning, repairing or replacement.

Accumulation of lint, oil and dirt on presser foot seat on presser bar may prevent proper seating of foot. Clean this area before checking and setting the presser bar.

CHECK

1. When presser foot is raised with presser bar lifting lever there should be a clearance of $9/32$ inch between presser foot and throat plate.
2. When presser foot rests firmly upon throat plate (with feed dog below throat plate) there should still be some clearance between presser bar position guide C2, Fig. 49 and lifting bracket W2, as shown in Fig. 49.
3. When presser foot is at its highest point and needle bar is at its lowest, top of presser foot should clear the lower end of needle bar M2, Fig. 49.

SETTING

- Release presser bar lifting lever, lowering presser foot.
- Loosen clamping screw D2, Fig. 49.
- Raise or lower guide C2, Fig. 49 as required.
- Make certain presser bar is turned correctly so that needle will locate centrally between the two toes of the presser foot.
- Securely tighten screw D2.

Review setting of check spring, as instructed on pages 18 and 19.

OTHER ADJUSTMENTS

- Presser bar bushing U2, Fig. 49, should be set so that its top is even with top of lifting bracket W2, Fig. 49 when bracket is all the way down.
- Presser foot should offer as little resistance as possible to material. Check bottom surface of foot for wear or abrasion; particularly at angle that toe makes with sole of presser foot.

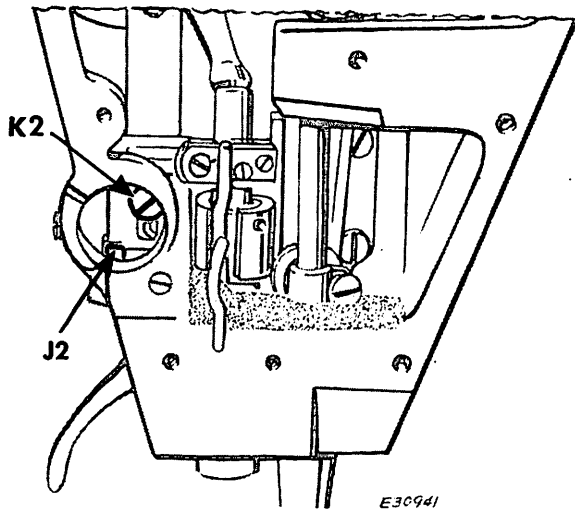


Fig. 48. Adjustment for Needle Thread Tension Releaser

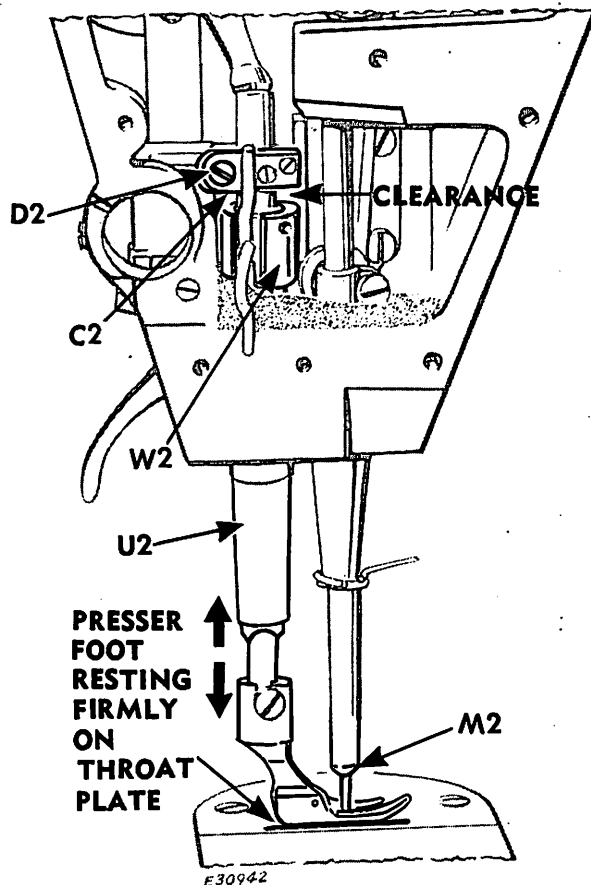


Fig. 49. Checking Height of Presser Bar

TO TIME THE FEED

Feeding movement is correctly timed, for average sewing conditions, by setting up the following alignment:

- Timing line **G2**, Fig. 50 on feed driving eccentric collar in line with timing line **H2** on feed lifting connection, as shown in Fig. 50, at same time that timing line **E2**, Fig. 51 on rotary take-up is in line with timing line **F2** on face plate, as shown in Fig. 51.

This alignment (see page 15) is set up before machine leaves factory.

When correctly timed . . .

- The feed dog stops its feeding action and drops below the throat plate before the needle enters the material on its downstroke.
- The feed dog begins its feeding action after the needle has risen above the material.

IF FOR ANY REASON IT MAY BE NECESSARY TO ALTER TIMING OF FEED . . .

- Set machine for longest stitch, as instructed on page 11.
- Loosen two screws **A2**, Fig. 50 on pulley.
- Turn hook driving shaft **B2**, Fig. 50, as required to obtain desired feeding movement.
- Then securely tighten two screws **A2**.
- Test-run machine to make certain that desired timing is achieved.
- Test feed assembly linkage for freedom of movement. Action of feed dog must be regular and smooth for maximum efficiency.

Re-time sewing hook, as instructed on page 17.

TO ELIMINATE PUCKERING OF MATERIAL: Advance feed timing very slightly.

TO CENTRALIZE FEED DOG IN THROAT PLATE SLOTS

CHECK

Feed dog should not contact edges of throat plate slots.

SIDewise SETTING

Feed dog should travel on a line midway between sides of throat plate slots.

Feed dog can be moved toward left or right, as required, after loosening two screws **J3** and screw **C3**, Fig. 52.

By moving bearing centres at **K3**, Fig. 52 toward left or right, as required, rock shaft **H3**, feed bar **G3** and feed dog can be moved to desired position.

Make certain that bearing centres **K3** will hold rock shaft **H3** snugly in place without binding, then securely tighten two screws **J3** and screw **C3**.

LENGTHwise SETTING

Set machine for longest stitch as instructed on page 11.

Feed dog should be set so that its movement is equidistant from front and rear edges of throat plate slots.

Loosen pinch screw **M3**, Fig. 52 and move feed bar **G3** and rock shaft **H3**, as required.

Securely tighten screw **M3**.

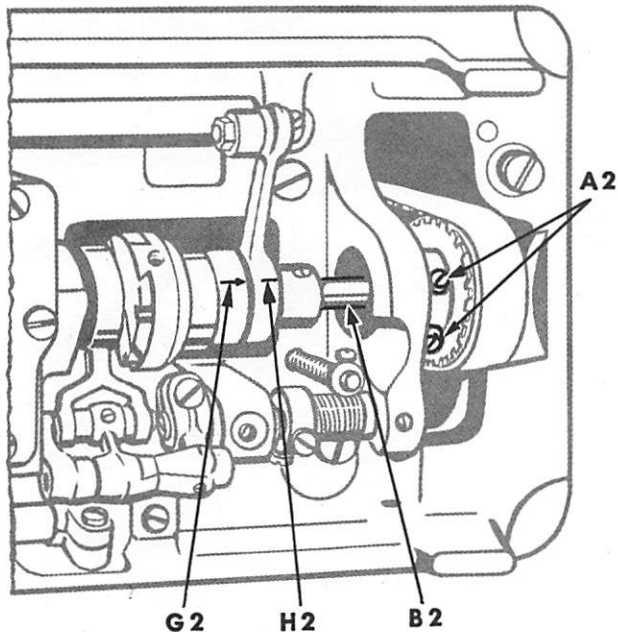


Fig. 50 Timing the Feed

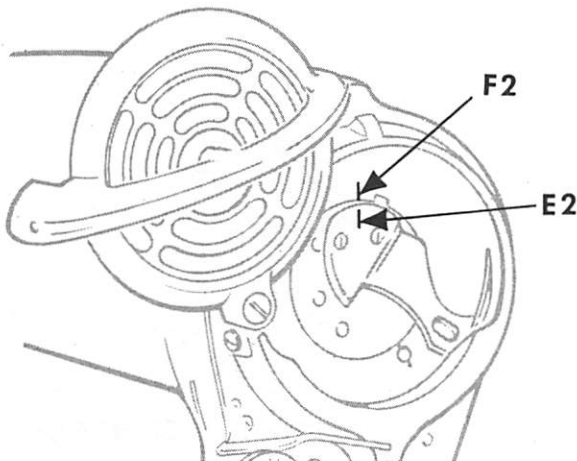


Fig. 51 Timing Marks on Take-up and on Face Plate

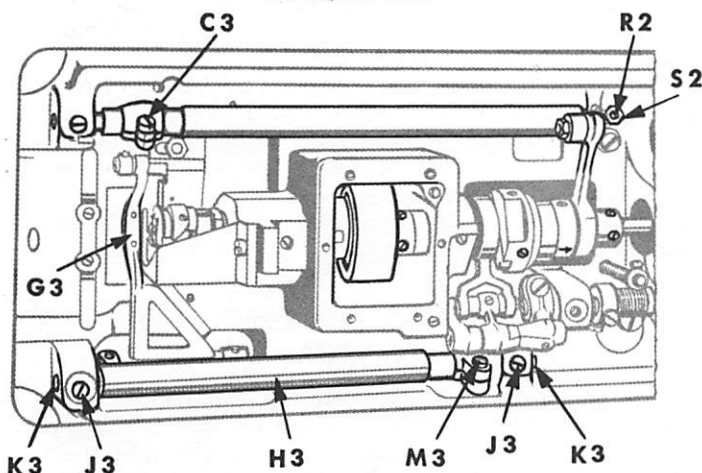


Fig. 52 Adjusting the Feed Dog

TO ADJUST FEED DRIVING ECCENTRIC GIB

Feed eccentric is provided with a gib Q3, Fig. 53 which can be adjusted to take-up any loose motion between feed driving eccentric and eccentric body. To adjust gib, loosen two locking screws R3, Fig. 53 nearest gib Q3; then turn in two adjusting screws S3, Fig. 53 against gib until all play is eliminated and eccentric fits snugly in slot in eccentric body. Securely tighten the two locking screws R3.

TO PREVENT UNAUTHORIZED CHANGE OF STITCH LENGTH

Tighten adjusting socket screws S3, Fig. 53 firmly and securely tighten locking screws R3, Fig. 53. Feed driving eccentric X3, Fig. 53 will then be locked and stitch length cannot be changed.

TO ADJUST FEED DRIVING ECCENTRIC ADJUSTING DISC

A spring held by collar Z3, Fig. 53 presses against feed eccentric cam to prevent it from moving out of position during operation. Ordinarily, collar Z3 should be set flush with end of hub of eccentric body, as shown.

To adjust, loosen set screw Y3. This set screw must enter timing groove in eccentric body when it is re-tightened.

TO CHECK THE KNEE LIFTER ROD SPRING

Spring P3, Fig. 53, between bed casting and collar O3, Fig. 53, on knee lifter lifting rod, cushions action of lifting bracket.

Occasionally inspect this spring to make certain it is in good working condition.

TO ADJUST FEED DRIVING AND REVERSING MECHANISM

Position in which crank W3, Fig. 54 is secured to feed reversing shaft determines actual travel of feed dog with respect to setting of feed driving eccentric X3, Fig. 53.

Correct position can best be obtained by trial.

Set eccentric X3 to 6 stitches per inch, as instructed on page 11. Place clean piece of paper beneath presser foot. Lower presser foot. **DO NOT DEPRESS FEED REVERSING HANDLE.** Loosen pinch screw V3, Fig. 54 and rotate crank W3 on its shaft until exactly 7 needle punctures per inch can be obtained on the paper. Securely tighten screw V3.

Machine is now correctly set for 6 stitches per inch, forward, and will produce a slightly shorter stitch in reverse when feed reversing lever is fully depressed as instructed on page 11.

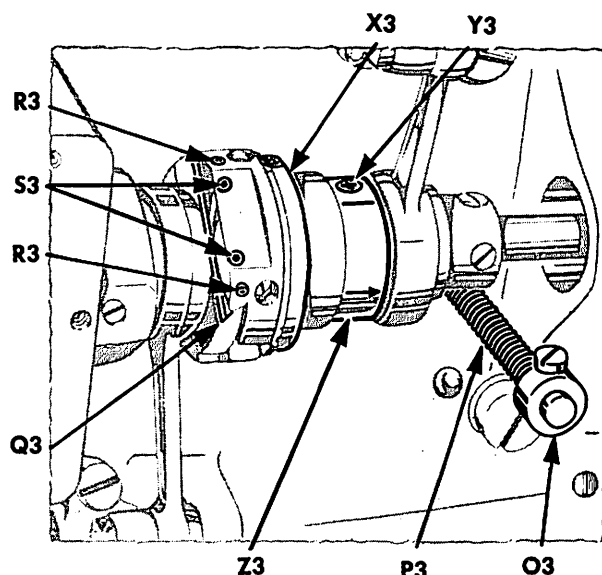


Fig. 53 Adjusting the Feed Eccentrics

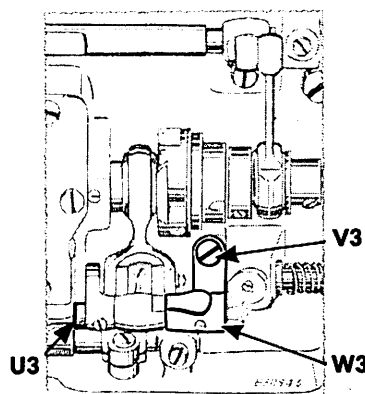


Fig. 54 Adjusting the Reverse Feed Mechanism

TO SET FEED DOG AT CORRECT HEIGHT

Before checking height of feed dog, set machine for longest stitch, as instructed on page 11.

When feed dog is at its highest position, rear teeth of feed dog should project above top surface of throat plate, .0415 inch to .0445 inch.

Variations of feed dog height may be necessary to balance height with presser foot pressure.

To adjust height of feed dog, loosen pinch screw C3, Fig. 52, in feed lifting crank and raise or lower feed bar G3, Fig. 52; as required.

When feed dog is set to desired height, securely tighten screw C3.

TO ADJUST FEED REVERSING LEVER STOP PIN

Top of stop pin, shown in Fig. 28, page 11, is normally set 5/16 inch above bottom of lever slot. This setting determines maximum stitch length that machine will sew in reverse when lever is fully depressed.

To adjust, loosen nut S2, Fig. 52, page 21 and turn stop pin R2, Fig. 52 upward or downward, as required.

If stop pin R2 is set too low, hinge stud U3, Fig. 54 will strike side of oil reservoir beneath machine bed.

Securely tighten nut S2 when correct setting is obtained.

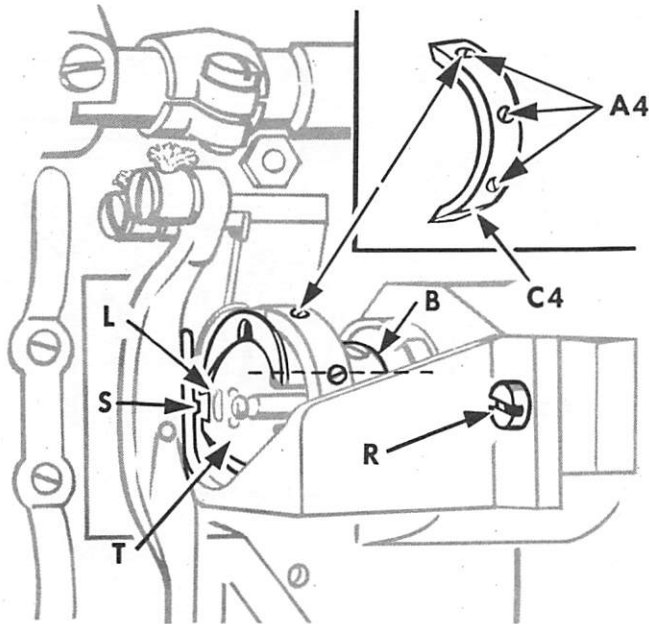


Fig. 55 Position of Bobbin Case Holder, in Relation to Hook; Necessary for Removal or Replacement

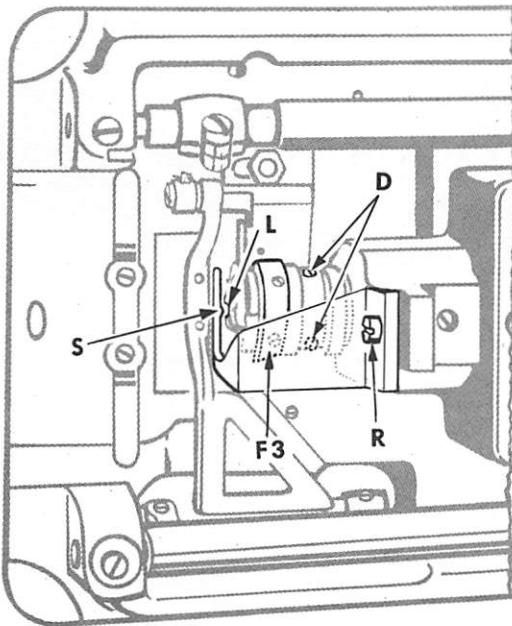


Fig. 56 Sewing Hook in Place

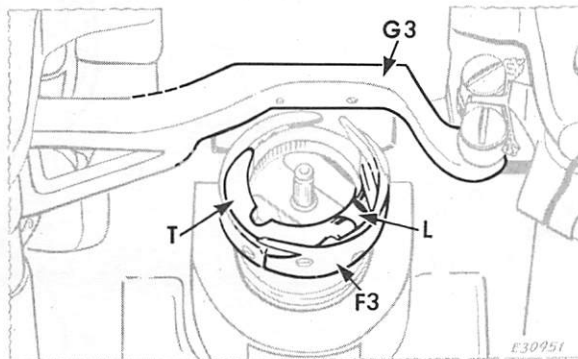


Fig. 57 Position of Hook in Relation to Feed Bar; Necessary for Removal or Replacement

THE BOBBIN CASE HOLDER

REMOVAL

Remove needle.

Remove bobbin case and bobbin, as instructed on page 8.

Remove large screw R and position finger S, Fig. 55.

Turn hook body B, to position shown in Fig. 55 and remove three small screws A4 and hook-section C4, Fig. 55.

Turn bobbin case holder in hook to position shown in Fig. 55 and slip bobbin case holder out of hook.

REPLACEMENT

Turn hook B to position shown in Fig. 55.

Install bobbin case holder T in hook body, keeping holder T in the relative position to hook body shown in Fig. 55.

Replace hook section C4, fastening it to hook body with three small screws A4, Fig. 55.

Turn bobbin case holder T as required to bring thread clearance notch L at top of holder ready to accept position finger S, as shown in Fig. 55.

Replace position finger S, as shown in Fig. 55 fastening it to machine with screw R.

Set thread clearance of position finger, as instructed on page 17.

Replace needle, as instructed on page 7.

THE SEWING HOOK

REMOVAL

Remove needle, slide plate and bobbin case. Remove screw R, Fig. 56. Remove bobbin case holder position finger S, Fig. 56. Loosen two screws D, Fig. 56 in hub of hook. Turn machine pulley over away from you until feed bar G3, Fig. 57 is raised to its highest point. Turn sewing hook until thread guard F3 is at the bottom, as shown in Fig. 56. Turn bobbin case holder until it is in position shown in Fig. 57.

Remove sewing hook from machine.

While sewing hook is off shaft, check oil wick complete 276062, as instructed on page 6.

REPLACEMENT

When replacing sewing hook on shaft, have thread guard F3, Fig. 57 at bottom of hook and bobbin case holder T turned to position shown in Fig. 57, so that hook will clear feed bar G3. Press hook all the way on shaft.

Turn bobbin case holder T, Fig. 55 until notch L is at top, as shown in Fig. 55. Replace position finger S, Fig. 56, being careful to see that position finger enters notch L at top of bobbin case holder, as shown in Fig. 56. Securely fasten position finger S by means of screw R, Fig. 56. Replace bobbin case, slide plate and needle.

Time sewing hook, as instructed on page 17.

THE HOOK SHAFT

REMOVAL

Remove throat plate and feed dog.

Remove sewing hook as instructed on page 23.

Remove cap screws T2, Fig. 58 and link B4, Fig. 58.

Drop feed bar G3, Fig. 58 down and out of the way of bushing K.

Loosen set screw J, Fig. 58 and withdraw bushing assembly K. Complete bushing assembly is shown out of machine in Fig. 60.

Remove two screws X2, Fig. 60 and the "half circle" end-bearing Y2, Fig. 60.

Withdraw hook shaft D4 with gear E4, Fig. 60 from left to right out of bushing K.

While hook shaft is out of machine "check" oil wick complete 276062, as instructed on page 6. Inspect all oil passages in shaft and bushing to see that they have not become clogged with lint or dirt.

REPLACEMENT

When replacing hook shaft make certain that raised surface H4 of thrust washer faces gear E4, Fig. 60 on shaft.

Slip hook shaft D4 with gear, from right to left through bushing K, Fig. 60.

End-bearing Y2, Fig. 60 can be moved end-wise enough to control end play of shaft before tightening two screws X2.

Replace complete bushing assembly in machine so that set screw J, Fig. 58 will bear upon spline on bottom of bushing K.

Make certain bushing K seats all the way in casting (gear E4 meshing with its mate) then securely tighten set screw J, Fig. 58.

Replace oil shield U, as shown in Figs. 58 and 59.

Install feed bar G3 and link B4 as shown in Fig. 58 securing them with cap screws T2, Fig. 58.

Replace sewing hook as instructed on page 23.

Replace feed dog and throat plate.

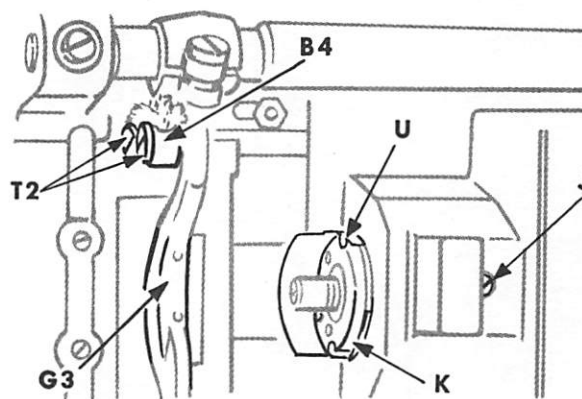


Fig. 58 Removing Hook Shaft Bushing Assembly

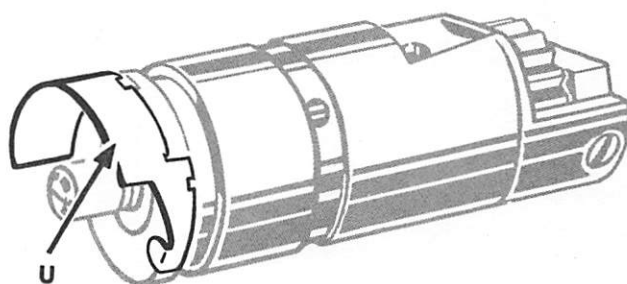


Fig. 59 Oil Shield Attached to Bushing

THE FEED ROCK SHAFTS

If feed rock shafts have been disturbed, disconnect small end of connection D3, Fig. 62, page 25 and lower end L3, Fig. 62 of feed driving connection.

Set eccentrics so that just enough side play remains to permit free ends of connections to be moved sidewise about 1/32 to 1/16 inch. See instructions on pages 21 and 22 on feed mechanism before assembling the rock shaft connections.

After assembling the connection D3, Fig. 62, turn cone bearing B3, Fig. 62 down tight and back off about 1/8 of a turn, locking it with lock nut A3, Fig. 62.

Bearings for feed rock shafts are fitted with Nylon inserts. To remove these inserts when worn, insert a screw in threaded hole (provided for this purpose) in insert and pull the screw, with insert, out of machine.

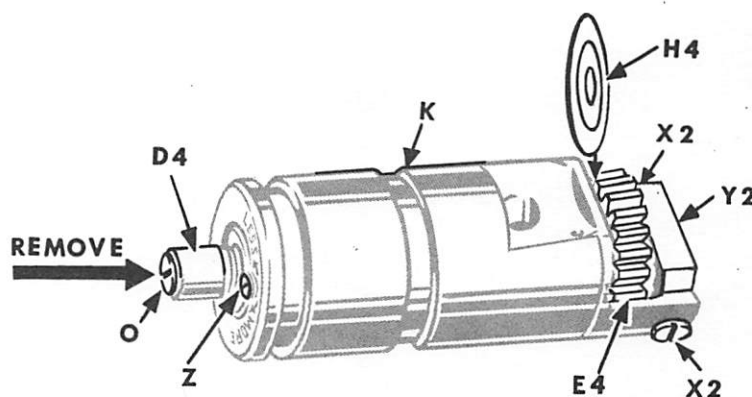


Fig. 60 Hook Shaft Bushing

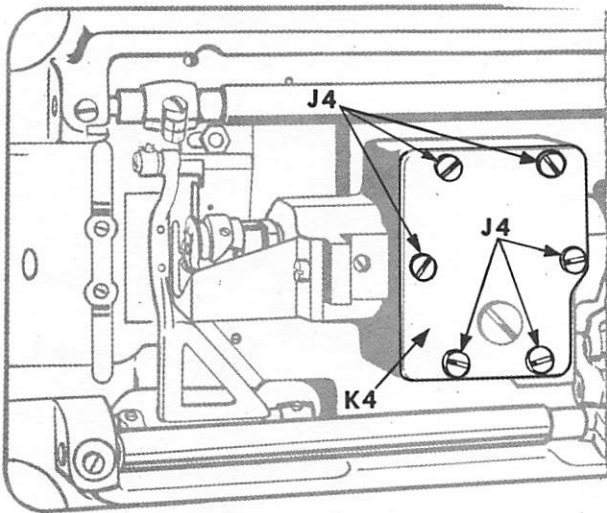


Fig. 61 Oil Reservoir Cover

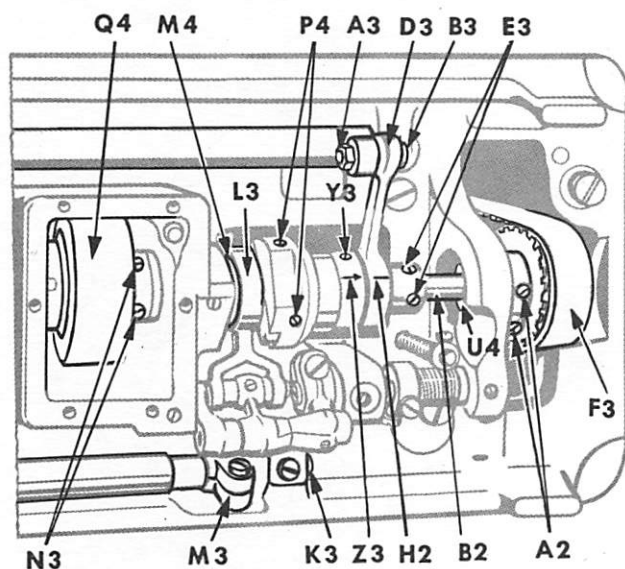


Fig. 62 Hook Driving Shaft and its Components

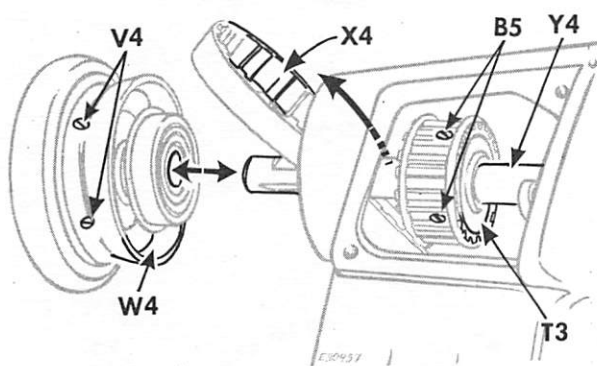


Fig. 63 Removing Arm Shaft Connection Belt

THE HOOK DRIVING SHAFT

REMOVAL

Remove six screws J4, Fig. 61 and reservoir bottom cover K4, Fig. 61, draining oil from machine.

Slip belt off lower pulley at F3, Fig. 62.

Loosen two set screws A2, Fig. 62.

Remove pulley from shaft B2, Fig. 62.

Loosen four set screws E3 and P4, Fig. 62 in feed-lifting and feed eccentrics.

Loosen two set screws N3, Fig. 62, in internal gear.

DO NOT LOOSEN SCREW Y3 IN COLLAR Z3, Fig. 62.

Draw shaft B2 with bushing M4 and ball bearing U4, Fig. 62, from left to right, out of machine.

When removing or replacing this shaft it is advisable to have the rotating hook and complete hook shaft and bushing assembly No. 272229 taken from the machine to allow the possible use of a brass drift to remove the hook driving shaft.

REPLACEMENT

When replacing shaft B2 make certain that oil lead wire is in place in shaft. Push shaft and pulley in (being sure feed eccentrics slip on shaft in their proper order) until snap ring on ball bearing U4 seats on casting. Then tighten gear screws N3.

Before tightening set screws P4, locate feed eccentric so that there will be approximately .004 inch clearance between feed eccentric and bushing at M4, Fig. 62.

Tighten set screws P4, Fig. 62 having the first screw (as shaft is turned over away from you) enter groove in shaft. Then move feed-lifting eccentric to left as far as it will go and tighten screws E3, seating the first or upper set screw in groove in shaft. Replace belt on pulley at F3.

Retime machine as instructed on page 15.

Note that ball bearing is correctly positioned when left side of pulley F3, sets firmly against ball bearing U4 and pulley hub is flush with end of shaft on other side.

Internal gear Q4 should have its inner face flush with end of shaft. Hook driving shaft bushing M4 will be correctly positioned when end-play has been removed from shaft B2 by setting bushing M4 against hub of internal gear Q4.

Replace oil reservoir bottom cover K4, Fig. 61 with its gasket and securely fasten with six screws J4, Fig. 61.

Fill oil reservoir as instructed on page 5.

THE ARM SHAFT CONNECTION BELT

REMOVAL

Remove needle to avoid damaging it while arm and hook shafts are out of time.

Loosen two screws V4, Fig. 63 in pulley groove. Remove machine pulley W4, Fig. 63 and ball bearing which comes out with it. Slip the belt X4, Fig. 63 off lower pulley at F3, Fig. 62. Lift belt X4 up and draw it out around arm shaft Y4, Fig. 63 through hole normally occupied by ball bearing, as shown in Fig. 63.

REPLACEMENT

Replace belt X4 through ball bearing hole, as shown in Fig. 63. After placing belt over upper pulley T3, Fig. 63, replace machine pulley W4 with its ball bearing.

To remove all end play from shaft, lightly tighten set screws V4 in machine pulley and, while holding needle bar crank in place at other end of shaft Y4, tap machine pulley into position with palm of hand. Tighten screws V4, firmly. Turn arm shaft until timing mark E2, Fig. 64, page 26, on rotary take-up is in line with mark F2 on face plate, as shown in Fig. 64. While keeping these two marks in line, turn lower shaft pulley until timing mark (arrow) on collar Z3, Fig. 62 is opposite timing mark H2, Fig. 62. Make certain that two set screws A2, Fig. 62 are accessible. With two shafts B2, Fig. 62 and Y4, Fig. 63 in this position, lead belt onto lower pulley F3, Fig. 62 at point farthest from you.

While turning machine pulley over from you, slide belt over remaining width of lower pulley F3. Check timing of machine before starting to sew, as instructed on page 15. If necessary, loosen set screws A2, Fig. 62 and turn lower pulley to bring upper and lower shafts into exact time.

REMOVAL

Arm shaft must be removed from face plate end of machine. Under no circumstances should an attempt be made to separate needle bar crank R4 from shaft Y4, Fig. 65, as they are manufactured as a unit, for accuracy.

Remove face plate, rotary take-up and associated parts as instructed on page 19.

Slip disc G4 from hinge stud N4, Fig. 65.

Remove needle set screw and needle.

Loosen needle bar pinch screw L2, Fig. 65 and remove needle bar M2 through top arm.

Withdraw needle bar connecting stud Z4, Fig. 65 from link S4. Insert screwdriver through hole in top rear of arm and loosen two set screws O4, Fig. 65 in crank R4.

Withdraw hinge stud N4, from crank. Thrust washer A5, Fig. 65 will fall from crank.

To remove needle bar connecting link S4, Fig. 65, drop it to its lowest position, draw its lower end forward out of guide block, turn link at right angles, and draw upward and out.

Slacken set screws in knife (upper) driving eccentric.

Remove belt as instructed on page 25. Loosen screws D5, Fig. 66 and remove pulley T3. Withdraw arm shaft Y4 with crank R4 from needle bar end.

REPLACEMENT

If it is found necessary to replace ball bearing at needle bar end of shaft Y4, it should be forced onto shaft until it rests against oiling felt flange, being careful not to crush flange.

Slip arm shaft Y4 with needle bar crank R4, Fig. 65 into machine (at needle bar end), as shown in Fig. 65.

Tighten set screws in knife (upper) driving eccentric, ensuring that the screws bind on the flats on the arm shaft.

Slip pulley T3 on arm so that it locates directly over similar pulley on lower shaft. Securely tighten two screws D5, Fig. 66.

Replace needle bar connecting link S4, Fig. 65 reversing movement necessary for its removal. (If for any reason needle bar guide block has been disturbed, it must be re-aligned correctly when assembling machine.)

Replace needle bar connecting stud Z4, as shown in Fig. 65, so that it slips through lower end of link S4 and enters guide block behind link S4.

Slip needle bar M2, down through arm of machine, through stud Z4 and finally through lower needle bar bushing.

Place thrust washer A5, Fig. 65, in its recess in crank R4 and slip hinge stud N4 through upper end of link S4 and into hole provided for it in crank R4, Fig. 63. Make certain that there will be no binding and a minimum of end play in linkage, and securely tighten both screws O4, Fig. 65 ensuring that the first or upper screw is located on the flat of the stud.

Replace disc G4, Fig. 65.

Replace face plate and rotary take-up as instructed on page 19.

Replace arm shaft connection belt X4 as instructed on page 25.

Re-time machine as instructed on page 15.

Reset needle bar, as instructed on page 16.

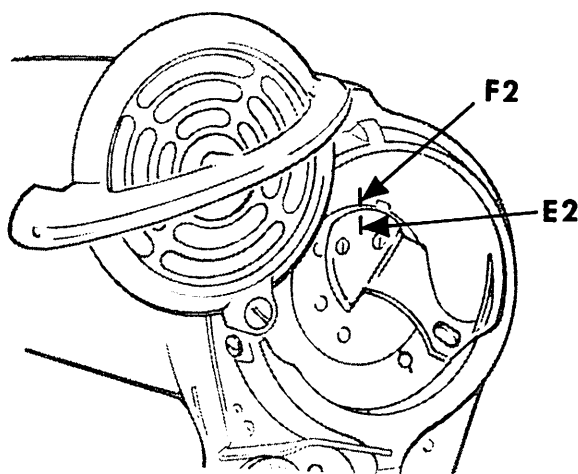


Fig. 64 Timing Marks at Face Plate

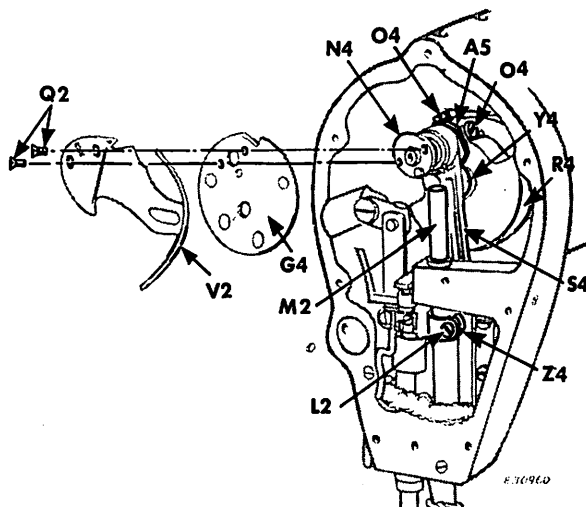


Fig. 65 Removing the Arm Shaft

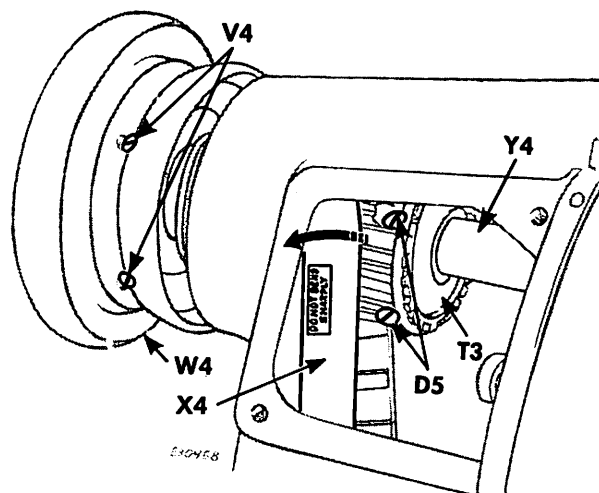
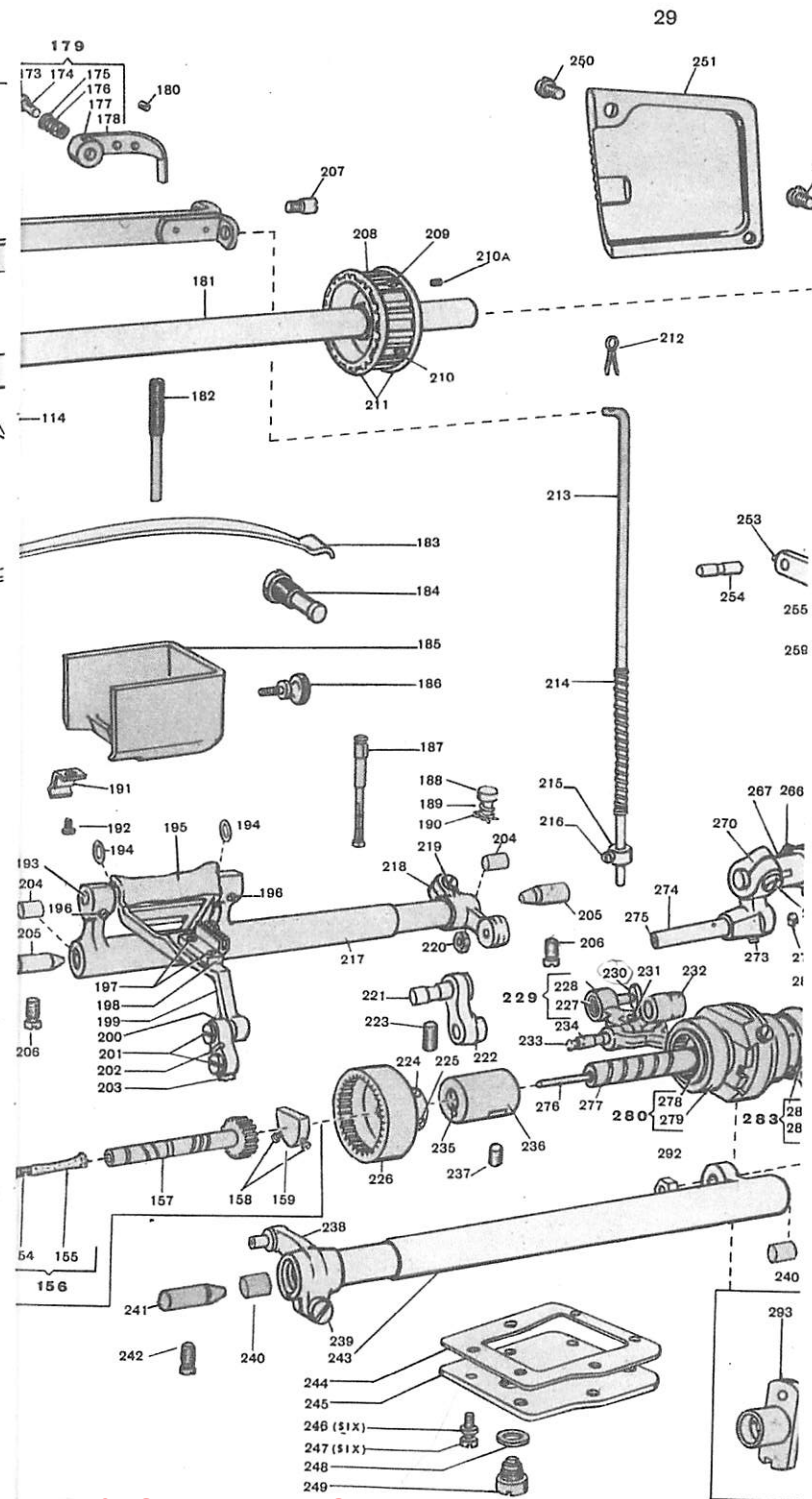
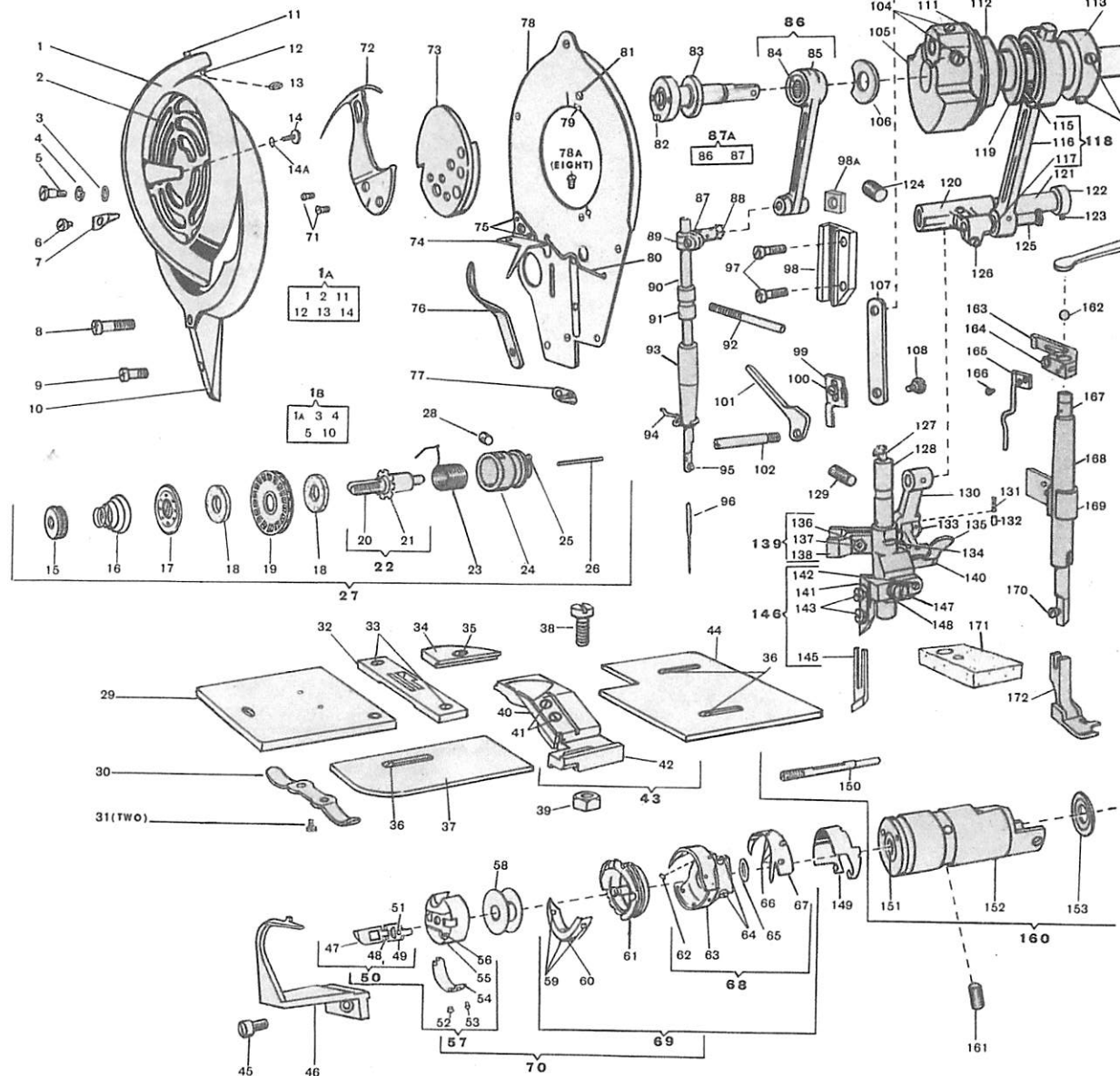


Fig. 66 Removing Pulley from Arm Shaft

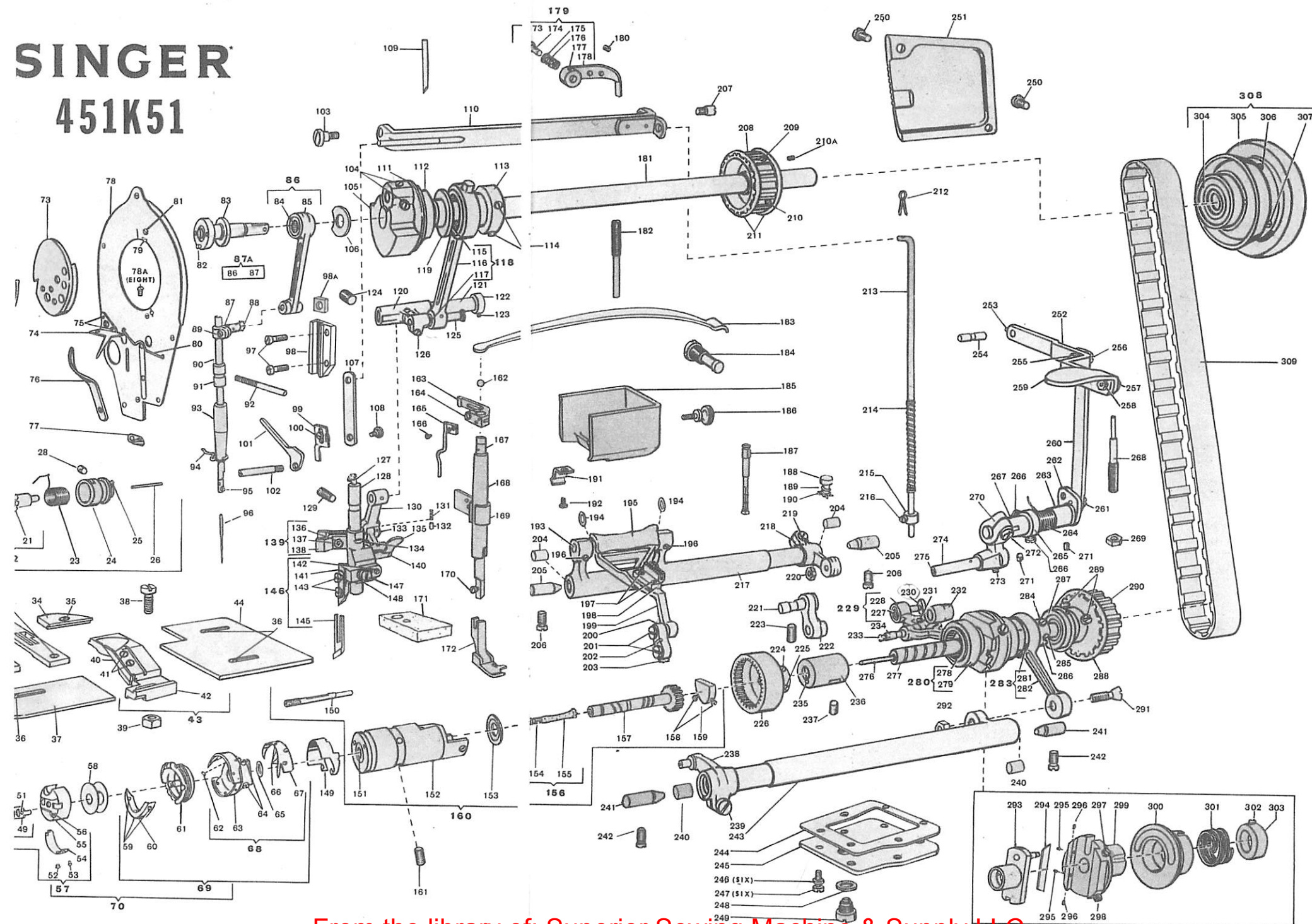
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451K51



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LIST OF PARTS FOR
451K51 MACHINE

Code No.	Part No.	Description.	Code No.	Part No.	Description.
1	276507	Rotary Take-up Guard Cover	78	276442	Face Plate
1A	106590-002	Rotary Take-up Guard Cover 276507 with 200161, 201537, 276038, 276508 and 350503	78A	350503	Face Plate Screw
1B	106592-002	Rotary Take-up Guard Cover complete, Nos. 67425, 106590-002, 200263, 230743 and 276506	79	272223	Thread Cutter (on Face Plate)
2	276038	Rotary Take-up Guard Cover Grill	80	272216	Rotary Take-up Guard Thread Shield
3	230743	Rotary Take-up Guard Cover Hinge Screw Thrust Washer	81	200583	Thread Cutter (on Face Plate) Screw
4	67425	Rotary Take-up Guard Cover Hinge Screw Spring Washer	82	276450	Rotary Take-up Mounting Disc Position Pin
5	200263	Rotary Take-up Guard Cover Hinge Screw	83	272206	Needle Bar Connecting Link Hinge Stud
6	200904	Thread Cutter (on Rotary Take-up Guard) Screw	84	270266	Needle Bar Connecting Link Needle Bearing
7	272224	Thread Cutter (on Rotary Take-up Guard)	85	93523	Needle Bar Connecting Link
8	141569	Rotary Take-up Guard Screw (long)	86	93524	Needle Bar Connecting Link 93523 with 270266
9	141570	Rotary Take-up Guard Screw (short)	87	93527	Needle Bar Connecting Stud
10	276506	Rotary Take-up Guard	87A	93528	Needle Bar Connecting Link 93524 with 93527
11	350503	Rotary Take-up Guard Cover Spring Catch Screw	88	202277	Needle Bar Connecting Stud Oil Packing Wick
12	276508	Rotary Take-up Guard Cover Spring Catch	89	350622	Needle Bar Connecting Stud Pinch Screw
13	201537	Rotary Take-up Guard Cover Spring Catch Screw Nut	90	270656	Needle Bar with 350621
14	200161	Rotary Take-up Guard Cover Grill Screw	91	270261	Needle Bar Bushing (upper)
14A	22889	Rotary Take-up Guard Cover Grill Lock Washer	92	350550	Needle Bar Bushing (upper) Set Screw
15	1560	Tension Thumb Nut	93	270124	Needle Bar Bushing (lower)
16	272219	Tension Spring	94	276464	Thread Guide (on Needle Bar Bushing)
17	272218	Tension Releasing Disc	95	350621	Needle Set Screw
18	202079	Tension Wheel Washer (felt)	96	200054	Needle, size 16 (88x9y)
19	272221	Tension Wheel (Rotary)	97	93525	Needle Bar Connecting Link Guide Block Screw
20	50304	Tension Stud	98	93520	Needle Bar Connecting Link Guide Block
21	272220	Tension Washer	98A	93520	Needle Bar Connecting Link Slide Block
22	276225	Tension Stud with Washer	99	276048	Tension Releaser (adjustable)
23	272225	Thread Take-up Spring	100	200132	Tension Releaser Screw
24	52083	Thread Take-up Spring Regulator	101	276027	Presser Bar Lifter
25	50305	Tension Stud Set Screw	102	350442	Presser Bar Lifter Hinge Screw
26	54515	Tension Releasing Pin	103	200272	Knee Lifter Rock Frame Hinge Screw (front)
27	272222	Tension (Rotary) complete	104	200374	Needle Bar Connecting Link Hinge Stud Set Screw
28	453	Thread Take-up Regulator Set Screw	105	276023	Needle Bar Crank with two 200374
29	106516	Bed Slide complete	106	270505	Needle Bar Connecting Link Thrust Washer
30	5947	Bed Slide Spring	107	276014	Knee Lifter Lifting Link
31	226	Bed Slide Spring Screw	108	200293	Knee Lifter Lifting Link Hinge Screw
32	270646	Throat Plate	109	276053	Needle Bar Connecting Link Hinge Stud Oiling Felt
33	691	Throat Plate Screw	110	276017	Knee Lifter Rock Frame
34	270618	Knife (lower) Bracket Clamp Plate	111	272145	Needle Bar Connecting Link Hinge Stud Oiling Felt
35	691	Knife (lower) Bracket Clamp Plate Screw			Flange
36	219	Bed Cover Plate Screw	112	272143	Arm Shaft Ball Bearing (front)
37	270606	Bed Cover Plate (front)	113	270640	Knife (upper) Driving Eccentric
38	200040	Knife (lower) Bracket Screw Nut	114	200346	Knife (upper) Driving Eccentric Set Screw
39	201520	Knife (lower) Bracket Screw Nut	115	268063	Knife (upper) Driving Eccentric Needle Bearing (upper)
40	270616	Knife (lower)	116	270620	Knife (upper) Driving Connection
41	141668	Knife (lower) Bracket Pinch Screw	117	270653	Knife (upper) Driving Connection Needle Bearing (lower)
42	106517	Knife (lower) Bracket	118	270621	Knife (upper) Driving Connection 270620 with 268063 and 270653
43	106518	Knife (lower) Bracket Holder Assembly	119	270626	Knife (upper) Driving Eccentric Cap Washer
44	270605	Bed Cover Plate (back)	120	276458	Knife (upper) Driving Connection Crank
45	160	Rotating Hook Bobbin Case Holder Position Bracket Screw	121	270623	Knife (upper) Driving Connection Crank Hinge Stud
46	276561	Rotating Hook Bobbin Case Holder Position Bracket	122	202574	Knife (upper) Driving Connection Crank Hinge Stud
47	125320	Rotating Hook Bobbin Case Latch Lever			Collar
48	2974	Rotating Hook Bobbin Case Latch Lever Fulcrum Pin	123	200380	Knife (upper) Driving Connection Crank Hinge Stud
49	40392	Rotating Hook Bobbin Case Latch			Collar Set Screw
50	40393	Rotating Hook Bobbin Case Hinge complete	124	200347	Knife (upper) Driving Connection Crank Hinge Stud
51	592	Rotating Hook Bobbin Case Latch Stop Screw			Set Screw
52	591	Rotating Hook Bobbin Case Tension Spring Regulating Screw	125	270630	Knife (upper) Driving Link (upper half) Hinge Stud
53	1380	Rotating Hook Bobbin Case Tension Spring Screw	126	200190	Knife (upper) Driving Connection Crank Pinch Screw
54	40394	Rotating Hook Bobbin Case Tension Spring	127	268258	Knife (upper) Holder Bracket Stud Oil Packing Wick
55	52235	Rotating Hook Bobbin Case	128	276462	Knife (upper) Holder Bracket Stud
56	2975	Rotating Hook Bobbin Case Latch Spring	129	430	Knife (upper) Holder Bracket Stud Binding Screw
57	52237	Rotating Hook Bobbin Case complete	130	270629	Knife (upper) Driving Link (upper half)
58	272152	Rotating Hook Bobbin	131	203213	Knife (upper) Driving Link (upper half) Locking
59	1367	Rotating Hook Section Screw			Plunger Spring
60	270876	Rotating Hook Section	132	270631	Knife (upper) Driving Link (upper half) Locking
61	270872	Rotating Hook Bobbin Case Holder (chromium plated)			Plunger
62	143301	Rotating Hook Oil Wick	133	270632	Knife (upper) Driving Link Hinge Pin
63	272136	Rotating Hook with Retaining Washer and Set Screw	134	200136	Knife (upper) Driving Link Hinge Pin Set Screw
64	1253	Rotating Hook Set Screw	135	270627	Knife (upper) Driving Link (lower half)
65	270878	Rotating Hook Oil Retaining Washer	136	1735	Knife (upper) Holder Bracket Adjusting Screw Nut
66	1053	Rotating Hook Thread Guard Screw	137	152	Knife (upper) Holder Bracket Adjusting Screw
67	270874	Rotating Hook Thread Guard	138	276559	Knife (upper) Holder Bracket
68	272137	Rotating Hook 272136 with 270874 and four 1053	139	106520	Knife (upper) Holder Bracket 276559 with 152 and 1735
69	276232	Rotating Hook 272137 with 270872, 270876 and three 1367	140	210	Knife (upper) Driving Link (lower half) Retaining Screw
70	276233	Rotating Hook with 52237	141	106519	Knife (upper) Holder
71	200577	Rotary Take-up Screw	142	141610	Knife (upper) Holder Adjusting Screw
72	276560	Rotary Take-up	143	50123	Knife (upper) Screw
73	272217	Rotary Take-up Mounting Disc	145	270619	Knife (upper)
74	276503	Face Plate Thread Guard	146	106521	Knife (upper) Holder Assembly
75	141568	Face Plate Thread Guard Screw	147	898	Knife (upper) Holder Screw
76	276447	Tension Rotary Threading Guide	148	202101	Knife (upper) Holder Screw Washer
77	276051	Thread Guide	149	270879	Rotating Hook Oil Guard

Code No.	Part No.	Description.	Code No.	Part No.	Description.
150	350498	Rotating Hook Shaft Regulating Screw	231	200394	Feed Driving Connection Link Hinge Pin Set Screw
151	270880	Rotating Hook Shaft Bushing Oil Packing (wick)	232	276165	Feed Reversing Shaft Crank Link
152	272228	Rotating Hook Shaft Bushing	233	244071	Feed Driving Connection Link Hinge Pin Oil Packing Wick
153	270044	Rotating Hook Shaft Thrust Washer	234	276171	Feed Driving Connection Link Hinge Pin
154	276061	Rotating Hook Shaft Oil Filter (wick) Holder	235	276046	Rotating Hook Driving Shaft Bushing Oil Packing (wick)
155	202423	Rotating Hook Shaft Oil Filter (wick)	236	276045	Rotating Hook Driving Shaft Bushing
156	276062	Rotating Hook Shaft Oil Filter complete	237	200346	Rotating Hook Driving Shaft Bushing Set Screw
157	276059	Rotating Hook Shaft	238	272109	Feed Bar Lifting Crank
158	201215	Rotating Hook Shaft End Bearing Screw	239	200040	Feed Bar Lifting Crank Pinch Screw
159	270164	Rotating Hook Shaft End Bearing	240	270942	Feed Lifting Rock Shaft Insert (nylon)
160	272229	Rotating Hook Shaft Bushing complete	241	270941	Feed Lifting Rock Shaft Centre
161	200346	Rotating Hook Shaft Bushing Set Screw	242	201254	Feed Lifting Rock Shaft Centre Set Screw
162	276025	Presser Bar Ball 7/32" diam.	243	272118	Feed Lifting Rock Shaft
163	272122	Presser Bar Position Guide	244	276491	Rotating Hook Oil Reservoir Cover Gasket
164	350411	Presser Bar Position Guide Pinch Screw	245	276246	Rotating Hook Oil Reservoir Cover
165	276057	Thread Pull-off	246	272154	Rotating Hook Oil Reservoir Cover Washer (fibre)
166	200145	Thread Pull-off Screw	247	200041	Rotating Hook Oil Reservoir Cover Screw
167	272121	Presser Bar	248	276245	Rotating Hook Oil Reservoir Drain Plug Gasket
168	276446	Presser Bar Bushing	249	276244	Rotating Hook Oil Reservoir Drain Plug
169	276028	Presser Bar Lifting Releasing Lever Bracket	250	200053	Arm Cover (back) Screw
170	176	Presser Foot Screw	251	276002	Arm Cover (back)
171	270058	Needle Bar Oiling Felt	252	276157	Feed Reversing Lever
172	106522	Presser Foot (hinged)	253	350477	Feed Reversing Lever Hinge Pin Set Screw
173	210958	Pre-Tension Stud Collar	254	276159	Feed Reversing Lever Hinge Pin
174	272209	Pre-Tension Stud	255	201520	Feed Reversing Lever Connection Hinge Screw (upper) Nut
175	210993	Pre-Tension Sleeve	256	350509	Feed Reversing Lever Connection Hinge Screw (upper)
176	272208	Pre-Tension Spring	257	200575	Feed Reversing Lever Handle Screw
177	200397	Pre-Tension Collar Set Screw	258	201529	Feed Reversing Lever Handle Nut
178	272207	Pre-Tension Bracket	259	276160	Feed Reversing Lever Handle
179	272210	Pre-Tension complete	260	276158	Feed Reversing Lever Connection
180	109857	Pre-Tension Bracket Screw	261	201107	Feed Reversing Lever Connection Hinge Screw (lower)
181	276452	Arm Shaft	262	276465	Feed Reversing Shaft
182	350435	Presser Bar Spring Screw (Pressure Regulating)	263	276162	Feed Reversing Shaft Bushing (back)
183	272123	Presser Bar Spring	264	276456	Feed Reversing Shaft Spring
184	350499	Presser Bar Spring Screw Stud	265	276457	Feed Reversing Shaft Spring Adjusting Collar
185	276557	Knife (upper) Driving Connection Crank Oil Guard	266	200092	Feed Reversing Shaft Spring Adjusting Collar Set Screw
186	201048	Knife (upper) Driving Connection Crank Oil Guard Thumb Screw	267	276179	Feed Reversing Shaft Bushing (front)
187	270155	Rotating Hook Oil Reservoir Oil Gauge	268	350569	Feed Reversing Lever Stop Pin
188	270140	Feed Regulating Stud	269	201524	Feed Reversing Lever Stop Pin Nut
189	270026	Feed Regulating Stud Spring	270	276163	Feed Reversing Shaft Crank
190	240245	Feed Regulating Stud Retaining Spring	271	200382	Feed Reversing Shaft Bushing Set Screw
191	270637	Knife (upper) Holder Bracket Latch	272	200040	Feed Reversing Shaft Crank Pinch Screw
192	200130	Knife (upper) Holder Bracket Latch Screw	273	200386	Feed Reversing Shaft Hinge Stud Set Screw
193	272107	Feed Bar Hinge Pin	274	276164	Feed Reversing Shaft Crank Hinge Stud
194	272108	Feed Bar Hinge Pin Washer	275	276046	Feed Reversing Shaft Crank Hinge Stud Oil Packing (wick)
195	272112	Feed Bar Hinge Pin Lubricating Felt	276	270036	Rotating Hook Driving Shaft Oil Lead Wire
196	200394	Feed Bar Hinge Pin Set Screw	277	276044	Rotating Hook Driving Shaft
197	208	Feed Dog Screw	278	270016	Feed Driving Connection Needle Bearing
198	149126	Feed Dog	279	276153	Feed Driving Connection
199	272106	Feed Bar	280	276154	Feed Driving Connection 276153 with 270016
200	272110	Feed Bar Lifting Link	281	270016	Feed Lifting Connection Needle Bearing
201	200169	Feed Bar Lifting Link Cap Screw	282	270013	Feed Lifting Connection
202	272111	Feed Bar Lifting Link Oil Wick Clamp	283	270014	Feed Lifting Connection 270013 with 270016
203	272115	Feed Bar Lifting Link Oil Wick	284	201220	Feed Lifting Eccentric Position Screw
204	270942	Feed Driving Rock Shaft Insert (nylon)	285	200382	Feed Lifting Eccentric Set Screw
205	270941	Feed Driving Rock Shaft Centre	286	276231	Feed Lifting Eccentric
206	201254	Feed Driving Rock Shaft Centre Set Screw	287	272144	Rotating Hook Driving Shaft Ball Bearing
207	200679	Knee Lifter Rock Frame Hinge Screw (back)	288	214206	Rotating Hook Driving Shaft Connection Belt Pulley Spring Flange
208	271127	Arm Shaft Connection Belt Pulley	289	200070	Rotating Hook Driving Shaft Connection Belt Pulley Set Screw
209	350492	Arm Shaft Connection Belt Pulley Position Screw	290	270169	Rotating Hook Driving Shaft Connection Belt Pulley
210	200347	Arm Shaft Connection Belt Pulley Set Screw	291	200545	Feed Lifting Connection Hinge Screw
210A	200363	Arm Shaft Connection Belt Pulley Set Screw	292	201522	Feed Lifting Connection Hinge Screw Nut
211	214206	Arm Shaft Connection Belt Pulley Spring Flange	293	270017	Feed Driving Eccentric
212	202302	Knee Lifter Lifting Rod Cotter Pin	294	240231	Feed Driving Eccentric Friction Glb
213	276015	Knee Lifter Lifting Rod	295	109918	Feed Driving Eccentric Friction Glb Adjusting Screw
214	276016	Knee Lifter Lifting Rod Spring	296	109917	Feed Driving Eccentric Friction Glb Adjusting Screw Set Screw
215	227227	Knee Lifter Lifting Rod Spring Collar	297	200333	Feed Driving Flange Position Screw
216	200113	Knee Lifter Lifting Rod Spring Collar Set Screw	298	200436	Feed Driving Flange Set Screw
217	272116	Feed Driving Rock Shaft	299	276180	Feed Driving Flange
218	276230	Feed Driving Connection Crank	300	276188	Feed Driving Eccentric Adjusting Disc
219	200040	Feed Driving Connection Crank Pinch Screw	301	270137	Feed Driving Eccentric Adjusting Disc Spring
220	201528	Feed Driving Connection Crank Hinge Screw Nut	302	201220	Feed Driving Eccentric Adjusting Disc Spring Collar Set Screw
221	276182	Feed Reversing Mechanism Support Stud	303	276009	Feed Driving Eccentric Adjusting Disc Spring Collar
222	276181	Feed Mechanism Support Stud	304	272142	Arm Shaft Ball Bearing (back)
223	200346	Feed Mechanism Support Stud Set Screw	305	141566	Machine Pulley Position Screw
224	201220	Rotating Hook Driving Shaft Gear Position Screw	306	141567	Machine Pulley Set Screw
225	200382	Rotating Hook Driving Shaft Gear Set Screw	307	101742	Machine Pulley complete
226	276047	Rotating Hook Driving Shaft Gear	308		
227	270653	Knife (upper) Driving Connection Needle Bearing (lower)	309	270926	Arm Shaft Connection Belt
228	276169	Feed Driving Connection Link			
229	276170	Feed Driving Connection Link 276169 with 270653			
230	350907	Feed Driving Connection Crank Hinge Screw			