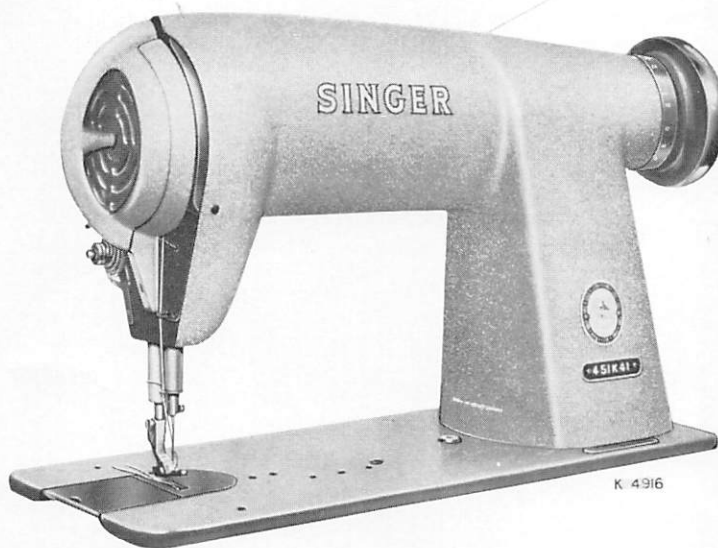


SERVICE MANUAL
AND
PARTS LIST
FOR
SINGER*
451K41, 451K45 AND 451K145
HIGH SPEED
SINGLE NEEDLE **LOCK STITCH**
MACHINES



Machine 451K41

THE SINGER MANUFACTURING COMPANY

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DESCRIPTION

Machine 451K41 produces top quality, high speed, lockstitching on dresses, skirts, shirts, blouses, brasieres, lingerie, ladies' overalls, children's wear, sportswear, rainwear, uniforms, aprons, caps and ties and many other similar light and medium weight garments.

Particularly designed for "wash and wear" materials, this machine has the following characteristics:

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.

Hinged presser foot 161066

Feed Dog 149031 (19 teeth) (22 teeth to the inch)

" " 149057 (21 ") (" " " " ")

Throat Plate 52033 for 149031

Throat Plate 147150 for 149057

Enclosed knee lifter rod and connections to knee lifter 228710.

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 272227, 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.

Maximum length of stitch, 6 to the inch.

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.

Machine 451K45 is similar to **Machine 451K41** except for these special features . . .

- **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.

- **Feed dog 149031**

- **Throat plate 52033**

- **Machine pulley 276530**: Large rim aluminium pulley designed for safety. Outside diameter of belt groove 2.9 inches. Effective diameter for 5/16 round leather belt, 2-3/8 inches.

Machine 451K145 is similar to **Reverse Feed Machine 451K45** except for these special features . . .

- **Designed for light, medium and medium-heavy fabrics.**

- **Long arm and bed.** Bed dimensions: Length, 18-3/4 inches. Width, 7 inches. Working space at right of needle, 11 inches.

- **Single needle**, Catalogue 1969 (135x39).

- **Feed dog 149366**

- **Throat plate 270326**

- **Needle bar stroke**, 1-5/16 inches

- **Presser bar lift**, 5/16 inches.

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.

MACHINE PULLEY

When machine is in operation, machine pulley always must turn over away from the operator, as shown in Fig. 3.

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 three 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.

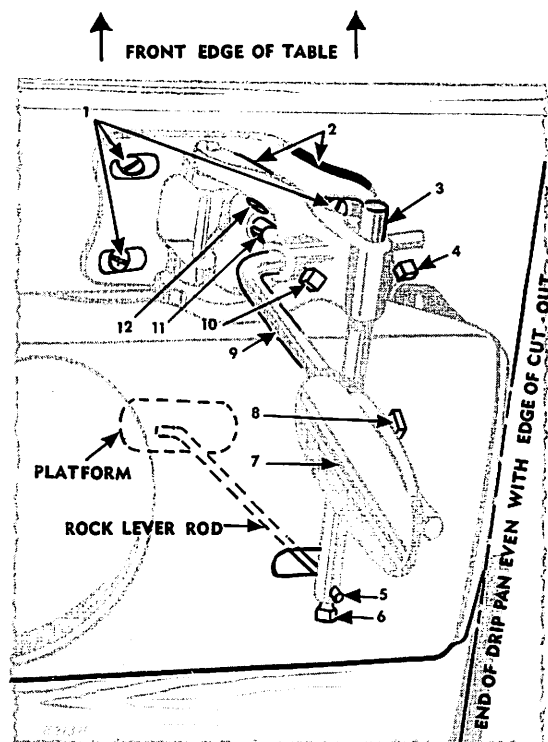


Fig. 2. Drip Pan and Knee Lifter beneath the Table

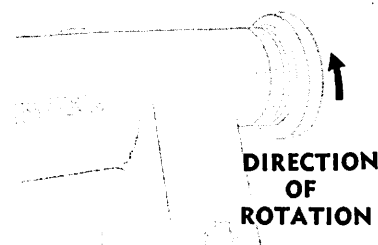


Fig. 3. Direction of Rotation

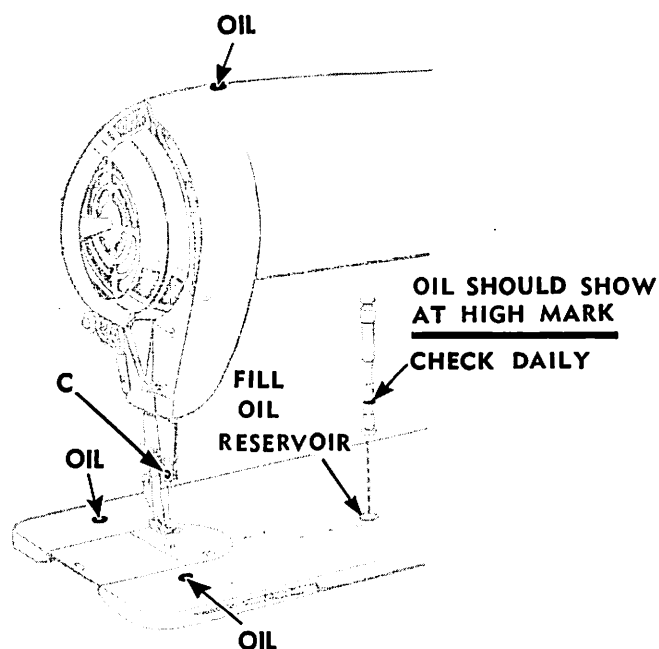


Fig. 4. Oil Reservoir and other Oiling Points on Machine

LUBRICATION AND CLEANING (Cont'd)

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 on page 4.

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 on page 6.

HOOK LUBRICATION TEST AND ADJUSTMENT

Thread machine, as instructed on pages 7 and 8.

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 20.

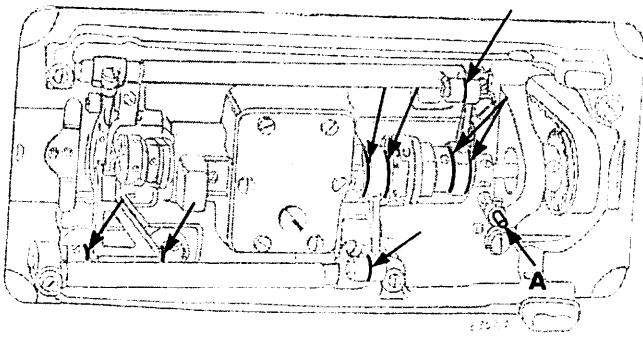


Fig. 5. Priming Points beneath Machine Bed

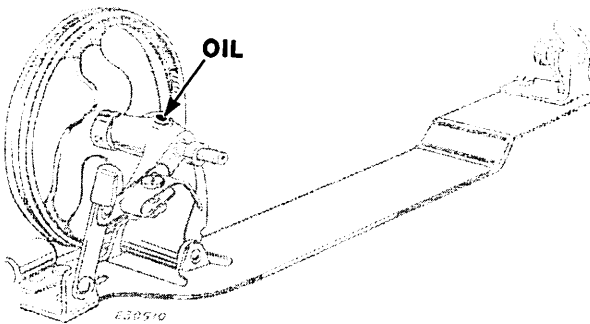


Fig. 6. Bobbin Winder Lubrication



Fig. 7. Approximate Spray Pattern

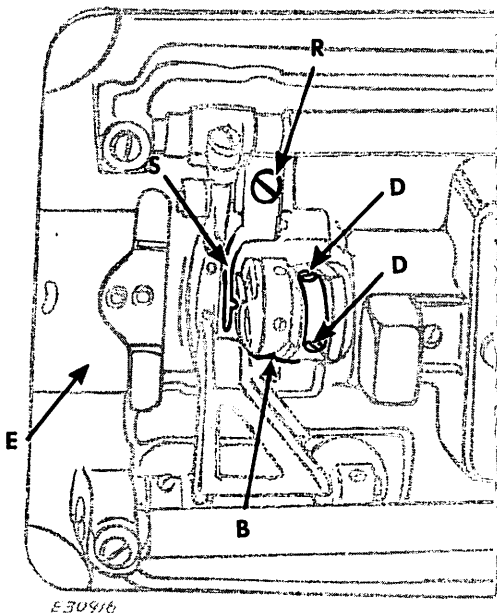


Fig. 8. Rotary Sewing Hook

HOOK LUBRICATION (Cont'd)

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 **276062** 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 20**.

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 at bottom of **page 5**. When hook lubrication is satisfactory, replace all parts removed earlier.

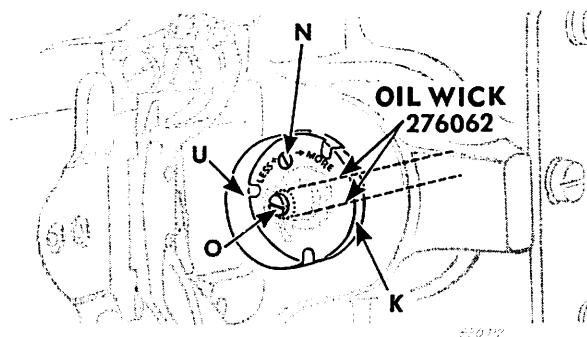


Fig. 9. Adjusting Oil Flow to Hook

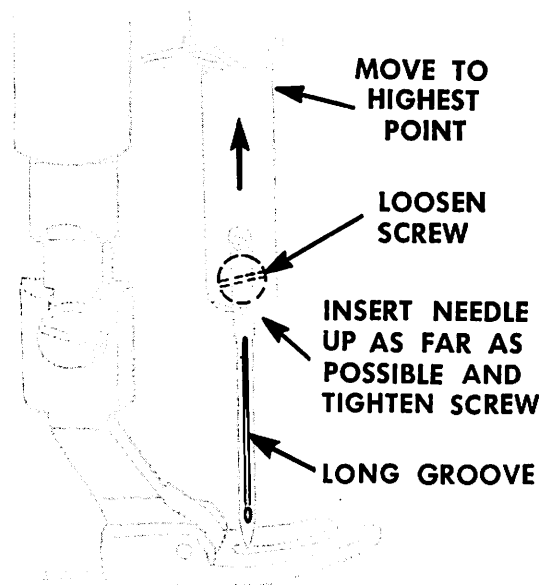


Fig. 10. Setting Needle

NEEDLES

Machines 451K41 and 451K45

Use SINGER* needles, Catalogue 1361 (88x9) made in Sizes 8 to 14 and 16 to 22.

These needles have a nickel finish but may be supplied with chromium finish when so ordered. Chrome plating of size 9 and smaller is not recommended.

Machine 451K145

Use SINGER* needles, Catalogue 1969 (135x39) made in Sizes 12, 13, 14, 16, 18, 19, 20, 21, 22 and 23.

These needles have a chrome finish.

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

Examples...

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

"100 Size 16, Catalogue 1969 (135x39) 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.

TO SET THE NEEDLE

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

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**) 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.

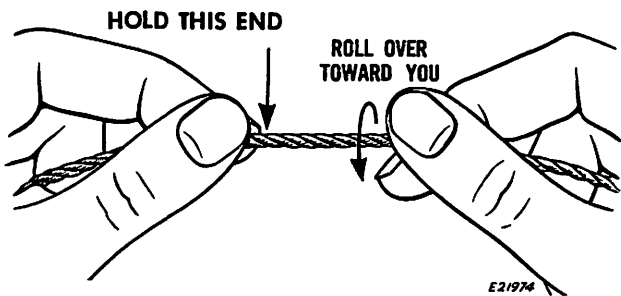


Fig. 11. How to Determine Thread Twist

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.

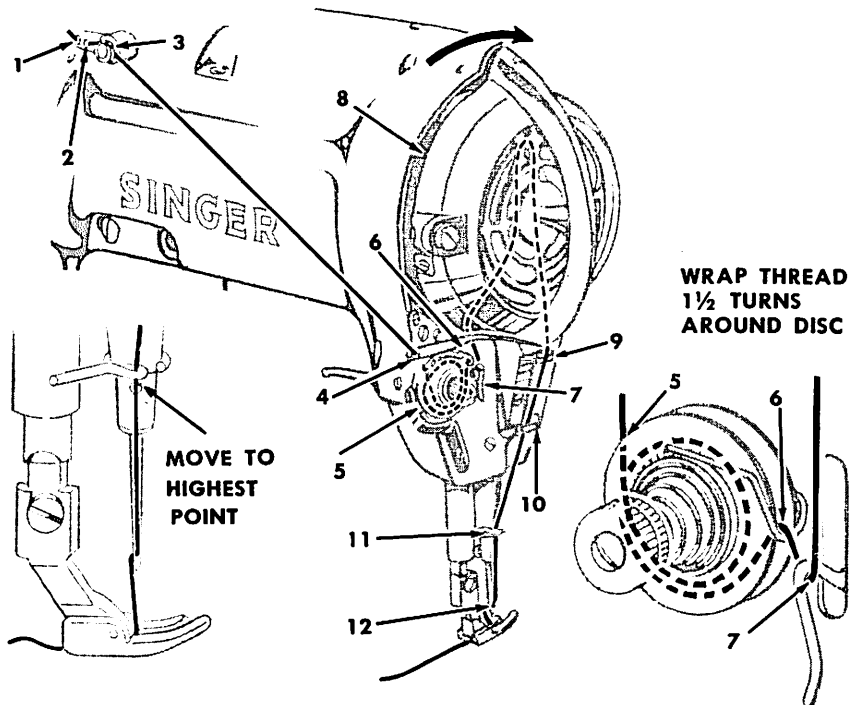


Fig. 12. Upper Threading Completed

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.

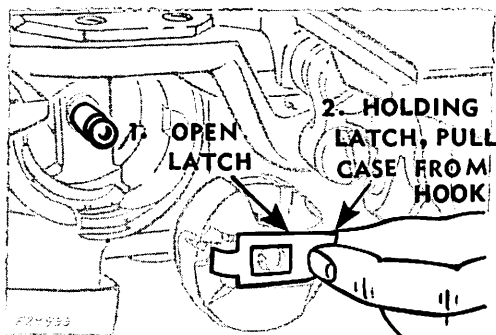


Fig. 13. Removing Bobbin Case from Sewing Hook

TO REMOVE BOBBIN

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

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.

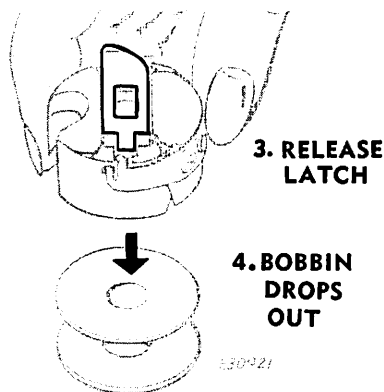


Fig. 14. Removing Bobbin from Case

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.

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.

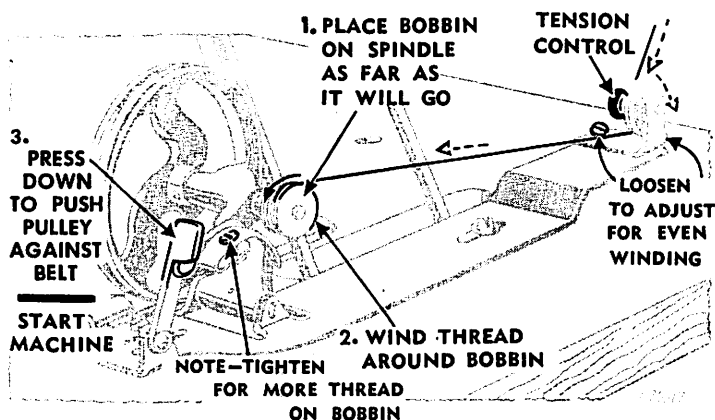


Fig. 15. Winding Bobbin

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.

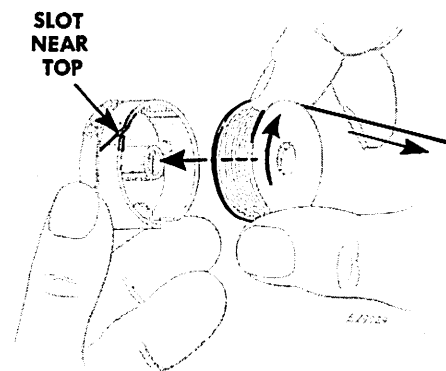


Fig. 16. Placing Bobbin in Bobbin Case

TO THREAD BOBBIN CASE

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

Hold bobbin case as shown in Fig. 16 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.

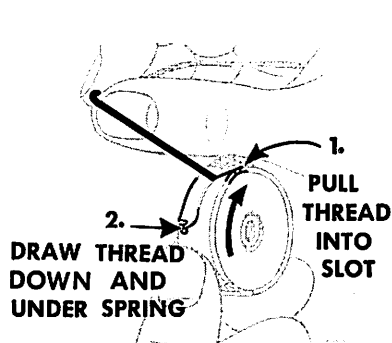


Fig. 17. Pulling Thread into the Slot

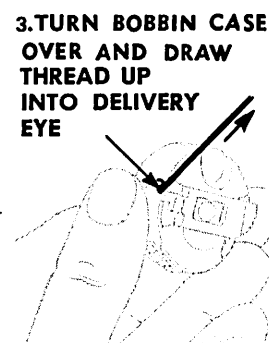


Fig. 18. Drawing Thread Under Tension Spring

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.

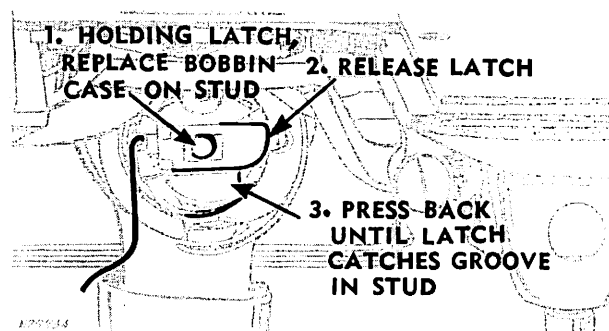


Fig. 19. Bobbin Case Threaded and Replaced

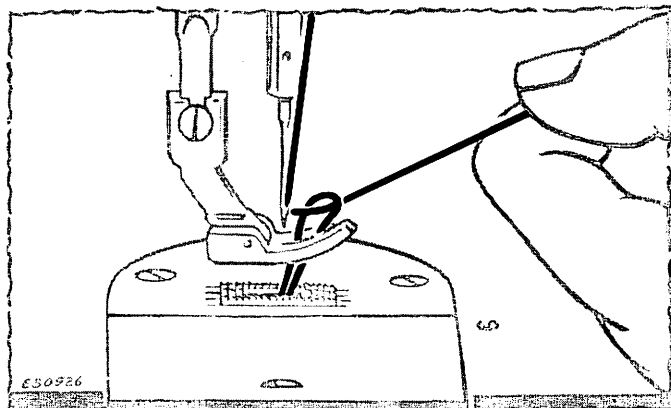


Fig. 20. Drawing Up Bobbin Thread

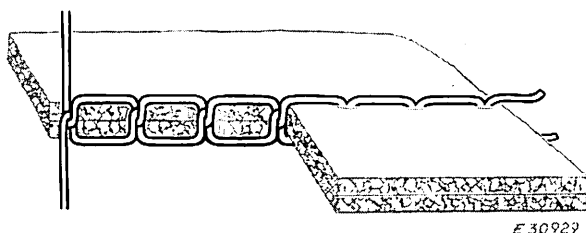


Fig. 21. Perfect Stitch

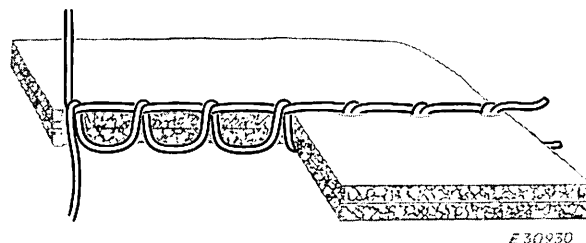


Fig. 22. Needle Thread Tension Too Tight

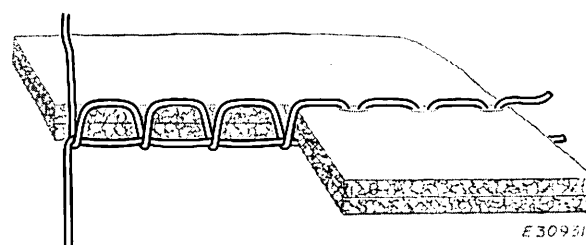


Fig. 23. Needle Thread Tension Too Loose

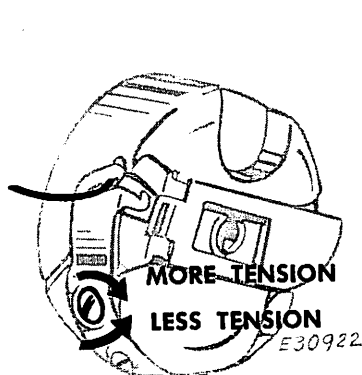


Fig. 24. Regulating Bobbin Thread Tension

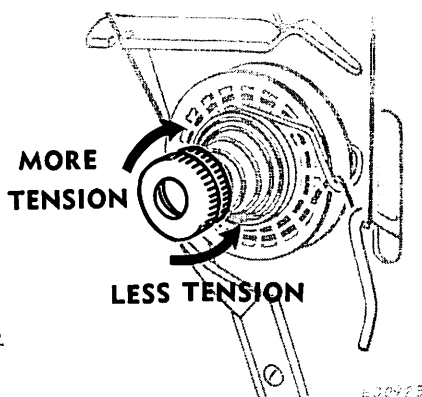


Fig. 25. Regulating Needle Thread Tension

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.

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.

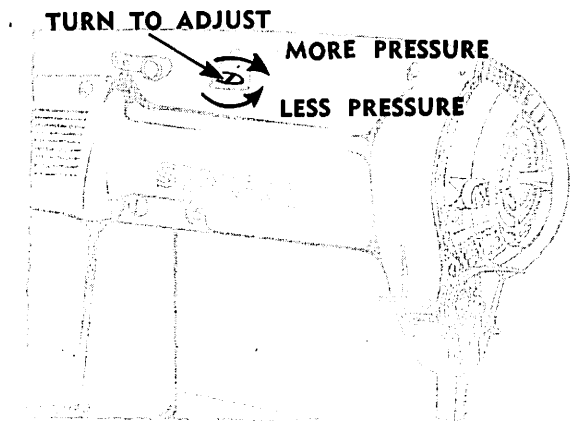


Fig. 26. Regulating Pressure on the Material

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.

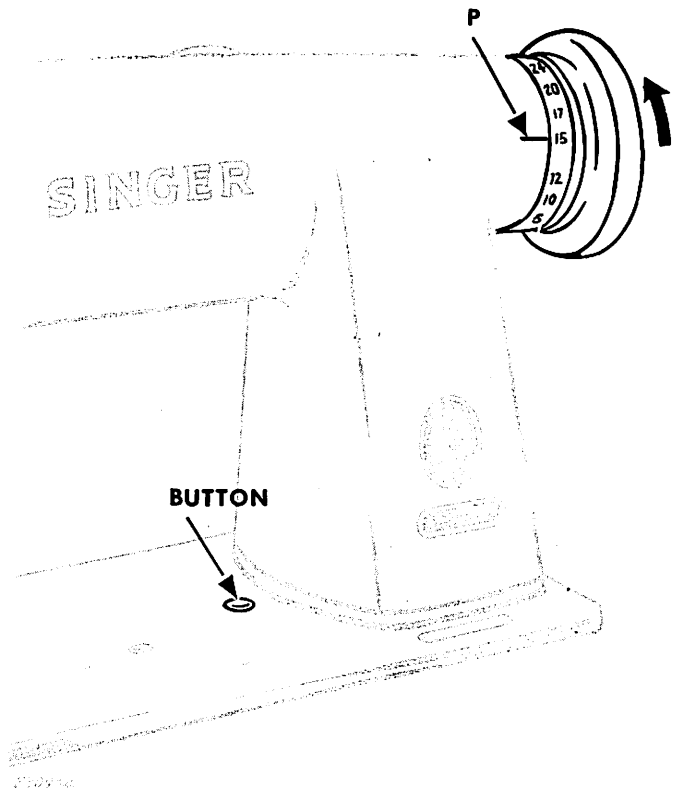


Fig. 27. Regulating Stitch Length

TO REVERSE THE FEED ON MACHINES 451K45 and 451K145

(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 19.

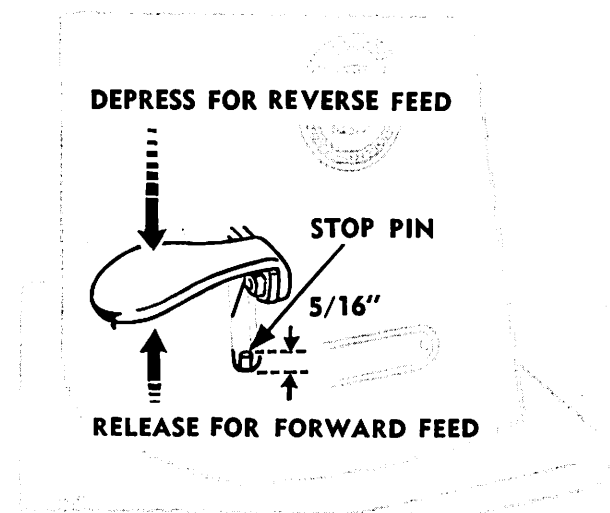


Fig. 28. Feed Reversing Lever

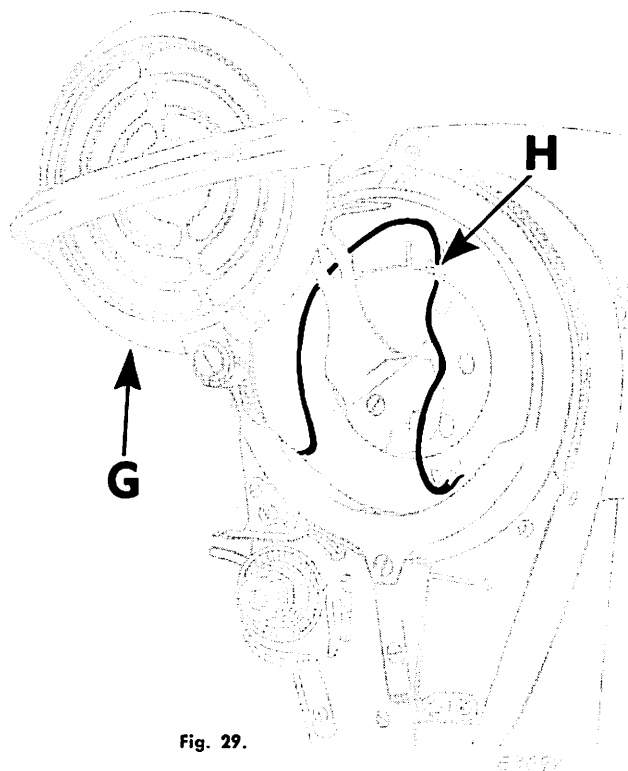


Fig. 29.

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 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.

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 pages 6 and 7.
3. Thread machine correctly, as instructed on pages 7 and 8.
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.

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 and 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 451K are made with extreme precision in machining and assembly, and "Superfinish" 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 of these machines . . .

- Height of presser foot above throat plate:
Machines **451K41** and **451K45**, **9/32** inch.
Machine **451K145**, **5/16** inch.
 - Needle bar stroke:
Machines **451K41** and **451K45**, **1-9/64** inches.
Machine **451K145**, **1-5/16** inches.
 - Rise of needle bar from lowest position to position where hook point reaches centre of needle (LOOP LIFT):
Machines **451K41** and **451K45**, **.085** inch.
Machine **451K145**, **.100** 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 slight variations from these settings.**

BALL BEARING AND NEEDLE BEARING NOTES

There are three ball bearings and three needle bearings in each of these machines. With reasonable care these bearings should enjoy a long and trouble-free life.

Follow oiling instructions given on **pages 4, 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 three 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 **pages 6 and 7**.)
3. Threading. (See **pages 7 and 8**.)
4. Speed of machine. (See **page 3**.)
5. Lubrication condition. (See **pages 4, 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 4, 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 13 through 16** 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. 30**, **page 13**, on take-up is in line with mark **F2**, **Fig. 30** on face plate, at same time that mark **G2**, **Fig. 31**, **page 13**, is in line with timing mark **H2**, **Fig. 31** on feed lifting connection.

To adjust for average sewing conditions, loosen the two pulley screws **A2**, **Fig. 31**; align timing marks **E2** and **F2**, **Fig. 30** and turn shaft **B2**, **Fig. 31** as required to align arrow **G2** with mark **H2**, **Fig. 31**.

Securely tighten screws **A2**.

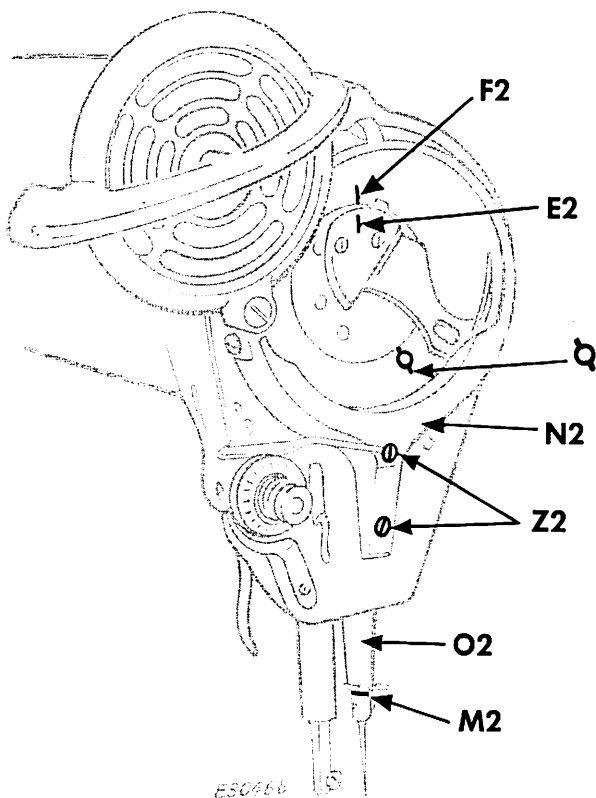


Fig. 30. Timing Mark on Take-up

2. SETTING NEEDLE BAR AT CORRECT HEIGHT

Turn machine pulley over away from you until timing mark E2, Fig. 30 on take-up is in line with mark F2, Fig. 30 on face plate.

Needle bar should then be at its highest position and lower timing mark M2, Fig. 30 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. 30 and loosen needle bar connecting stud pinch screw L2, Fig. 32, 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. 32.

Raise or lower needle bar as required to bring eye of needle just above needle guard of bobbin case holder, as shown in Fig. 33, allowing freedom for needle thread.

Securely tighten screw L2.

Figures 34 and 35 illustrate opposite extremes of incorrect settings of needle bar in relation to needle guard on bobbin case holder.

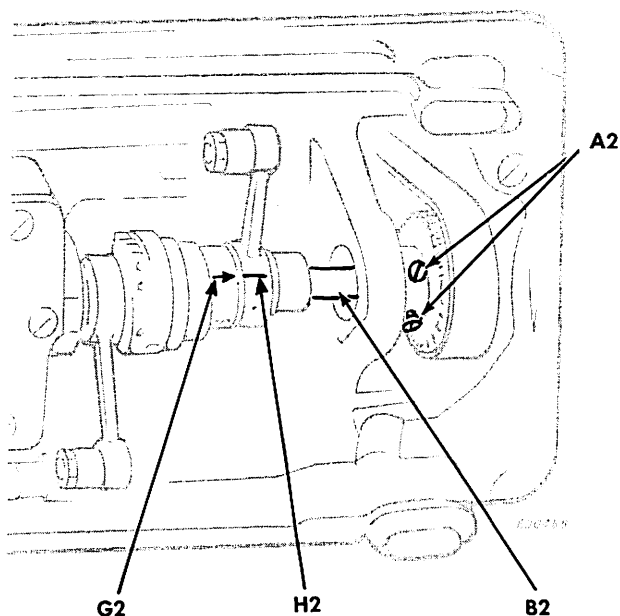


Fig. 31. Timing Mark on Feed Lifting Connection

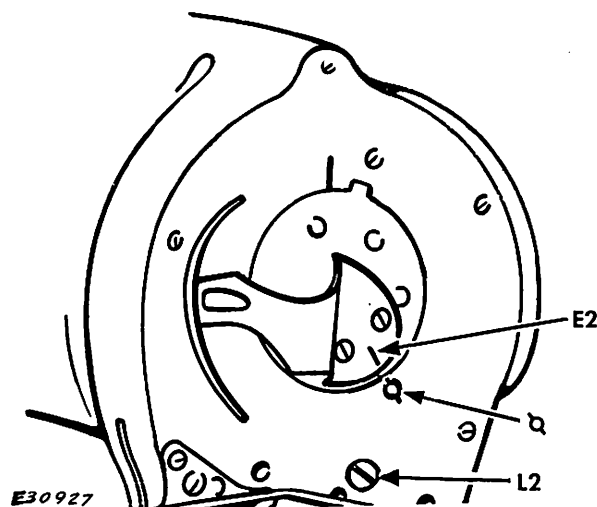


Fig. 32. Needle Bar Setting

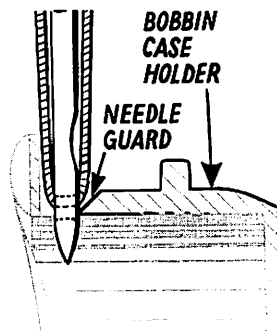


Fig. 33. Correct Height of Needle when at Bottom of Stroke

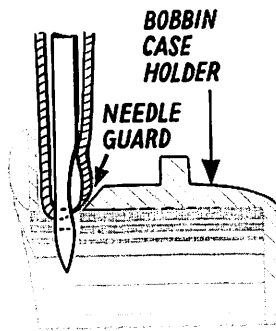


Fig. 34. Needle Too Low when at Bottom of Stroke

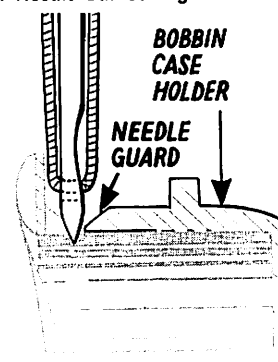


Fig. 35. Needle Too High when at Bottom of Stroke

4. TO RESET NEEDLE BAR BUSHING

Remove face plate, as instructed on page 16.

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

Drive needle bar bushing O2, Fig. 30, page 13 up or down in casting as required to bring its lower end level with the lower timing mark M2, Fig. 30 on needle bar.

Replace face plate, as instructed on page 16.

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 6.

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. 36.

At this setting, point of sewing hook should be at centre of needle, as shown in inset in Fig. 37. 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. 37 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. 37.

Rotate bobbin case holder T, Fig. 37, almost a half-turn, so that needle will not contact needle guard on bobbin case holder.

Then, loosen set screw J, Fig. 37 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. 38 and bobbin case holder, T, Fig. 38 should be just sufficient to allow thickness of thread to pass through easily. Normally this requires an .020 inch to .022 inch clearance, as shown in Fig. 38.

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.

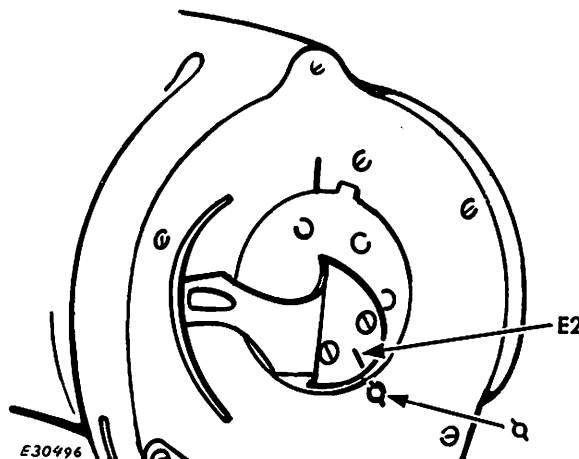


Fig. 36. Timing Marks for Hook

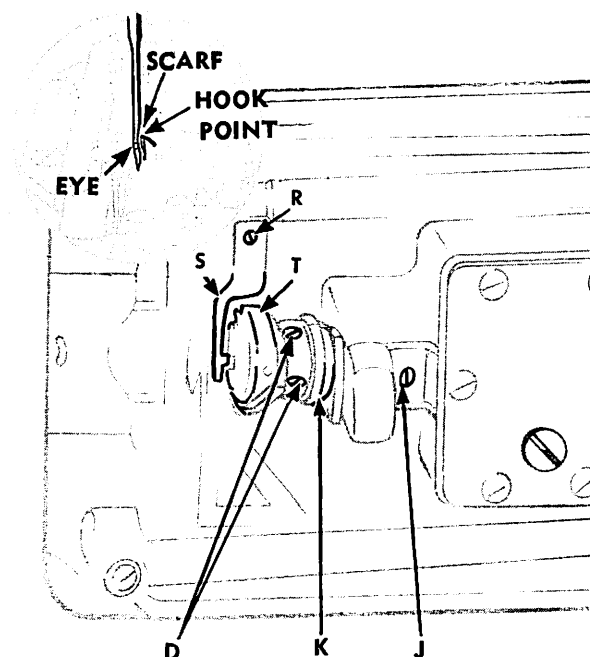


Fig. 37. Setting the Hook

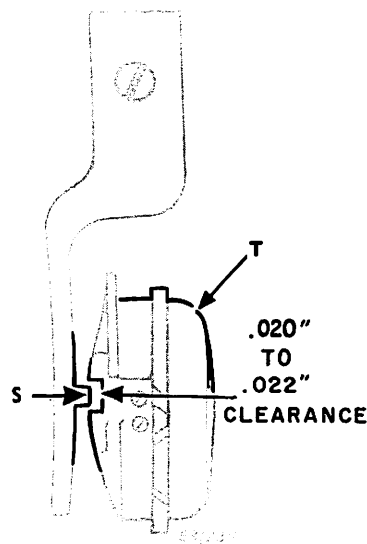


Fig. 38. Bobbin Case Holder Position Finger

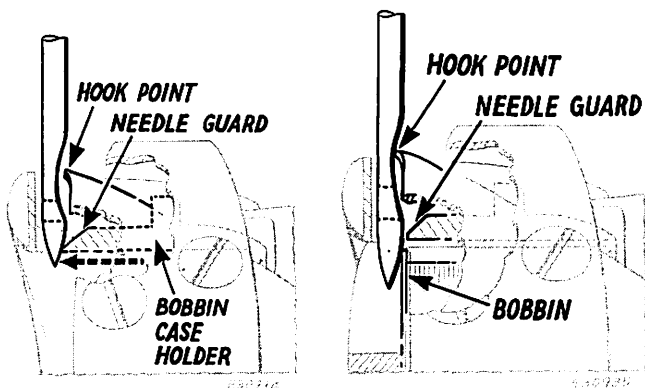


Fig. 39. Correct Relationship of Needle-Guard to Hook Point at Loop-taking Time

Fig. 40. Needle Contacting Hook Point and Bobbin (Too Much Metal Removed from Guard)

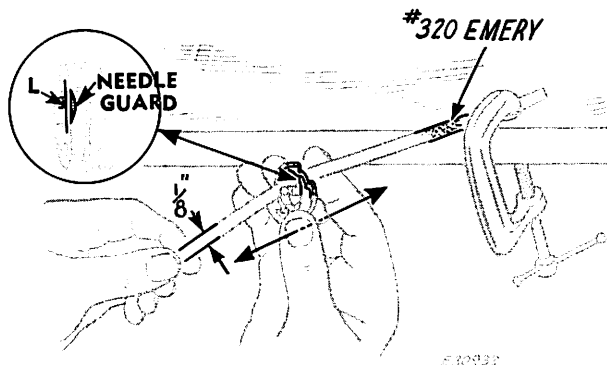


Fig. 41. Stringing the Needle Guard

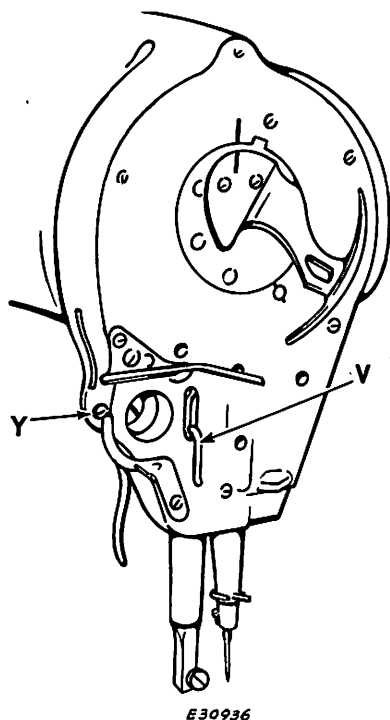


Fig. 42. Removing Check-Spring

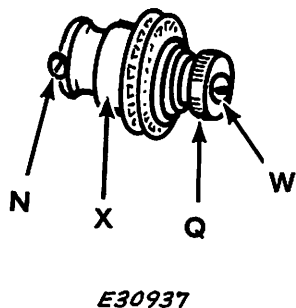


Fig. 43. Check-Spring Assembly Removed from Machine

8. FUNCTION OF BOBBIN CASE HOLDER NEEDLE GUARD

Needle guard on bobbin case holder (see inset in Fig. 41) 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. 39.

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. 41 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 12 through 14, 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 20.

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. 41.

Extreme care must be taken not to remove too much metal as this will allow hook point to rub needle, as shown in Fig. 40, 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. 40; 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 20.

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. 42 and 44 (with presser foot resting on throat plate.)

To position check-spring, loosen screw Y, Fig. 42 and remove complete tension assembly. Loosen set screw N, Fig. 43. Turn thumb nut Q, Fig. 43 out toward slotted end of stud W, Fig. 43 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. 43. Securely tighten set screw N.

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. 44.

HEIGHT VARIATIONS (FOR REVERSE FEED MACHINES)

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. 44.)

To adjust tension, loosen screw Y, Fig. 45 and remove entire assembly. Loosen set screw N, Fig. 43, page 15 and, while holding regulator X, Fig. 43, turn stud over slightly toward left to increase tension or toward right to decrease tension. Tighten screw N, Fig. 43, and replace assembly in machine with spring at "2 o'clock" as shown in Fig. 44.

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. 30, page 13 and take-up guard N2, Fig. 30.
2. Remove two screws Q2 and rotary take-up V2, Fig. 45.
3. Loosen screw Y, Fig. 45 and remove needle thread tension assembly.
4. Remove nine screws F, Fig. 45 and remove thread guide I, tension threading guide M and face plate P2, Fig. 45.

REPLACEMENT

1. Install face plate P2, guide M and guide I as shown in Fig. 45, fastening them to machine casting with nine screws F, Fig. 45.
2. Replace take-up V2 and two screws Q2, Fig. 45.
3. Replace needle thread tension assembly and securely tighten set screw Y, Fig. 45.
4. Inspect check-spring setting as instructed on page 15 and above.
5. Replace take-up guard N2, Fig. 30, page 13 and securely tighten two screws Z2, Fig. 30.

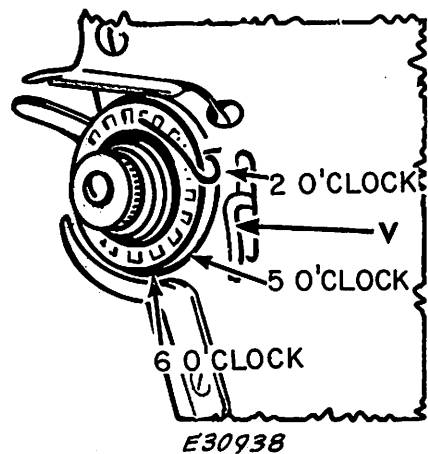


Fig. 44. Setting the Check-Spring

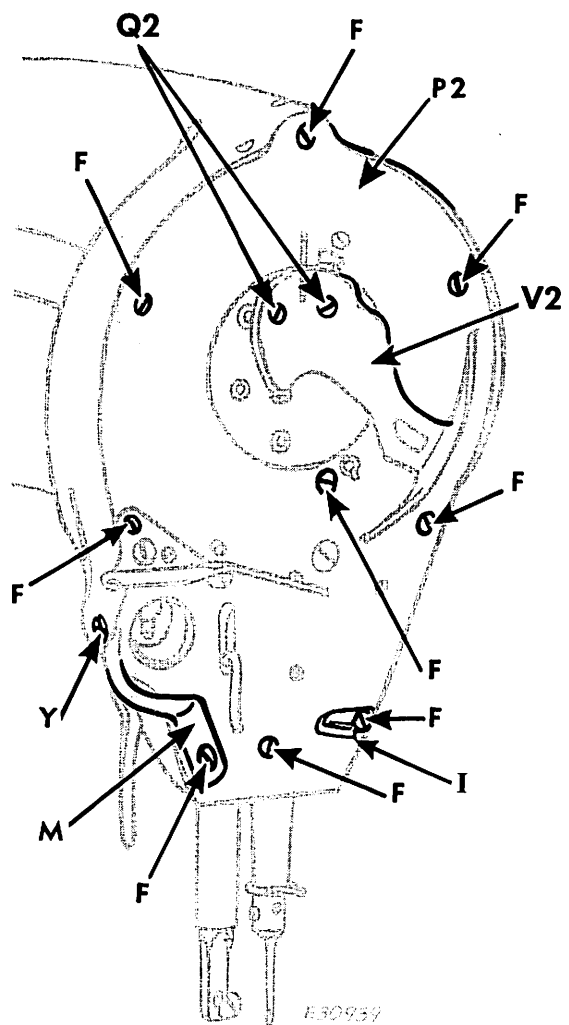


Fig. 45. Removing Face Plate

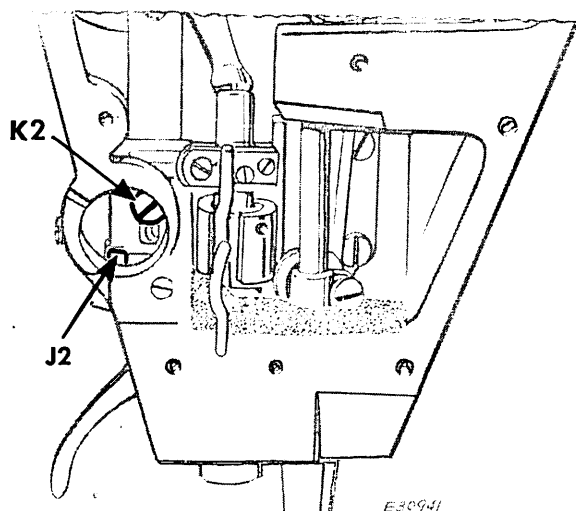


Fig. 46. Adjustment for
Needle Thread Tension Releaser

TO ADJUST THE NEEDLE THREAD TENSION RELEASER

Tension releaser J2, Fig. 46 automatically releases spring pressure on tension discs when presser bar is raised.

To adjust, loosen screw K2, Fig. 46.

To release tension earlier, raise releaser J2.

To release tension later, lower releaser J2.

When correct setting is obtained, securely tighten screw K2.

VARIATION

To prevent premature release of tension, when stitching heavy material, releaser J2 should be set lower than when stitching light work.

TO SET PRESSER BAR AT THE CORRECT HEIGHT

PREPARATION

Remove face plate, as instructed on page 16.

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 between presser foot and throat plate:
 - 9/32 inch for Machines 451K41 and 451K45
 - 5/16 inch for Machine 451K145
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. 47 and lifting bracket W2, as shown in Fig. 47.
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. 47.

SETTING

- Release presser bar lifting lever, lowering presser foot.

- Loosen clamping screw D2, Fig. 47.

- Raise or lower guide C2, Fig. 47 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 15 and 16.

OTHER ADJUSTMENTS

- Presser bar bushing U2, Fig. 47, should be set so that its top is even with top of lifting bracket W2, Fig. 47 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.

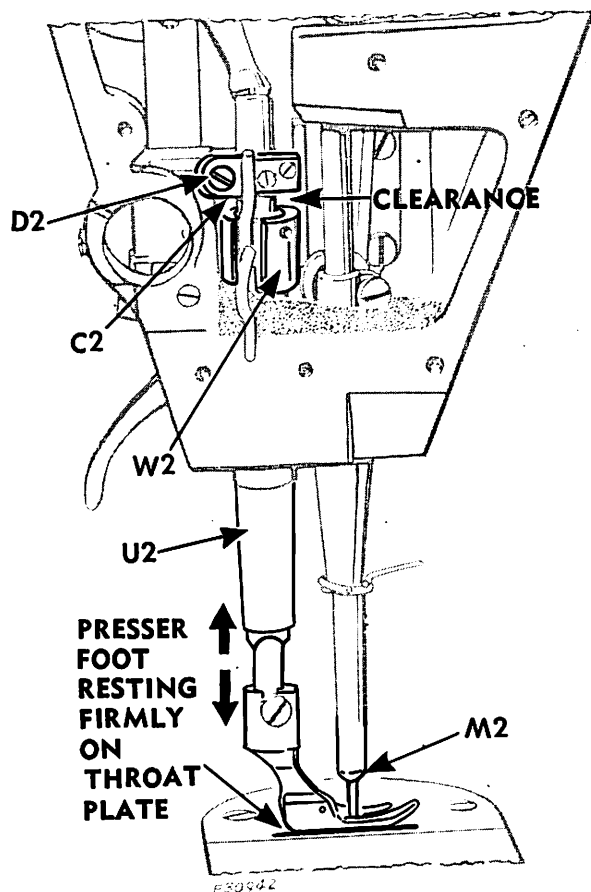


Fig. 47. Checking Height of
Presser Bar

TO TIME THE FEED

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

- Timing line **G2**, Fig. 48 on feed driving eccentric collar in line with timing line **H2** on feed lifting connection, as shown in Fig. 48, at same time that timing line **E2**, Fig. 49 on rotary take-up is in line with timing line **F2** on face plate, as shown in Fig. 49.

This alignment (see page 12) 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 10.
- Loosen two screws **A2**, Fig. 48 on pulley.
- Turn hook driving shaft **B2**, Fig. 48, 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 14.

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.

SIDELINE 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. 50.

By moving bearing centres at **K3**, Fig. 50 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**.

LENGTHWISE SETTING

Set machine for longest stitch as instructed on page 10.

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

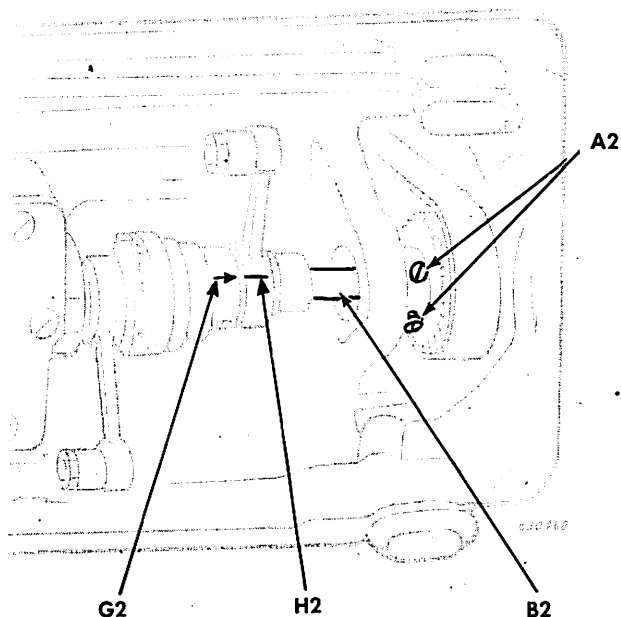


Fig. 48. Timing the Feed

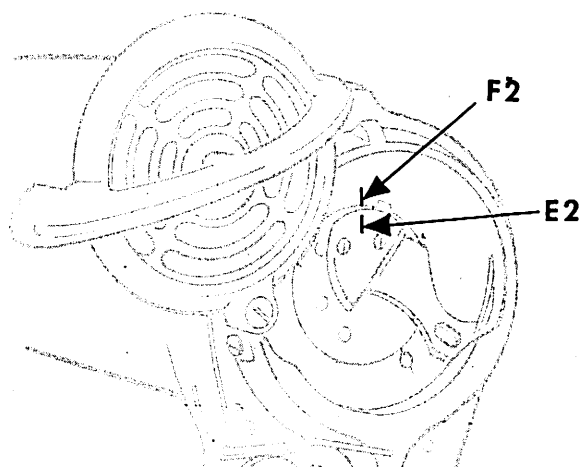


Fig. 49. Timing Marks on Take-up and on Face Plate

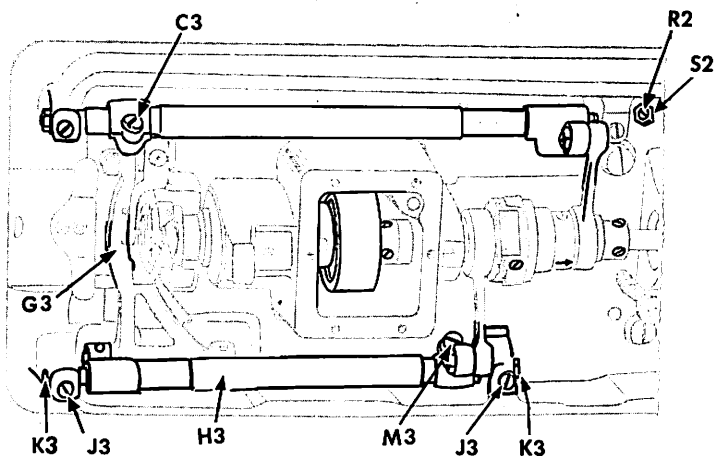


Fig. 50. Adjusting the Feed Dog

Loosen pinch screw **M3**, Fig. 50 and move feed bar **G3** and rock shaft **H3**, as required.

Securely tighten screw **M3**.

Set feed dog at correct height.

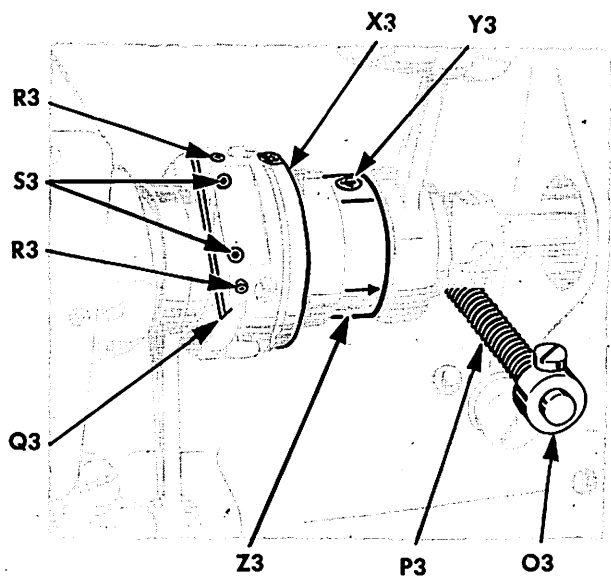


Fig. 51. Adjusting the Feed Eccentrics

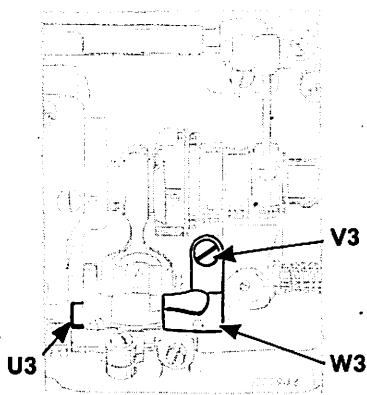


Fig. 52. Adjusting the Reverse Feed Mechanism
(Machines 451K45 and 451K145)

TO SET FEED DOG AT CORRECT HEIGHT

Before checking height of feed dog, set machine for **longest stitch**, as instructed on **page 10**.

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. 50, in feed lifting crank and raise or lower feed bar G3, Fig. 50, 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 10, is normally set $\frac{5}{16}$ 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. 50, page 18 and turn stop pin R2, Fig. 50 upward or downward, as required.

If stop pin R2 is set too low, hinge stud U3, Fig. 52 will strike side of oil reservoir beneath machine bed.

Securely tighten nut S2 when correct setting is obtained.

TO ADJUST FEED DRIVING ECCENTRIC GIB

Feed eccentric is provided with a gib Q3, Fig. 51 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. 51 nearest gib Q3; then turn in two adjusting screws S3, Fig. 51 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. 51 firmly and securely tighten locking screws R3, Fig. 51. Feed driving eccentric X3, Fig. 51 will then be locked and stitch length cannot be changed.

TO ADJUST FEED LIFTING ECCENTRIC CAM

A spring held by collar Z3, Fig. 51 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. 51, between bed casting and collar O3, Fig. 51, 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 (Machines 451K45, 451K145)

Position in which crank W3, Fig. 52 is secured to feed reversing shaft determines **actual** travel of feed dog with respect to setting of feed driving eccentric X3, Fig. 51.

Correct position can best be obtained by trial.

Set eccentric X3 to **6 stitches per inch**, as instructed on **page 10**. Place clean piece of paper beneath presser foot. Lower presser foot. **DO NOT DEPRESS FEED REVERSING HANDLE**. Loosen pinch screw V3, Fig. 52 and rotate crank W3 on its shaft until exactly **6 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 10**.

THE BOBBIN CASE HOLDER

REMOVAL

Remove needle.

Remove bobbin case and bobbin, as instructed on page 7.

Remove large screw R and position finger S, Fig. 53.

Turn hook body B, to position shown in Fig. 53 and remove three small screws A4 and hook-section C4, Fig. 53.

Turn bobbin case holder in hook to position shown in Fig. 53 and slip bobbin case holder out of hook.

REPLACEMENT

Turn hook B to position shown in Fig. 53.

Install bobbin case holder T in hook body, keeping holder T in the relative position to hook body shown in Fig. 53.

Replace hook section C4, fastening it to hook body with three small screws A4, Fig. 53.

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. 53.

Replace position finger S, as shown in Fig. 53 fastening it to machine with screw R.

Set thread clearance of position finger, as instructed on page 14.

Replace needle, as instructed on page 6.

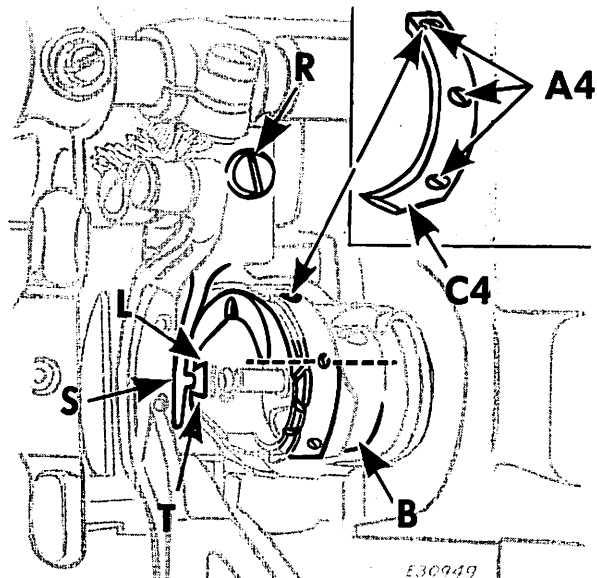


Fig. 53. Position of Bobbin Case Holder, in Relation to Hook; Necessary for Removal or Replacement

THE SEWING HOOK

REMOVAL

Remove needle, slide plate and bobbin case. Remove screw R, Fig. 54. Remove bobbin case holder position finger S, Fig. 54. Loosen two screws D, Fig. 54 in hub of hook. Turn machine pulley over away from you until feed bar G3, Fig. 55 is raised to its highest point. Turn sewing hook until thread guard F3 is at the bottom, as shown in Fig. 54. Turn bobbin case holder until it is in position shown in Fig. 55.

Remove sewing hook from machine.

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

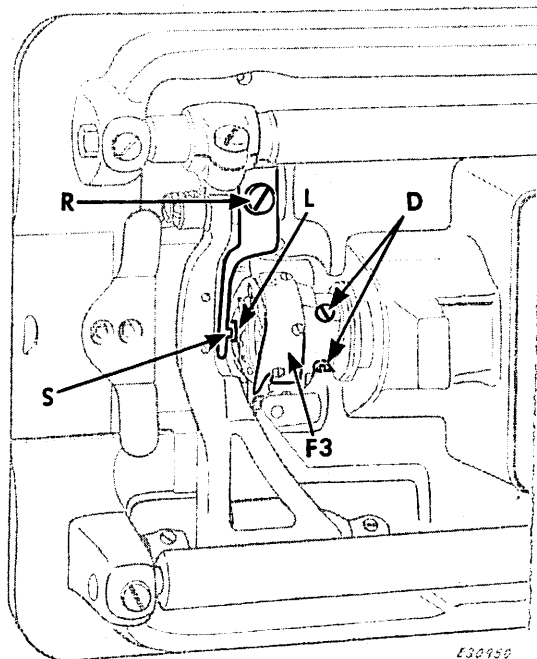


Fig. 54. Sewing Hook in Place

REPLACEMENT

When replacing sewing hook on shaft, have thread guard F3, Fig. 55 at bottom of hook and bobbin case holder T turned to position shown in Fig. 55, so that hook will clear feed bar G3. Press hook all the way on shaft.

Turn bobbin case holder T, Fig. 53 until notch L is at top, as shown in Fig. 53. Replace position finger S, Fig. 54, being careful to see that position finger enters notch L at top of bobbin case holder, as shown in Fig. 54. Securely fasten position finger S by means of screw R, Fig. 54. Replace bobbin case, slide plate and needle.

Time sewing hook, as instructed on page 14.

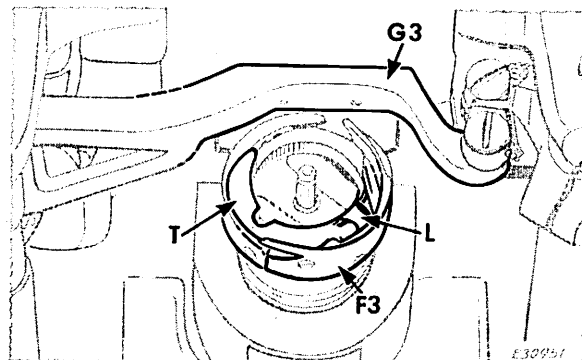


Fig. 55. Position of Hook in Relation to Feed Bar; Necessary for Removal or Replacement

THE HOOK SHAFT

REMOVAL

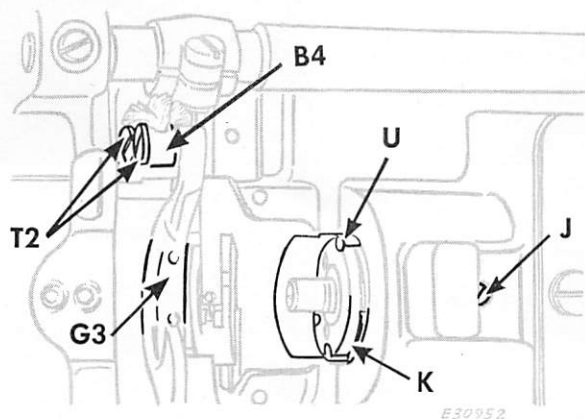


Fig. 56. Removing Hook Shaft Bushing Assembly

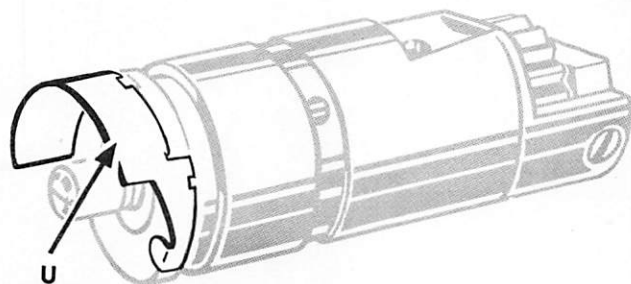


Fig. 57. Oil Shield Attached to Bushing

Remove throat plate and feed dog.
Remove sewing hook as instructed on page 20.
Remove cap screws T2, Fig. 56 and link B4, Fig. 56.
Drop feed bar G3, Fig. 56 down and out of the way of bushing K.

Loosen set screw J, Fig. 56 and withdraw bushing assembly K. Complete bushing assembly is shown out of machine in Fig. 58.

Remove two screws X2, Fig. 58 and the "half circle" end-bearing Y2, Fig. 58.

Withdraw hook shaft D4 with gear E4, Fig. 58 from left to right out of bushing K.

While hook shaft is out of machine "check" oil wick 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. 58 on shaft.

Slip hook shaft D4 with gear, from right to left through bushing K, Fig. 58.

End-bearing Y2, Fig. 58 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. 56 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. 56.

Replace oil shield U, as shown in Figs. 56 and 57.

Install feed bar G3 and link B4 as shown in Fig. 56 securing them with cap screws T2, Fig. 56.

Replace sewing hook as instructed on page 20.

Replace feed dog and throat plate.

THE FEED ROCK SHAFTS

If feed rock shafts have been disturbed, disconnect small end of connection D3, Fig. 60, page 22 and lower end L3, Fig. 60 of feed driving connection. (NOTE: On reverse feed machines, end L3 is forked.)

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 18 and 19 on feed mechanism before assembling the rock shaft connections.

After assembling the connection D3, Fig. 60, turn cone bearing B3, Fig. 60 down tight and back off about 1/8 of a turn, locking it with lock nut A3, Fig. 60.

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.

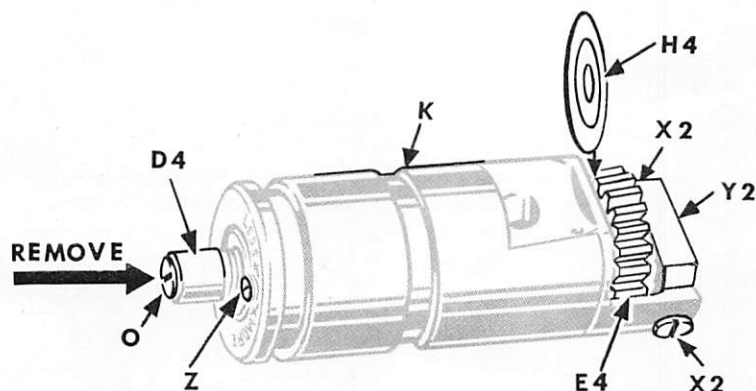


Fig. 58. Hook Shaft Bushing

THE HOOK DRIVING SHAFT

REMOVAL

Remove six screws J4, Fig. 59 and reservoir bottom cover K4, Fig. 59, draining oil from machine.

Slip belt off lower pulley at F3, Fig. 60.

Loosen two set screws A2, Fig. 60.

Remove pulley from shaft B2, Fig. 60.

Loosen four set screws E3 and P4, Fig. 60 in feed-lifting and feed eccentrics.

Loosen two set screws N3, Fig. 60, in internal gear.

DO NOT LOOSEN SCREW Y3 IN COLLAR Z3, Fig. 60.

Draw shaft B2 with its ball bearing U4, Fig. 60 from left to right, out of machine.

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. 60.

Tighten set screws P4, Fig. 60 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 12.

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. 59 with its gasket and securely fasten with six screws J4, Fig. 59.

Fill oil reservoir as instructed on page 4.

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. 61 in pulley groove. Remove machine pulley W4, Fig. 61 and ball bearing which comes out with it. Slip the belt X4, Fig. 61 off lower pulley at F3, Fig. 60. Lift belt X4 up and draw it out around arm shaft Y4, Fig. 61 through hole normally occupied by ball bearing, as shown in Fig. 61.

REPLACEMENT

Replace belt X4 through ball bearing hole, as shown in Fig. 61. After placing belt over upper pulley T3, Fig. 61, 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. 62, page 23, on rotary take-up is in line with mark F2 on face plate, as shown in Fig. 62. While keeping these two marks in line, turn lower shaft pulley until timing mark (arrow) on collar Z3, Fig. 60

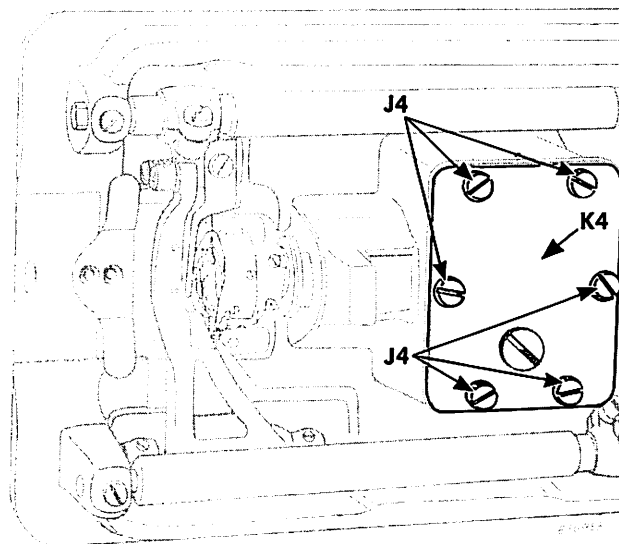


Fig. 59. Oil Reservoir Cover

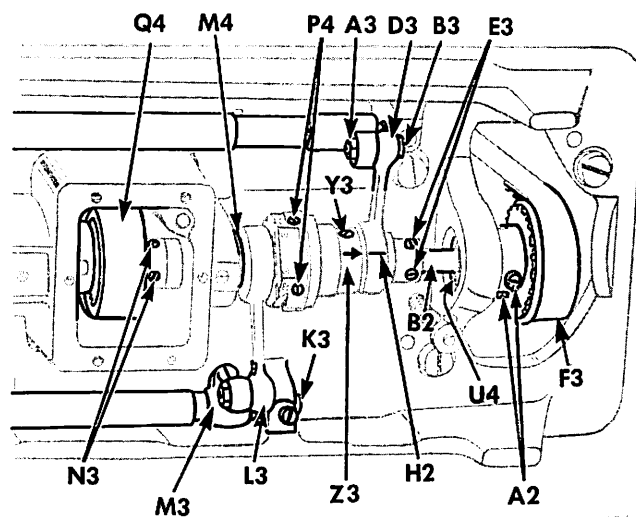


Fig. 60. Hook Driving Shaft and its Components

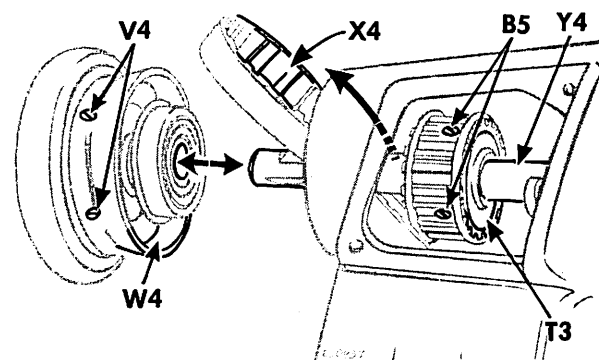


Fig. 61. Removing Arm Shaft Connection Belt

is opposite timing mark H2, Fig. 60. Make certain that two set screws A2, Fig. 60 are accessible. With two shafts B2, Fig. 60 and Y4, Fig. 61 in this position, lead belt onto lower pulley F3, Fig. 60 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 12. If necessary, loosen set screws A2, Fig. 60 and turn lower pulley to bring upper and lower shafts into exact time.

THE ARM SHAFT

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. 63, as they are manufactured as a unit, for accuracy.

Remove face plate, rotary take-up and associated parts as instructed on page 16.

Slip disc G4 from hinge stud N4, Fig. 63.

Remove needle set screw and needle.

Loosen needle bar pinch screw L2, Fig. 63 and remove needle bar M2 through top arm.

Withdraw needle bar connecting stud Z4, Fig. 63 from link S4. Insert screwdriver through hole in top rear of arm and loosen two set screws O4, Fig. 63 in crank R4.

Withdraw hinge stud N4, from crank. Thrust washer A5, Fig. 63 will fall from crank.

To remove needle bar connecting link S4, Fig. 63, 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.

Remove belt as instructed on page 22. Loosen screws D5, Fig. 64 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. 63 into machine (at needle bar end), as shown in Fig. 63.

Slip pulley T3 on arm so that it locates directly over similar pulley on lower shaft. Securely tighten two screws D5, Fig. 64.

Replace needle bar connecting link S4, Fig. 63 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. 63, 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. 63, 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. 63 ensuring that the first or upper screw is located on the flat of the stud.

Replace disc G4, Fig. 63.

Replace face plate and rotary take-up as instructed on page 16.

Replace arm shaft connection belt X4 as instructed on page 22.

Re-time machine as instructed on page 12.

Reset needle bar, as instructed on page 13.

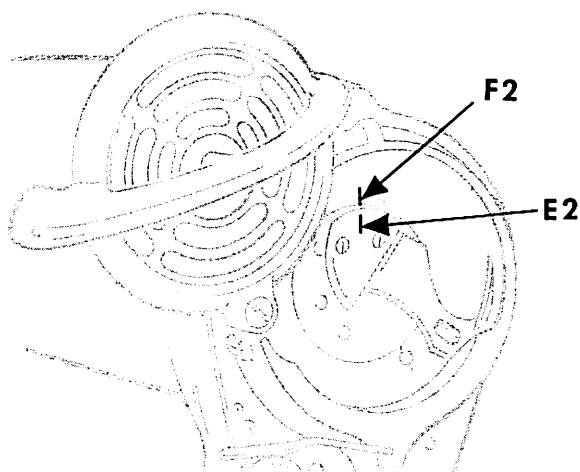


Fig. 62. Timing Marks at Face Plate

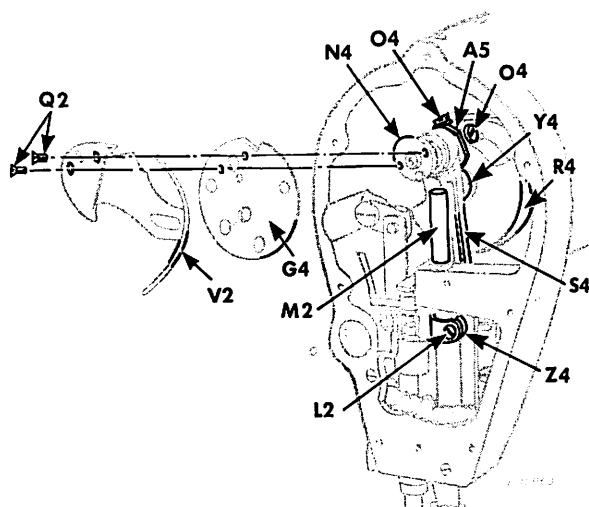


Fig. 63. Removing the Arm Shaft

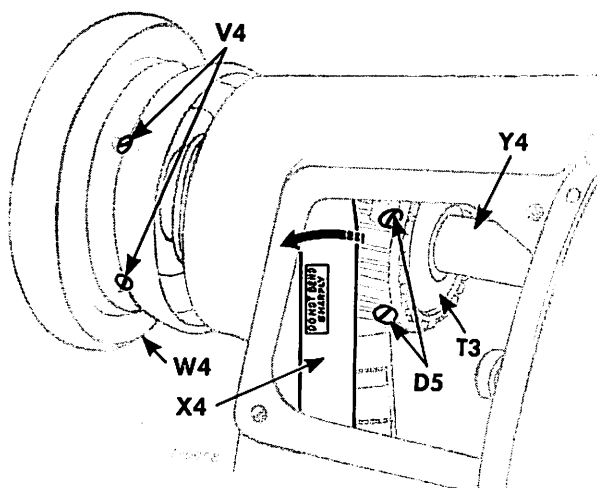


Fig. 64. Removing Pulley from Arm Shaft