

SINGER
CLASS 251

USE SINGER* OILS and LUBRICANTS

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

*The following are the correct lubricants for the
241, 251, 253, 400w, 402w and 410w Machines:*

TYPE A — MANUFACTURING MACHINE OIL, LIGHT GRADE

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

TYPE C — MANUFACTURING MACHINE OIL, LIGHT GRADE

OTHER SINGER LUBRICANTS

TYPE E — THREAD LUBRICANT

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

TYPE F — MOTOR OIL

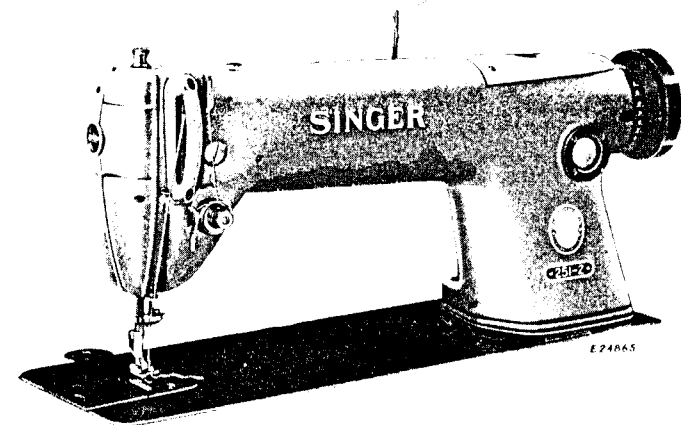
For oil lubricated motors and plain bearings in power
tables and transmitters.

NOTE: All of the above oils are available in 1 quart,
1 gallon and 5 gallon cans.

BALL BEARING LUBRICANT

This pure grease is specially designed for the lubrication
of ball bearings and ball thrust bearings of motors and
electric transmitters, ball bearing hangers of power tables,
etc. Furnished in 1 lb. and 4 lb. tins.

SERVICE MANUAL FOR SINGER* SEWING MACHINES OF CLASS 251 SINGLE NEEDLE LOCK STITCH AUTOMATIC OILING SYSTEM



CAUTION— See that the oil reservoir is filled as instructed on page 5
before running the machine, even to test the speed.

THE SINGER MANUFACTURING COMPANY

DESCRIPTION

Machines of Class 251 are high speed, single needle, lock stitch machines with a completely automatic lubricating system. They have a gear driven, lubricated, rotary sewing hook on a horizontal axis and a drop feed.

The rotary sewing hook makes two revolutions for each stitch.

The bed of these machines is 18-3/4 inches long and 7 inches wide. The space at the right of the needle is 11 inches. The machine base and oil reservoir furnished with these machines will fit any table cut-out provided for Machines of Classes 31-, 96- and 241-.

A centrifugal oil pump delivers oil, under pressure, to all the principal bearings. Provision is also made to automatically lubricate all the other bearings in the machine.

The needle thread take-up lever is covered by an oil guard to prevent splashing of excess oil.

An oil flow window, in direct view of the operator, indicates the circulation of oil inside the arm of the machine.

The machine pulley furnished is for a 3/8 inch V-belt. It can be used for a 5/16 inch round belt, when desired.

These machines are furnished with a knee lifter, which is an integral part of the machine base and oil reservoir.

Machine 251-1 has a needle bar stroke of 1-9/64 inches and a presser bar lift of 9/32 inch; can sew a maximum of 7 stitches to the inch and is designed for sewing **light weight** fabrics.

Machine 251-2 has a needle bar stroke of 1-13/64 inches and a presser bar lift of 5/16 inch; can sew a maximum of 5-1/2 stitches to the inch on **medium-heavy to light weight**† fabrics.

Machine 251-3 has a needle bar stroke of 1-7/16 inches and a presser bar lift of 3/8 inch; can sew a maximum of 5-1/2 stitches to the inch on **heavy to light weight**‡ fabrics. This machine can also be furnished with a presser bar lift of 7/16 inch, enabling it to sew **extra-heavy to light weight**‡ material.

†For best performance on light weight fabrics, it is recommended that **Machines 251-2** and **251-3** be equipped with fittings designed for the particular operation.

SPEED

The maximum speed recommended for Machines 251-1 and 251-2 is 5000 revolutions per minute and for Machine 251-3, 4300 revolutions per minute according to the material being sewn and the type of work being done.

It is advisable to operate these machines at a more moderate speed the first few days, after which they can be operated at maximum speed.

When the machine is in operation, the top of the machine pulley must always turn over toward the operator.

SETTING UP

When shipped, the base is held to the machine by a **single bolt** through the bottom of the base. **Discard this bolt** and plug the hole by inserting from inside the base, the special cap screw **K**, **Fig. 3**, furnished with the machine.

The base fits into a standard table cut-out and rests on the four corners **without fastening**.

Rasp the edges of the cut-out, if necessary, **as the base must slide in without driving** and must be located so that the **machine head does not touch the table** when it is placed on the base.

Use shims on the corners, if necessary, to prevent the base from rocking. The base should also be **level in both directions** so that the oil level will be accurately indicated by the marks in the base.

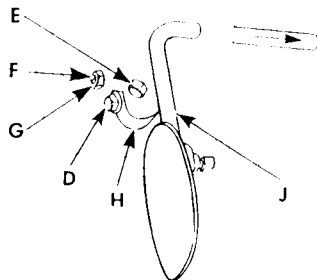


Fig. 2. Installation of Knee Lifter

See that the plunger **L**, **Fig. 3** is in place inside the base, before putting the machine on the base.

The machine head rests on the cork gasket in the base and is not fastened. **The machine hinges must not support the head** except when it is tilted back.

The knee lifter is shipped assembled to the base, except for the knee plate and lever **J**, **Fig. 2**. After the base is in position, loosen the set screws **D** and **E**, **Fig. 2** and slide the shaft forward to the position shown in **Fig. 2**. Attach the knee lifter lever **J**. Set the stop screw **F** so that there is **only a little play of the lifter before it starts to lift the presser bar**, then hold the screw and tighten lock nut **G**. Set the rear stop dog **H** to allow the presser bar to be just raised to its limit but not enough to permit further strain on the knee lifter parts or to permit the action of the knee lifter to lift the machine from its base.

CAUTION:—Before starting the machine, it must be thoroughly oiled, in accordance with the following instructions.

LUBRICATION

Machines of Class 251 have an automatic lubricating system in which oil is circulated from a reservoir in the base. See X-Ray view of machine on **pages 24 and 25**.

TURN BACK MACHINE



Fig. 3. Oil Reservoir

BEFORE STARTING THE MACHINE, the oil reservoir must be filled as instructed in **Fig. 3**, with **"TYPE A"** or **"TYPE C"** OIL, sold by Singer Sewing Machine Company. For description of these oils, see inside front cover of this book.

NOTE: Before starting a machine which has been **standing idle for several weeks**, it is advisable to remove the face plate and oil the needle bar and take-up bearings. The automatic oiling system will lubricate these bearings **after the first few minutes**.

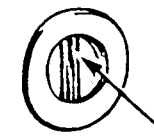
When in operation, the oil level in the reservoir should be inspected at least twice a month, or as often as necessary, to keep it from going below the **LOW** mark, see **Fig. 3**, in the reservoir.

The correct operation of the lubricating system is shown by a continuous stream of oil passing through the oil flow window, as shown in **Fig. 4**, while the machine is running.

CAUTION

If the oil flow should stop, the machine should be stopped and not run again until the cause has been determined.

See instructions, covering Oil Removing Wick Assembly, on **pages 38 to 41**.



SHOULD SHOW
STEADY OIL FLOW

Fig. 4. Oil Flow Window

ADJUSTMENT OF ROTATING HOOK OIL FLOW REGULATOR

The sewing hook is automatically lubricated. The flow of oil is controlled by the oil flow regulator illustrated below.

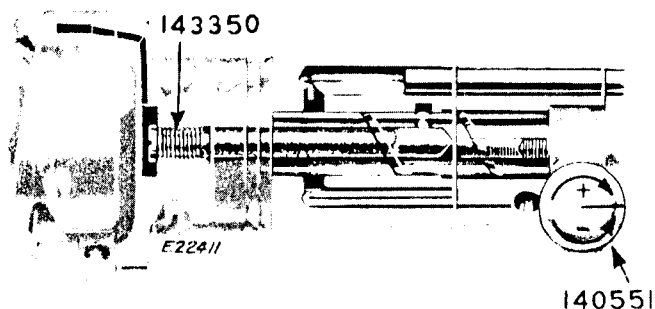


Fig. 5. Oil Flow Regulator in Hook Shaft Bushing

The oil flow regulator is set at the factory for automatic lubrication of the hook under average sewing conditions. If more or less oil is desired, turn the adjusting thumb screw 140551, Fig. 5, **clockwise to increase** the flow of oil to the hook, as indicated by the (+) sign under its arrow on the head of the thumb screw, or turn it **counter-clockwise to decrease** the flow, as indicated by the (-) sign under its arrow on the head of the thumb screw 140551.

To determine whether the oil is properly flowing to the hook, withdraw the bed slide and hold a piece of thin paper under the hook while the machine runs for ten seconds. There should be a slight trace of oil on the paper. If there is not, adjust the oil flow regulator, as instructed above, or replace the oil filter 143350, Fig. 5, in the head of the hook shaft, as instructed on page 32.

HINTS FOR PERFECT OPERATION

When in operation, the top of the machine pulley must always turn over toward the operator.

Do not run the machine with the presser foot resting on the feed without cloth under the presser foot.

Do not run the machine when both bobbin case and needle are threaded unless there is material under the presser foot.

Do not try to aid the machine by pulling the fabric lest you bend the needle. The machine feeds the work without assistance.

The slide over the bobbin case should be kept closed when the machine is in operation.

If the sewing hook should become excessively warm, it may be due to an insufficient supply of oil to the hook (see instructions, above, for adjusting oil flow regulator).

NEVER TOUCH THE STITCH REGULATOR PLUNGER WHILE THE MACHINE IS RUNNING.

NEEDLES

Needles for Machines of Class 251 are as follows:

MACHINE	PRESSER BAR LIFT	TYPE OF MATERIAL	NEEDLES	
			CLASS AND VARIETY	SIZES
251-1	9/32 inch	Light	88 x 9	8, 9, 10, 11, 12, 13, 14, 16, 17, 18, 19, 20, 21, and 22
251-2	5/16 inch	Medium-Heavy to Light	16 x 257	8, 9, 10, 11, 12, 13, 14, 16, 17, 18, 19, 20, 21, 22, 23, and 24
251-3	3/8 inch Regular	Heavy to Light		
251-3	7/16 inch	Extra-Heavy to Light	16 x 261	16, 18, 19, 21, 22, and 23

The above needles are regularly nickel finish but are available with chromium finish if so ordered.

The size of the needle to be used should be determined by the size of the thread which must pass freely through the eye of the needle. Rough or uneven thread, or thread which passes with difficulty through the eye of the needle, will interfere with the successful use of the machine.

Orders for needles must specify the **Quantity** required, the **Size** number, also the **Class** and **Variety** numbers, separated by an x.

The following is an example of an intelligible order:

"100 No. 16, 88 x 9 Needles."

The best stitching results will be obtained by using needles sold by Singer Sewing Machine Company.

THREAD

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

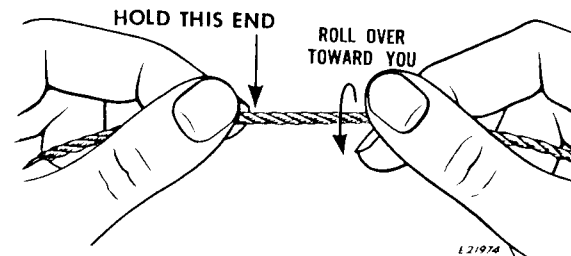


Fig. 6. How to Determine the Twist

To determine the twist, hold the thread as shown above. Roll the thread over toward you between the thumb and forefinger of the right hand; if left twist, the strands will wind tighter; if right twist, the strands will unwind.

RELATIVE SIZES OF NEEDLES AND THREAD

The following sizes of needles and thread are recommended according to the class of work:

SIZES OF NEEDLES	CLASSES OF WORK	SIZES OF COTTON, LINEN OR SILK
14	Shirtings, Sheetings, Calicoes, Muslins, Silks, Dress Goods and all classes of general work.	60 to 80 Cotton A and B Silk
16 and 17	All kinds of heavy Calicoes, light Woolen Goods, heavy Silk, Seaming, Stitching, etc.	40 to 60 Cotton C Silk
18	Tickings, Upholstery, Woolen Goods, Trousers, Boys' Clothing, Cloaks, etc.	30 to 40 Cotton D Silk
19	Heavy Woolens, Tickings, Bags, Heavy Coats, Trousers, Heavy Clothing generally.	20 to 30 Cotton E Silk 60 to 80 Linen
21	Bags, Coarse Cloths and Heavy Goods.	16 to 20 Cotton 40 to 60 Linen

TO SET THE NEEDLE

Turn the machine pulley over toward the operator until the needle bar moves to its highest point.

After loosening needle set screw, insert needle UP into needle bar AS FAR AS IT WILL GO, as instructed in Fig. 7.

NOTE: The needle is held in place, in Machines 251-2 and 251-3, by means of a **needle clamp** instead of by means of the set screw in the needle bar as in Machine 251-1, illustrated in Fig. 7.

The single continuous groove of the needle **MUST** face the left end of the machine, as shown in Fig. 7.

Securely tighten needle set screw.

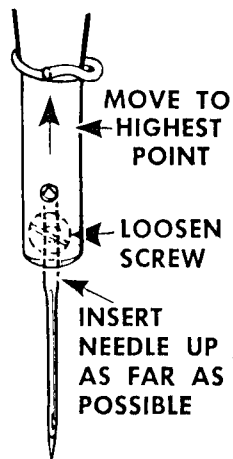


Fig. 7. Setting the Needle
(Machine 251-1)

UPPER THREADING

NOTE: The take-up lever oil guard should **NOT** be removed when threading the machine. It is removed in Fig. 8 only to show the entire path of the needle thread.

Pass the needle thread from the unwinder through the threading points in the order shown in Figs. 8 and 9.

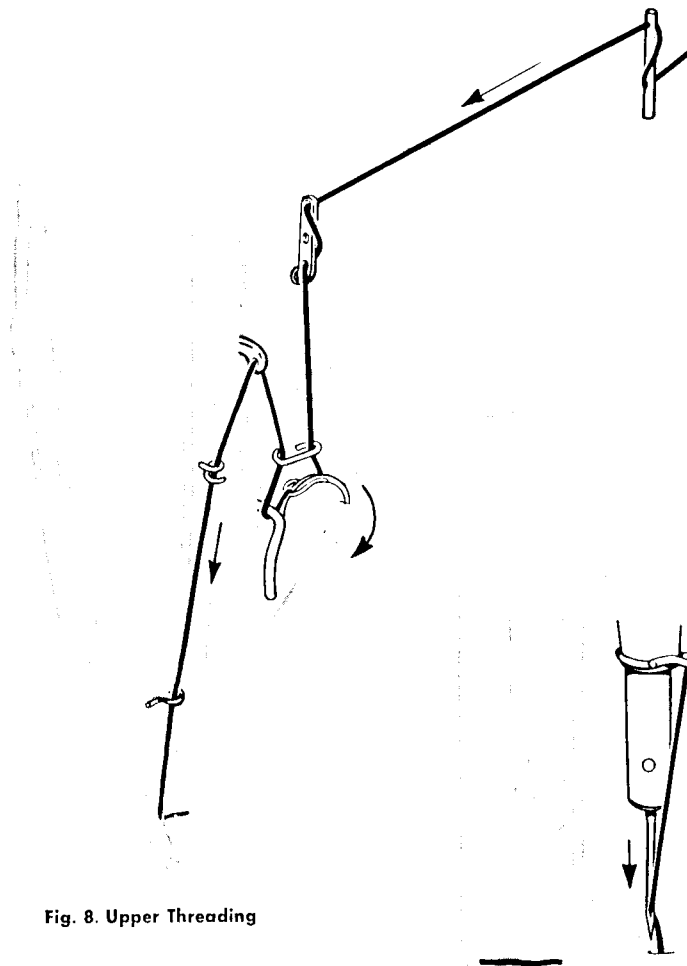


Fig. 8. Upper Threading

Fig. 9. Threading the Needle

Draw about two inches of thread through the eye of the needle with which to commence sewing.

TO REMOVE THE BOBBIN

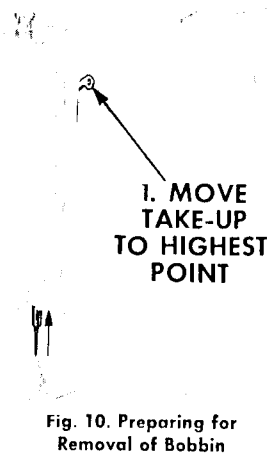


Fig. 10. Preparing for Removal of Bobbin

Turn the machine pulley over toward the operator, until the needle thread take-up lever is at its highest point as shown in Fig. 10.

Reach beneath the bed of the machine with the left hand and remove the bobbin, as instructed in Figs. 11 and 12.

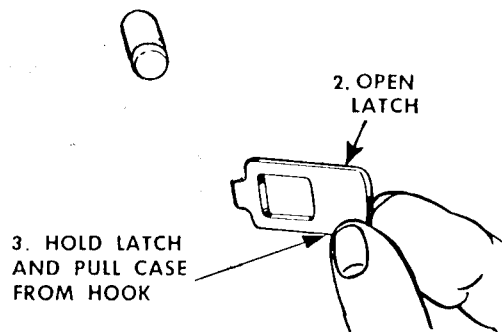


Fig. 11. Removing Bobbin Case from Sewing Hook

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

To remove the bobbin from the bobbin case, release the latch, turn the open end of the bobbin case downward and the bobbin will drop out, as shown in Fig. 12.

4. RELEASE LATCH
5. BOBBIN DROPS OUT

Fig. 12. Removing the Bobbin

TO WIND THE BOBBIN

See Fig. 13.

Fasten bobbin winder to table with its driving pulley in front of the machine belt, as shown below, so that pulley will move away from belt when sufficient thread has been wound upon the bobbin.

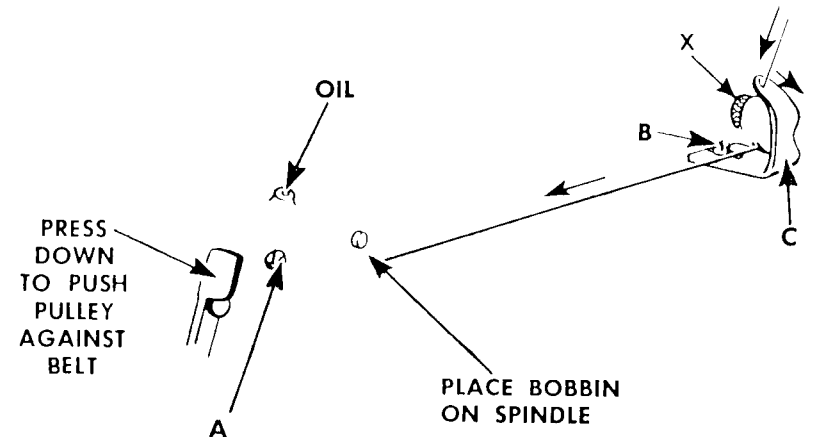


Fig. 13. Winding the Bobbin

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 the bobbin a few times. Press down on thumb latch, pushing driving pulley over against belt, as shown in Fig. 13. Start machine.

Bobbin winder will stop automatically, when the amount of thread for which it is regulated is wound upon the bobbin. For more thread on bobbin, turn screw **A** inward; for less thread on bobbin, turn screw **A** outward.

When winding a bobbin with fine thread, a light tension should be used. Adjust the knurled nut **X**, Fig. 13, to regulate the tension.

If thread winds unevenly on bobbin, loosen screw **B** and move tension bracket **C** to the left or right, as required. Tighten screw **B**.

Bobbins can be wound while the machine is stitching.

NOTE: Occasionally apply a few drops of oil to the oil well, shown in Fig. 13, on top of the bobbin winder frame.

TO THREAD THE BOBBIN CASE

Hold the bobbin so that the thread will unwind in the direction shown in **Fig. 14**.

Hold the bobbin case as shown in **Fig. 14** and place the bobbin into it.

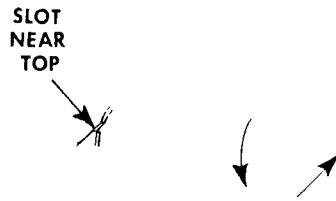
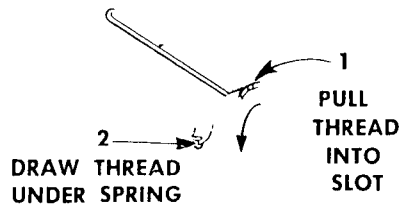


Fig. 14. Placing Bobbin in Bobbin Case



Pull the thread into the slot 1 and under the tension spring 2, **Fig. 15**.

Fig. 15. Pulling the Thread into the Slot



Fig. 16. Drawing the Thread Under the Tension Spring

Draw the thread into the delivery eye at the end of the tension spring, as shown in **Fig. 16**.

TO REPLACE THE BOBBIN

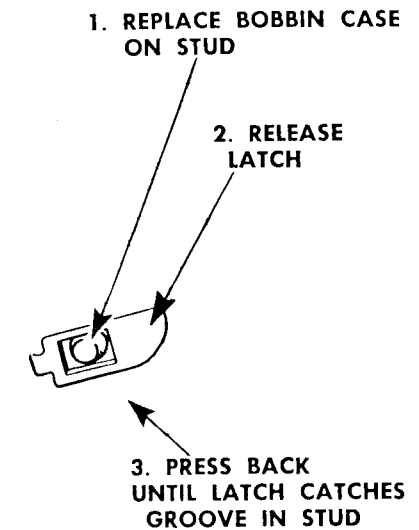


Fig. 17. Bobbin Case Threaded and Replaced

After threading, take bobbin case by latch in the left hand and place bobbin case on center stud of bobbin case holder, as instructed in **Fig. 17**. Release latch. Press bobbin case back until latch catches groove near end of stud. Allow about two inches of thread to hang free.

TO PREPARE FOR SEWING

Hold slack end of needle thread loosely and turn machine pulley over toward 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. 18. Lay both threads back under presser foot.

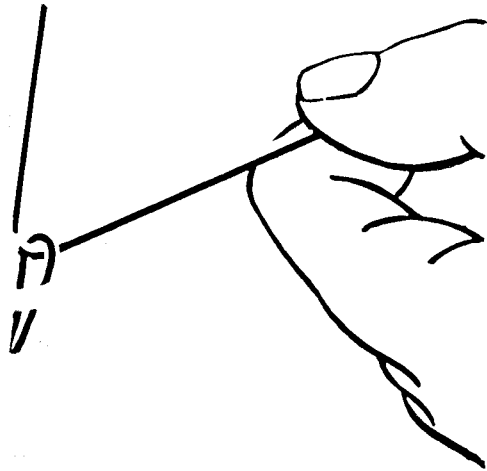


Fig. 18. Drawing Up the Bobbin Thread

TO COMMENCE SEWING

Place material beneath the presser foot, lower the presser foot and commence to sew, turning the machine pulley over toward you.

TO REMOVE THE WORK

1. Let the thread take-up lever rest at its highest point.
2. Raise the presser foot.
3. Draw the work toward the rear until it is clear of the needle.
4. Cut the threads close to the goods.

TENSIONS

For ordinary stitching, the needle and bobbin threads should be locked in the center of the thickness of the material, thus:



Fig. 19. Perfect Stitch

If the tension on the **needle thread** is **too tight**, or if that on the **bobbin thread** is **too loose**, the needle thread will lie straight along the upper surface of the material, thus:



Fig. 20. Tight Needle Thread Tension

If the tension on the **bobbin thread** is **too tight**, or if that on the **needle thread** is **too loose**, the bobbin thread will lie straight along the under surface of the material, thus:



Fig. 21. Loose Needle Thread Tension

TO REGULATE THE TENSION ON THE NEEDLE THREAD

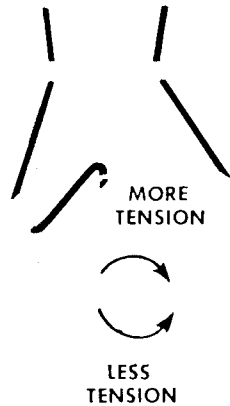


Fig. 22. Regulating Needle Thread Tension

Tension on the needle thread should be regulated only when the presser foot is down.

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

Having lowered the presser foot, turn the thumb nut at the front of the tension discs, as instructed in Fig. 22.

TO REGULATE THE TENSION ON THE BOBBIN THREAD

When the tension on the bobbin thread has been once properly adjusted, a correct stitch can usually be obtained by **varying the tension on the needle thread only**.

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

To regulate the tension on the bobbin thread, remove the bobbin case and turn the screw in the tension spring, as instructed in Fig. 23.

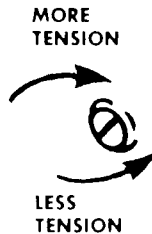


Fig. 23. Regulating Bobbin Thread Tension

TO REGULATE THE LENGTH OF STITCH

BEFORE DEPRESSING PLUNGER (1) MAKE CERTAIN THAT MACHINE IS NOT RUNNING.

To change the length of stitch, depress plunger and turn machine pulley, over toward operator, **slowly**, until plunger drops into notch in the feed eccentric, as instructed in Fig. 24. Then turn machine pulley, backward or forward, until numeral representing desired length of stitch is opposite the mark on the front of the arm.

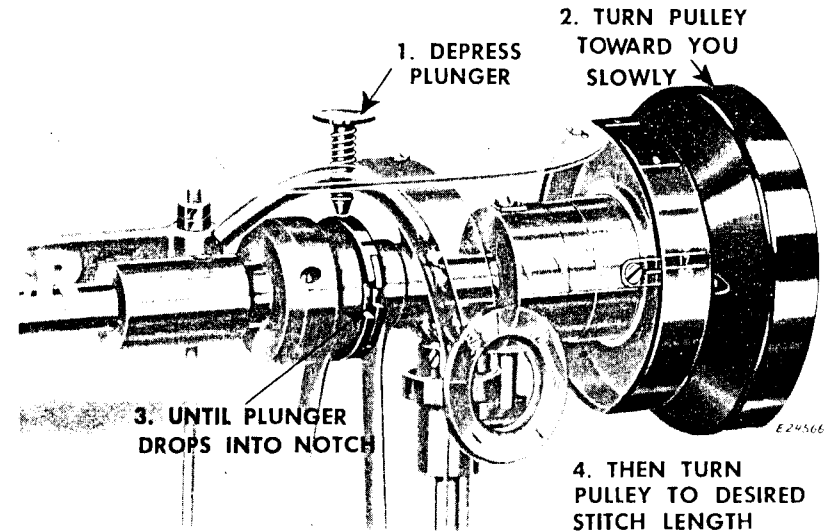


Fig. 24. Regulating Length of Stitch

The numeral "6" on the stitch indicator plate, shown above, indicates the longest possible stitch; the numeral "30" indicates the shortest stitch.

Release the plunger when the desired setting is obtained.

TO PREVENT OPERATOR FROM CHANGING STITCH LENGTH

The stitch regulator plunger (see Fig. 24) can be removed to prevent an unauthorized person from changing stitch length.

To remove the plunger, remove the retaining ring near the tip of the plunger, allowing the plunger to be withdrawn. The hole in the top cover should then be filled by inserting a plug screw 140607, which can be obtained at an additional charge.

TO REGULATE THE PRESSURE ON THE MATERIAL

The pressure on the material should be as light as possible, while still sufficient to insure proper feeding.

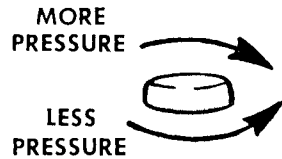


Fig. 25. Regulating the Pressure on the Material

Turn the thumb screw, shown in Fig. 25, toward the right to increase or toward the left to decrease the pressure, as required.

TO SET THE NEEDLE BAR AT THE CORRECT HEIGHT

See that the needle is correctly set in the needle bar, as instructed on page 8, "TO SET THE NEEDLE." Then remove the face plate.

The needle bar has two timing marks near its upper end (see Fig. 26). Rotate the machine pulley over toward the operator until the needle bar moves down to its **lowest** position. The **upper** timing mark on the needle bar should then be even with the lower end of the needle bar bushing, as shown in Fig. 26.

To set the needle bar at the correct height, loosen the clamp screw M, Fig. 26, and raise or lower the needle bar as required. Then securely tighten the screw M.

NOTE: If the needle bar bushing N, Fig. 26 has been disturbed, thus making it impossible to use the timing marks, loosen needle bar bushing set screw P and raise or lower the bushing N as required to bring the top of bushing flush with top of machine casting, as shown in Fig. 26. Securely tighten set screw P. The needle bar should then be set at the correct height as instructed at bottom of page 18.

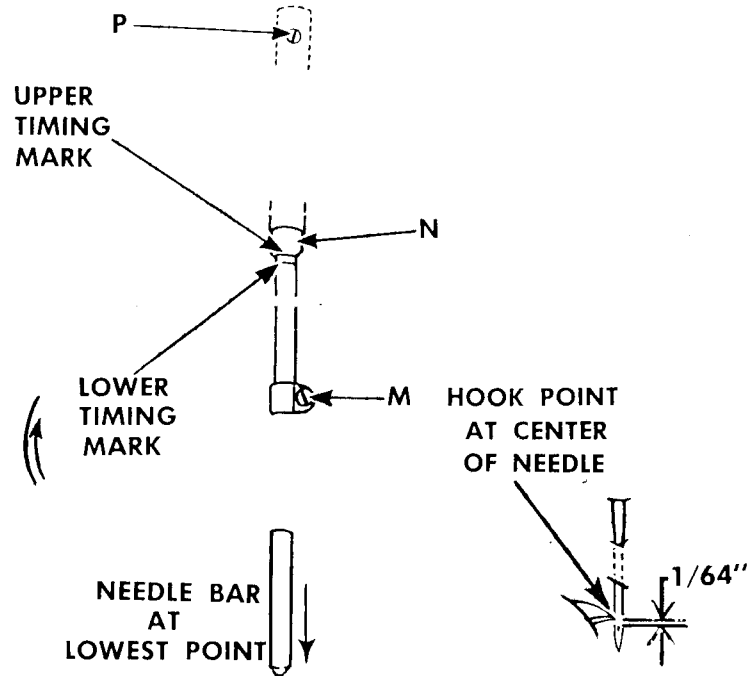


Fig. 26. Setting Needle Bar

Fig. 27. Needle Bar Set at Correct Height

Re-time the hook as instructed on page 24. When the hook is correctly timed and the needle bar is set at the correct height the top of needle eye will be approximately 1/64 inch below the point of the hook at the same time that the hook point is at the center of the needle. See Fig. 27.

When replacing the face plate, make certain that the screw holes in the face plate gasket are aligned with the respective screw holes in the face plate, avoiding injury to the gasket and consequent oil leakage.

ADJUSTMENT OF NEEDLE THREAD TAKE-UP SPRING SETTING THE HEIGHT OF THE SPRING:

Thread the machine. Turn the machine pulley over toward operator until take-up lever reaches its lowest point and begins to rise.

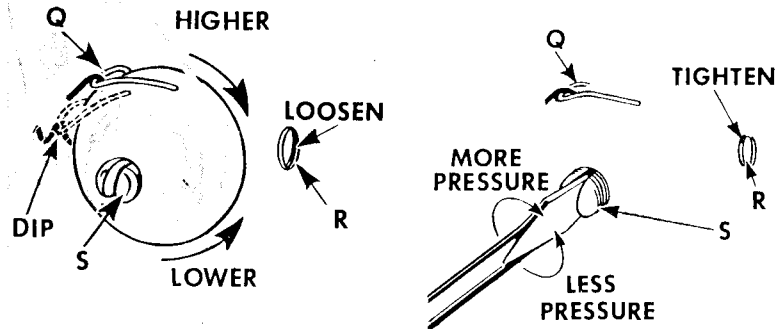


Fig. 28. Setting
Height of Spring

As take-up lever begins to rise, the needle thread is cast off the hook. The **HEIGHT** of the thread take-up spring **Q** should be set so that at this point (cast-off) the take-up spring will "check" (show a slight dip) and return to rest.

Later, when take-up lever approaches top of stroke, it begins to set the stitch, causing the take-up spring to be drawn all the way down.

As take-up lever descends, the take-up spring will return to its highest point (rest).

To adjust height of take-up spring **Q**, loosen set screw **R** and, by turning stud **S**, rotate entire take-up assembly **over toward right to raise the spring or over toward the left to lower it**. Securely tighten set screw **R**.

NOTE: Under certain conditions of tacking, it may be necessary to set the take-up spring higher than it is otherwise normally set.

ADJUSTING TENSION ON TAKE-UP SPRING:

The tension on the thread take-up spring **Q** should be sufficient to ensure its action at high speed. However, it should be light enough to permit it to be pulled all the way down before any thread is drawn through the tension discs.

Before adjusting, make certain that set screw **R** is securely tightened so that when stud **S** is turned, the remainder of the assembly **cannot** turn. Also make certain that the **thumb nut is in place on stud S**, so that stud may be turned with screwdriver without breaking.

To adjust tension on take-up spring, turn only the stud **S** (using screwdriver with blade large enough to fit snugly into slots in stud) **over toward right to increase tension or over toward left to decrease tension**, as shown in Fig. 29.

NOTE: The tension on the take-up spring may require different settings depending upon the size of thread used. Heavier thread requires more tension to ensure correct thread control.

CAUTION: Take-up spring setting must be checked each time a different foot is applied to machine.

TO SET THE PRESSER BAR AT THE CORRECT HEIGHT

When presser bar is **fully raised** by presser bar lifter and **needle bar is at its lowest position**, presser foot should just **clear** bottom of needle bar, as shown in Fig. 30.

When presser foot rests squarely on throat plate, with feed dog below throat plate, there should be a slight amount of play between guide bracket **T**, Fig. 30 and lifting bracket **U**, Fig. 30. This will permit presser foot to rest firmly upon material.

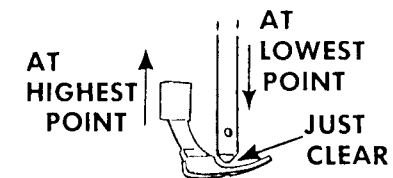
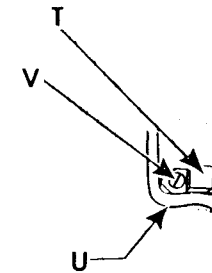


Fig. 30. Presser Bar Set at Correct Height

To adjust, loosen clamp screw **V**, Fig. 30 and raise or lower guide bracket **T**, as required.

When presser bar is set at correct height, securely tighten screw **V**.

CAUTION: Whenever guide bracket has been moved on presser bar, check take-up spring for correct setting, as instructed on page 20.

TO TIME THE SEWING HOOK

The point of the sewing hook should be at the center of the needle, as shown in **Figs. 31 and 32**, when **lower** timing mark on needle bar reaches the bottom end of needle bar bushing **N** during the upward stroke of needle, as shown in **Fig. 31**.

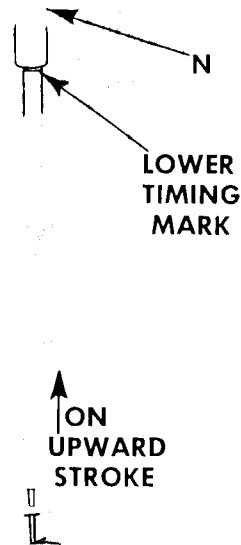


Fig. 31. Timing the Sewing Hook

Before checking timing of sewing hook, remove presser foot, feed dog, slide plate and throat plate.

To time the sewing hook turn machine pulley over toward the operator until **lower** timing mark on needle bar reaches bottom end of needle bar bushing **N**, on upward stroke of needle.

Then loosen two hub set screws **X**, **Fig. 32**, in hub of hook. (The two screws **X** can be reached from top of bed with throat plate off.)

While maintaining position of needle, as described above, turn hook on its shaft as required to bring hook point to center of needle, as shown in **Fig. 32**. Make certain that hub of hook is firmly against hook shaft oil retaining collar **K3**, as shown in **Fig. 35**, then securely tighten two set screws **X**.

HOOK POINT
AT CENTER
OF NEEDLE



Fig. 32. Sewing Hook Correctly Timed

TO SET THE SEWING HOOK SIDewise IN RELATION TO THE NEEDLE

Sewing hook should never strike needle.

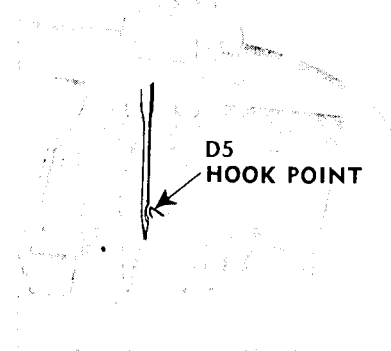


Fig. 33. Clearance Between Hook Point and Needle

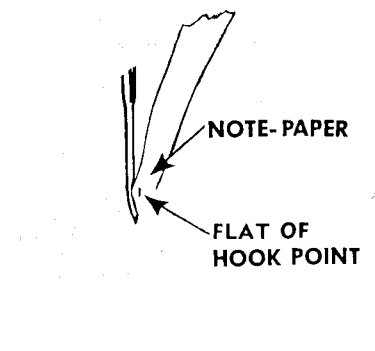
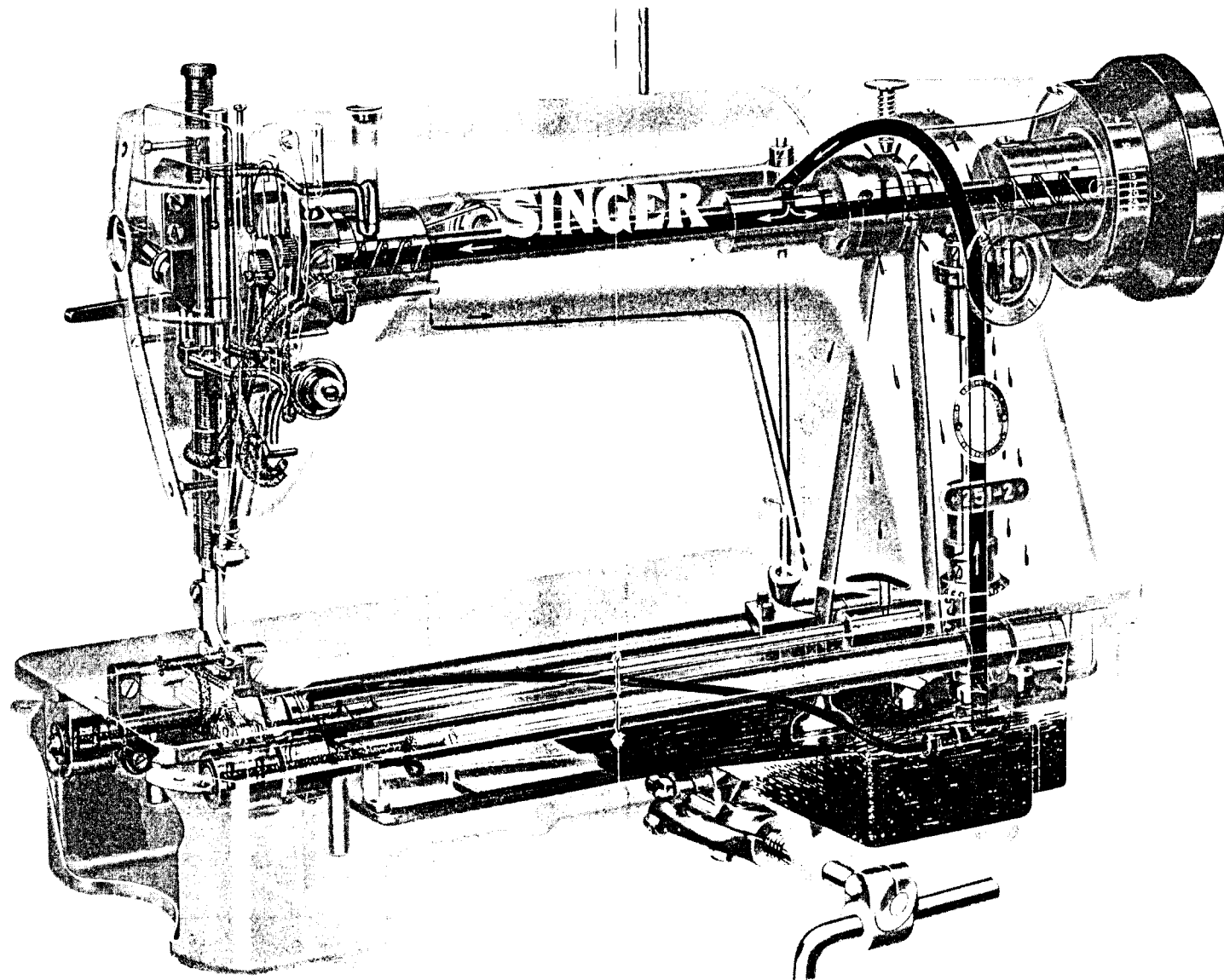


Fig. 34. Checking Clearance Between Needle and Flat of Hook Point

When point of sewing hook passes needle, **clearance** between hook point and needle at **D5**, **Fig. 33** should be approximately equal to thickness of a piece of note paper (about .005 inch), as shown in **Fig. 34**. Not only point of hook but **FLAT OF HOOK POINT** should clear needle **scarf** until heel of flat has passed the needle.



AUTOMATIC LUBRICATION SYSTEM OF MACHINES OF CLASS 251-
(Lubrication Shown in Black)

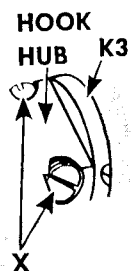


Fig. 35. Hub of Hook
Firmly Against Oil
Retaining Collar

Before adjusting the side-wise position of the sewing hook, make certain that hook has been correctly placed on the hook shaft; the hub of the hook firmly against the hook shaft retaining collar K3, as shown in Fig. 35. See also instructions on page 23, under "TO TIME THE SEWING HOOK."

To set the hook sidewise in relation to the needle:

Remove bobbin case, as instructed on page 10.

Loosen hook shaft bushing set screw Z3, Fig. 36.

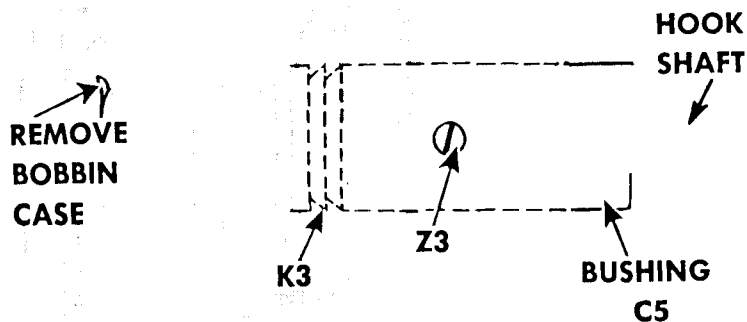


Fig. 36. Hook Shaft Bushing and Hook Assembly

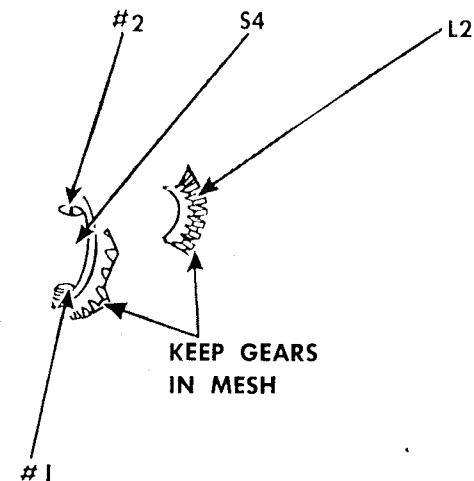


Fig. 37. Loosening Hook Shaft Bevel Gear

Loosen the two set screws #1 and #2, on the hook shaft bevel gear S4, Fig. 37, just enough to loosen the gear on the hook shaft.

CAUTION: MAKE CERTAIN THAT THE TWO BEVEL GEARS L2 AND S4 ARE KEPT IN MESH UNTIL SET SCREWS #1 AND #2 ARE SECURELY RETIGHTENED.

Using a light mallet and a 1/4 inch brass drift pin, as instructed in Figs. 38 to 40, move the hook assembly, toward or away from the needle, as required. TAP VERY LIGHTLY on drift pin to avoid injury to hook assembly.

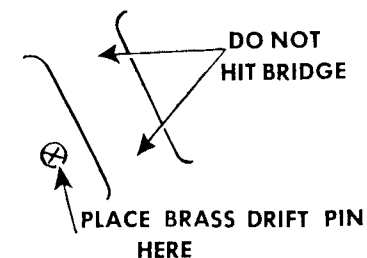


Fig. 38. Where to Place
Drift Pin to Move Hook Assembly
Away from Needle

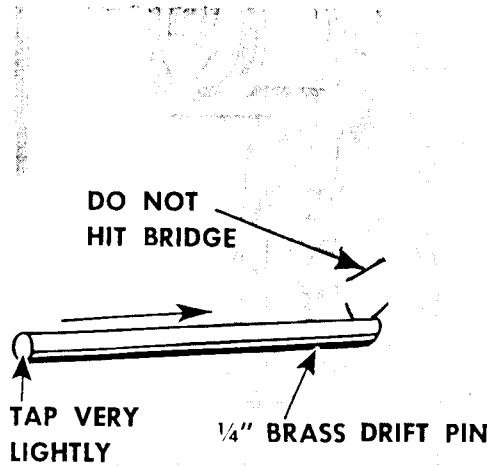


Fig. 39. Moving Hook Assembly away from Needle

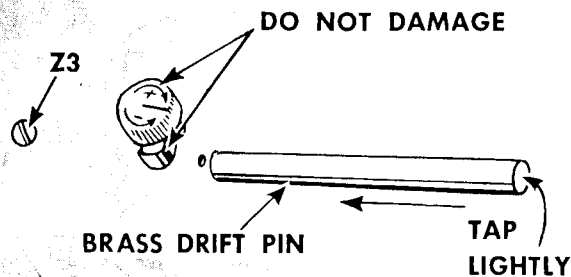


Fig. 40. Moving Hook Assembly toward Needle

When the point of the hook has been correctly set in relation to the needle, securely tighten the hook shaft bushing set screw **Z3**, **Fig. 40**.

Make certain set screw **#1**, **Fig. 37** (the first of two bevel gear set screws to appear as the machine pulley is turned over toward operator) seats over flat on hook shaft. Remove all end shake from hook shaft, by pushing hook firmly against front hook shaft bushing and, at the same time, pushing gear **S4**, **Fig. 37** toward the hook on the shaft. Securely tighten first set screw **#1**, **Fig. 37**, page 27, then tighten set screw **#2**.

Time the sewing hook, as instructed on pages 22 and 33.

Replace the bobbin and bobbin case, as instructed on page 13.

FEED ECCENTRIC STOP SCREWS

The machine is prevented from making longer stitches than a pre-determined maximum by the stop screw **W**, **Fig. 41** in the feed eccentric.

Feed eccentric stop screw 140256, furnished with Machine 251-1, permits a maximum length of seven stitches per inch. Stop screw 140258, for 14 stitches per inch or shorter, can also be used. Machines 251-2 and 251-3 are regularly fitted with stop screw 140257 permitting a maximum length of 5-1/2 stitches per inch, but either 140256 (7 stitches per inch) or 140258 (14 stitches per inch) can be used.

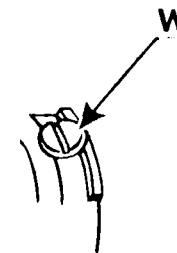


Fig. 41. Feed Eccentric Stop Screw

TO TIME THE FEED

Before the machine leaves the factory, feed lifting eccentric-and-bevel-gear and feed eccentric are set for **average sewing conditions**, by having timing screw in each eccentric enter groove provided for them in arm shaft.

As the grooves in the arm shaft are not visible to the adjuster, machine pulley should be turned over toward operator until feed lifting eccentric connecting rod **A2**, **Fig. 42** is at its **lowest** position. Timing screw **Y**, **Fig. 42** will then be on **top** of feed lifting eccentric-and-bevel-gear. Loosen timing screw **Y** and set screw **O** and, while maintaining this position of gear, turn arm shaft until timing screw, as it is slowly tightened, can be felt to drop into its groove in arm shaft. Securely tighten timing screw **Y** and set screw **O**.

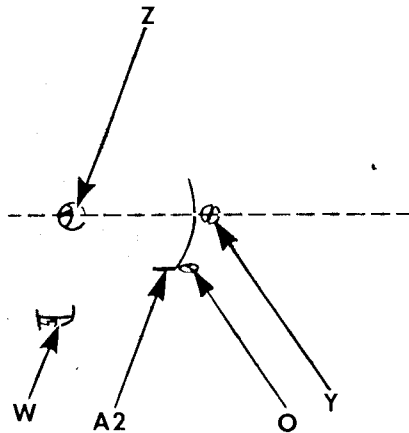


Fig. 42. Timing the Feed

Feed eccentric timing screw, **Z**, **Fig. 42** appears immediately after large stop screw **W**, **Fig. 42**, when feed eccentric is rotated toward operator. Feed eccentric should be set for average sewing conditions, by having this timing screw **Z** **exactly in line** with timing screw **Y**, as shown in **Fig. 42**. Thus, as timing screw **Z** is tightened it will drop into its groove in arm shaft which is in line with groove provided for feed lifting eccentric-and-bevel-gear timing screw **Y**. Securely tighten timing screw **Y** and two set screws in feed eccentric.

If, for any reason, it is necessary to alter the timing of either eccentric, timing screw should be removed and eccentric locked in desired setting by means of set screws only.

NOTE: Whenever the timing of the feed is changed, sewing hook should be checked for necessary adjustment also, as instructed on **pages 22 and 23**.

TO SET THE FEED DOG AT THE CORRECT HEIGHT

FULL DEPTH REAR TEETH

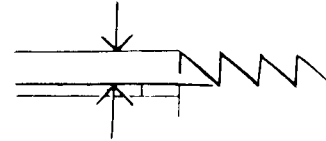


Fig. 43. Showing Feed Dog at Correct Height

When the feed dog is at its **highest** position, approximately the **full depth** of the **rear teeth** of the feed dog should project above the top surface of the throat plate, as shown in **Fig. 43**.

Before checking the height of the feed dog, set the machine for the **longest** stitch, as instructed on **page 17**.

To adjust, loosen the clamping screw **B2**, **Fig. 44** and raise or lower the feed dog (which is fastened to the feed bar **C2**, **Fig. 44**) as required. Then securely tighten screw **B2**.

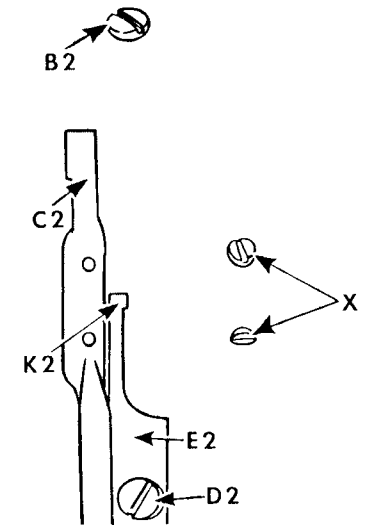


Fig. 44. Adjusting Height of Feed Dog

TO REMOVE THE SEWING HOOK

Remove the needle, slide plate and bobbin case. Remove the screw **D2**, **Fig. 44** and the bobbin case holder position bracket **E2**, **Fig. 44**. Loosen the two set screws **X**, **Fig. 44** in the hub of the hook and turn the machine pulley over toward the operator until the feed bar **C2** is raised to its **highest** point.

Turn the sewing hook until the thread guard **F2**, is at the **bottom**, as shown in **Figs. 45 and 46**, **page 32**. Turn the bobbin case holder **G2**, until the notch **J2** is also near the bottom, as shown in **Figs. 45 and 46**. The sewing hook can then be removed from the hook shaft.

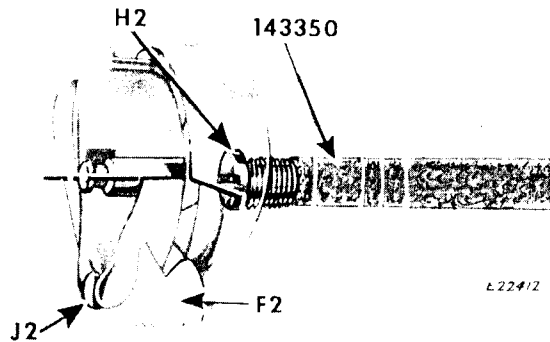


Fig. 45. Removing and Replacing Bobbin Case Holder
(Correct Position of Bobbin Case Holder in
Relation to the Sewing Hook)

NOTE: While the sewing hook is off the shaft, it is advisable to replace the oil filter 143350, Fig. 45, in the end of the hook shaft. Unscrew the filter from the center of the shaft at H2, Fig. 45 and replace with a complete new filter 143350.

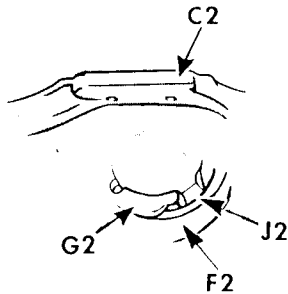


Fig. 46. Removing Sewing Hook (Correct Position of Thread Guard
and Bobbin Case Holder)

TO REPLACE THE SEWING HOOK

When placing a new sewing hook on the shaft, have the sewing hook thread guard F2 at the bottom and the bobbin case holder G2 turned to the position shown in Fig. 46, so that the hook will clear the feed bar C2.

Place the hook in position on the shaft and turn the bobbin case holder G2 until the notch J2 is at the top. Replace the bobbin case holder position bracket E2, Fig. 44, making certain that the finger K2, Fig. 44 enters the notch J2 (which is now at the top of the bobbin case holder.) Then securely fasten the position finger by means of the screw D2, Fig. 44.

Replace the needle. Time the sewing hook as instructed on pages 22 and 23. Replace the bobbin case and slide plate.

TO REMOVE AND REPLACE THE HOOK SHAFT

Remove and replace the hook shaft in the following manner:—

1. Remove the sewing hook, as instructed on pages 31 and 32.
2. Mark the two lower bevel gears L2 and S4, Fig. 47, with chalk or crayon, on one tooth of one gear and the corresponding space in the other gear. This is important, as these gears may become separated during removal of shaft. These marks will then make it possible to obtain the original relative position of the gears.
3. While holding the two gears L2 and S4 in mesh, as instructed in Fig. 47, loosen the two set screws #1 and #2 in the hook shaft bevel gear, withdraw the old hook shaft and insert the new shaft.

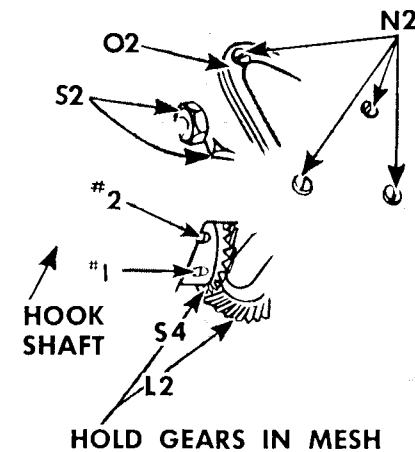


Fig. 47. Removing and Replacing Hook Shaft

4. Make certain that set screw #1 (the first of the two bevel gear set screws to appear as the machine pulley is turned over toward operator) seats over flat on the hook shaft. Remove all end shake from hook shaft, by pushing hook firmly against front hook shaft bushing and, at the same time, pushing gear S4, Fig. 47 toward the hook on the shaft. Securely tighten first set screw #1, then securely tighten the second screw #2.
5. Replace the sewing hook, as instructed on page 32.
6. Time the sewing hook, as instructed on pages 22 and 23.

TO REMOVE THE OIL PUMP

Remove the oil pump from the upright arm shaft, in the following manner:—

1. Loosen the two oil pipe clamping sleeve nuts S2, Fig. 47.
2. Remove the four screws N2, Fig. 47.
3. Remove the screen frame, screen and oil pump cover O2, Fig. 47.

4. Remove the locking screw **Q2**, **Fig. 48** from the center of the upright arm shaft, by turning it over toward the left (counterclockwise).
5. Remove the impeller **P2**, by turning it over toward the **RIGHT** (clockwise) to loosen it, as instructed in **Fig. 48**.

CAUTION: — The impeller **P2** is designed to be screwed to the shaft by means of a **LEFT-HAND THREAD** and must be **turned over toward the right to be loosened**. Avoid damage to this impeller, as the efficient automatic lubrication of the machine is dependent upon it.

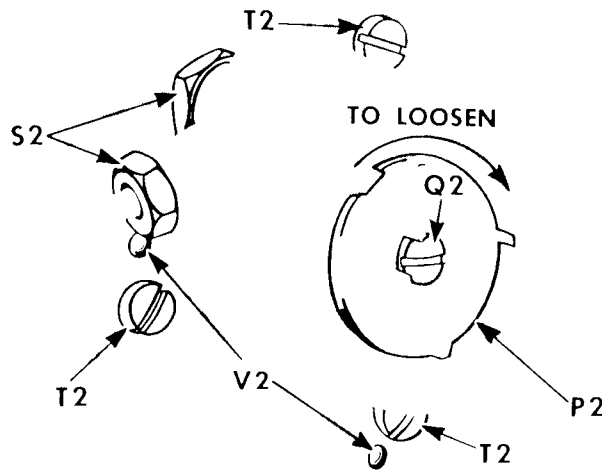


Fig. 48. Oil Pump

6. Remove the three screws **T2**, **Fig. 48**.
7. Carefully pull the old oil pump body off the lower end of the upright arm shaft.

TO REPLACE THE OIL PUMP

Replace oil pump in the following manner:—

1. Place oil pump body on underside of machine bed, so that position pins **V2**, slip into proper holes in machine casting as shown in **Fig. 48**.
2. Replace and securely tighten the three screws **T2**. Make certain that machine turns freely as screws are tightened.
3. Carefully replace impeller **P2**, turning it over toward the **LEFT** to **SCREW** it on arm shaft (see **CAUTION** above).
4. Make certain that impeller **P2** is not so tight that it will bind arm shaft and that impeller clears both top and bottom of interior of oil pump body, then lock it in position by means of locking screw **Q2**.
5. Replace pump cover, screen and frame **O2** and four screws **N2**, **Fig. 47**. Securely tighten screws **N2**.
6. Replace two oil pipes in oil pump body, as shown in **Fig. 48**, and securely tighten sleeve nuts **S2**.

TO REMOVE AND REPLACE THE NEEDLE BAR

Remove the needle bar in the following manner:—

1. Remove needle and needle set screw or needle clamp.
2. Remove face plate.
3. Loosen clamping screw **M**, **Fig. 49**
4. Loosen screw **R2** sufficiently to allow needle bar to pass, then slip needle bar up through both needle bar bushings and out of machine.

If it becomes necessary to remove upper needle bar bushing **N**, **Fig. 49**, first remove screw **R2** and take-up lever oil guard **W2**. Then loosen set screw **P** and drive bushing **N** down and out of head of machine. Use a 13/32 inch driving pin.

Before replacing needle bar, replace upper needle bar bushing **N**, by driving it down into hole provided for it in head of the machine. Make certain top of bushing **N** is level with top of arm. Tighten set screw **P**.

Replace needle bar in the following manner:—

1. Slip needle bar down through both bushings in head of the machine. Tighten screw **M**.
2. Replace needle clamp and needle. See page 8.
3. Set needle bar at correct height and replace face plate, as instructed in last paragraph on page 19.
4. Replace oil guard **W2** and fasten it securely to bushing with set screw **R2**.

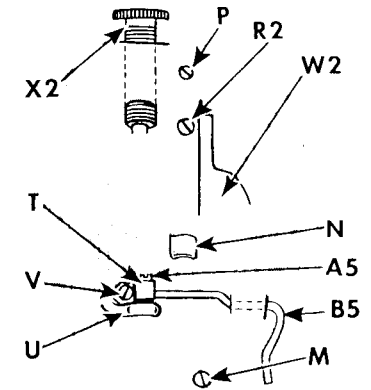


Fig. 49. Removing and Replacing Needle Bar and Presser Bar

TO REMOVE AND REPLACE THE PRESSER BAR

To remove the presser bar:—

1. Remove presser foot and face plate.
2. Remove presser bar regulating thumb screw, **X2**, **Fig. 49** with upper section of presser bar from the head of the machine.
3. Loosen clamping screw **V** and screw **A5** and slip guide bracket **T** up off presser bar and out of machine.
4. Slide presser bar up through bushing and out of machine.

To replace the presser bar:—

1. Slip presser bar down through lower presser bar bushing.
2. Replace guide bracket **T** as shown in **Fig. 49**.
3. Replace presser foot.
4. Replace presser bar regulating thumb screw **X2** with upper section of presser bar.
5. Set the presser bar at the correct height, as instructed on page 21. Tighten screw **V**.
6. Tighten screw **A5** making sure that slack thread regulator **B5** just clears the casting. Replace face plate, as instructed on page 19.

TO REMOVE NEEDLE BAR LINK AND THREAD TAKE-UP

Remove needle bar link and thread take-up in the following manner:—

1. Remove face plate and arm hole plug **A3**, Fig. 50 from machine.
2. Remove needle bar, upper needle bar bushing, presser bar and guide bracket **T**, Fig. 51 as instructed on page 35.
3. Loosen set screw **Y2**, Fig. 50 in needle bar crank, reaching with a screwdriver through the hole in the arm, opened by removal of plug **A3**, and turning machine pulley as required.
4. Using wrench 146057 (through same hole) and turning machine pulley as required, loosen the large hexagon head clamping screw **Z2**, Fig. 50, on the needle bar crank.

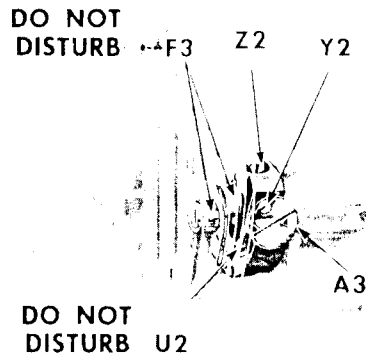


Fig. 50. Needle Bar Crank

CAUTION: DO NOT DISTURB the smaller hexagon head position screw **U2**, Fig. 50, which holds the needle bar crank at its correct position on the horizontal arm shaft.

5. Loosen small set screw **B3**, Fig. 51 in the rear of the arm of the machine.
6. Insert a face plate screw **E3**, Fig. 51 in the tapped hole in center of stud **C3**, Fig. 51 and, while holding back the needle bar link inside the head at **G3**, Fig. 51, pull upon the screw **E3** until the stud **C3** is removed. Remove face plate screw from stud.
7. Back the end of the take-up **H3**, Fig. 51 toward the inside of the machine turning the machine pulley, as required until the take-up is free of the slot provided for it.

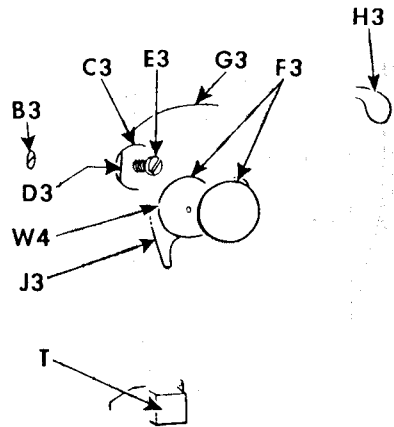


Fig. 51. Needle Bar Link and Thread Take-up

8. The needle bar link **G3** and take-up **H3** can now be pulled free of the needle bar crank **WITHOUT DISTURBING THE NEEDLE BEARINGS F3**, Fig. 50.

NOTE: If the needle bearings **F3**, Fig. 50, are accidentally disturbed, they must be re-assembled so that **there are exactly 18 bearings in each of the two assemblies.**

TO REPLACE THE NEEDLE BAR LINK AND THREAD TAKE-UP

Replace the needle bar link and thread take-up in the following manner:—

1. Make sure that the wearing plate **J3** is in place on the face of the needle bar crank, as shown in Fig. 51. Place the needle bar link **G3** and take-up **H3** in the head of the machine so that the stud in the center of the linkage slips into the hole provided for it in the needle bar crank, as shown in Figs. 50 and 51.
2. Slip the upper end of the take-up **H3** through the slot provided for it in the head of the machine.
3. Insert stud **C3** through needle bar link **G3** and into its hole in the machine casting so that the **flat on the stud faces the rear** of the machine. The mark **D3** on the stud indicates the position of this flat. Fig. 51 shows the stud with the mark **D3** in the correct position.
4. When the stud **C3** is fully and correctly inserted, turn the set screw **B3** inward lightly against the flat on the stud **C3**.
5. Insert a screwdriver through the hole in the front of the head of the machine and turn machine pulley as required to reach set screw **Y2** in needle bar crank. While tightening screw **Y2**, turn stud **W4** by hand to find its flat, then **slightly tighten** set screw **Y2** in needle bar crank. Make certain that assembly **F3** is firmly against wearing plate **J3**. Produce a very slight side play by pushing take-up lever **H3** gently right and left; then securely tighten screw **B3**.
6. Using wrench 146057 through same hole and turning machine pulley as required, **tighten** hexagon head screw **Z2**.
7. **Securely tighten** set screw **Y2**.
8. Replace guide bracket **T** in head of machine, as shown in Fig. 51.
9. Replace and adjust presser bar, upper needle bar bushing and needle bar with their accessories, as instructed on pages 19 and 35.
10. Replace and securely tighten arm hole plug **A3**.
11. Replace the face plate (see instructions at bottom of page 19).

TO REMOVE AND REPLACE THE UPRIGHT ARM SHAFT

If it is found necessary to remove the upright arm shaft **K3**, Fig. 52, it should be removed in the following manner:—

1. Remove oil pump, as instructed on pages 33 and 34.
2. Remove sewing hook shaft, as instructed on page 33, except that instead of immediately replacing hook shaft merely remove hook shaft bevel gear.
3. Remove arm top cover.
4. Remove screw **L3** and oil lead **M3**, Fig. 52.
5. Remove four cap screws **N3**, Fig. 52.
6. Remove oil flow window cap **O3**, window **P3**, oil flow body **R3** with two gaskets **Q3**, Fig. 52.
7. Mark the two bevel gears **S3**, Fig. 52, with chalk or crayon, on one tooth of one gear and the corresponding space between the teeth of the other gear so that these gears may be re-assembled, if necessary, in their original relative positions without difficulty.
8. Loosen set screws **T3**, Fig. 52 in bevel gear at upper end of upright arm shaft.
9. Make certain bevel gear at lower end of upright arm shaft is fastened securely. Then while holding upper bevel gears **S3** in mesh, draw upright arm shaft down and out of machine and insert new upright arm shaft up through bevel gear, as shown in Fig. 52.
10. Turn shaft so that one of the two set screws **T3** will bear upon the upper gear flat on the shaft and tighten the set screws **T3**.
11. Replace hook shaft with hook shaft bevel gear as instructed on page 33.
12. Replace oil pump, as instructed on page 34.
13. Replace oil flow window assembly, oil lead and arm top cover as shown in Fig. 52.

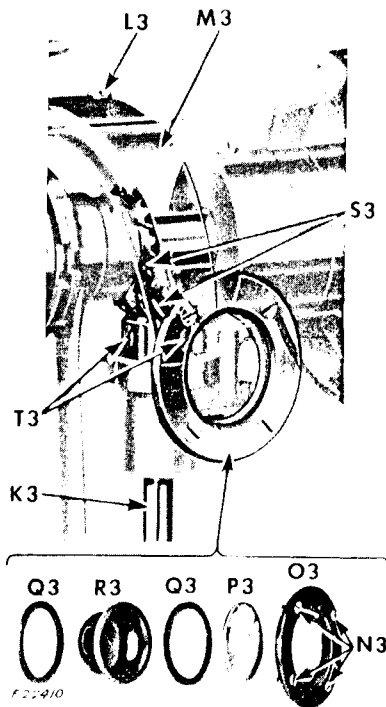


Fig. 52. Removing Upright Arm Shaft

TO REMOVE AND REPLACE ARM SIDE SHIELD WICK, NEEDLE BAR WICK AND NEEDLE BAR CONNECTING STUD WICK

Arm side shield wick may be removed, after removing face plate and two screws **U3**, Fig. 53. Lift arm side shield **V3**, Fig. 53 up and out of machine.

When replacing arm side shield wick, make sure that lower end of wick drops into oil pool beneath needle bar crank and that the two upper wick loops come as close as possible to the needle bearings **F3**, Fig. 54 without touching them. Then replace and securely tighten screws **U3**.

To remove needle bar wick and connecting stud wick, move take-up lever **H3**, so that it does not interfere with removal of oil guard **W2**. Then remove face plate and screw **R2**, Fig. 53; lift take-up oil guard **W2**, Fig. 53, with the two wicks, up and out of machine.

When replacing needle bar wick and connecting stud wick make sure that lower end of wick drops into oil pool behind lower needle bar bushing and that upper wick loop is behind the needle bar, as shown in Fig. 53.

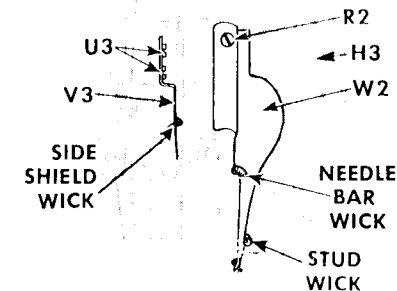


Fig. 53. Arm Side Shield Wick, Needle Bar Wick and Connecting Stud Wick

TO REMOVE OIL WICK HOLDER

Oil wick holder includes two oil wick leaders, see Fig. 55, and one oil wick for the needle bar link and for the two sets of needle bearings in the thread take-up as shown in Fig. 54. It is removed in the following manner:—

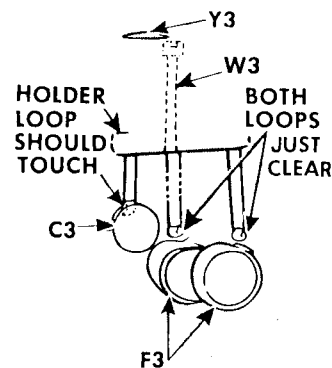


Fig. 54. Wick Loops for Needle Bar Link and Thread Take-up

1. Remove face plate, needle bar and upper needle bar bushing from the machine, as instructed on page 35.
2. Remove upper section of presser bar, as instructed on page 35.
3. Remove stud **C3**, Fig. 46, as instructed in steps 6 and 7 on page 36.
4. Remove holder screw **W3**, Fig. 54.
5. Pulling gently, draw entire oil wick holder assembly out of the head of the machine.

TO INSTALL OIL WICK HOLDER

1. Remove parts mentioned in Steps 1 to 3, above, under removal of oil wick holder.

- Remove top arm plug Y3, Figs. 54 and 55. Use a sharp-bladed screwdriver or a small chisel to pry plug Y3 from arm casting.
- Insert two oil wick leaders into arm casting, as shown in Fig. 55, so that wick is slack over edge of casting at point A4, Fig. 55. This will insure free passage of oil. Use tweezers through the plug hole at Y3 to loop the wick and bring it into positive contact with the arm shaft at point B4, as shown in Fig. 55.

NOTE: DO NOT FORCE the wick leaders down too tightly against the edge A4 of the casting, as shown in Fig. 56, as this will decrease the flow of oil from the arm shaft to the needle bar link and take-up bearings.

CAUTION: If the bottom of either oil wick leader is caught on the ledge as shown at C4, Fig. 57, no oil can be taken up by the wick to be carried to the needle bar link and thread take-up bearing, where it is needed. Make sure that the oil wick leaders are pushed all the way down into the smaller hole, without jamming, until they touch the arm shaft, as shown in Fig. 55.

When oil wick leaders are correctly installed, replace holder

- When oil wick leaders are correctly installed, replace holder screw W3, Fig. 54.
- Replace stud C3, as instructed in Steps 3 and 4, under replacement of needle bar link and thread take-up, on page 36.
- Adjust the three oil wick loops in holder, see Figs. 54 and 55, so that two of the loops come as close as possible to, without touching, the two sets of needle bearings F3 while the third wick loop makes positive contact with the wick inside the stud C3, in the needle bar link, as shown in Fig. 54.

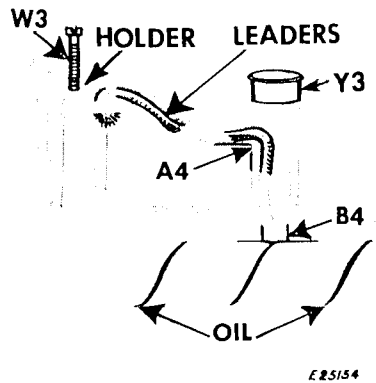


Fig. 55. Replacing Oil Wick Holder

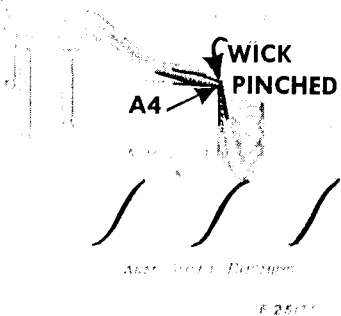


Fig. 56. Incorrect Installation

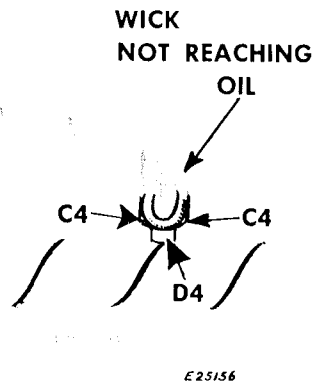


Fig. 57. Incorrect Installation

- Securely tighten holder screw W3.
- Replace arm top plug Y3.
- Replace upper section of presser bar, upper needle bar bushing and needle bar, as instructed on page 35.
- Replace face plate, as instructed in last paragraph on page 19.

OIL-REMOVING WICK ASSEMBLY (HEAD END) COMPLETE 147056

The function of the oil-removing wick assembly, Complete 147056, furnished with the machine, is to remove excess oil from the head of the machine arm.

This assembly is shown in Fig. 60. Additional sets of the oil-removing wick, wick holder body and spring, Complete 147108, shown in Fig. 60, will be furnished on order.

CAUTION: If inferior oil is used, absorption of the excess oil by this wick may be reduced considerably. The consequent leakage of accumulated oil will then cause serious damage to materials being sewn.

When filling the machine reservoir use "TYPE A" or "TYPE C" OIL, sold by Singer Sewing Machine Company. For further instructions on oiling, see inside front cover of this book and pages 5, 6, 39 and 40.

CAUTION: Before inserting a new oil removing wick, it must be saturated with oil.

TO REMOVE OIL-REMOVING WICK ASSEMBLY

Oil-removing wick assembly 147056 should be removed in the following manner:—

- Remove face plate.
- Loosen presser foot lifting lever hinge screw E4, Fig. 58.
- Loosen presser foot lifting lever link stud screw F4, Fig. 58.
- Remove head end of presser foot lifting lever G4 with spring H4, Fig. 58 from the machine arm.
- Remove presser foot screw and presser foot.
- Remove presser bar thumb screw X2, Fig. 58 with upper section of presser bar.
- Remove arm side shield with wick, as instructed on page 39.
- Loosen screw V and remove guide bracket T, Fig. 58, as instructed on page 35.
- Remove presser bar lifting link J4, Fig. 58 with stud.
- Loosen four screws K4, Fig. 58 in the oil removing hinge plate and cover L4, Fig. 58.

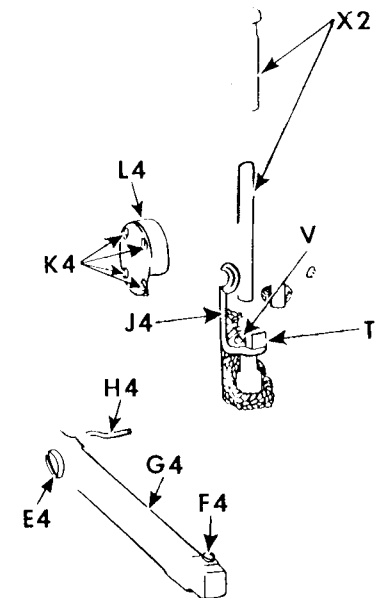


Fig. 58. Preparing to Remove Oil-Removing Wick

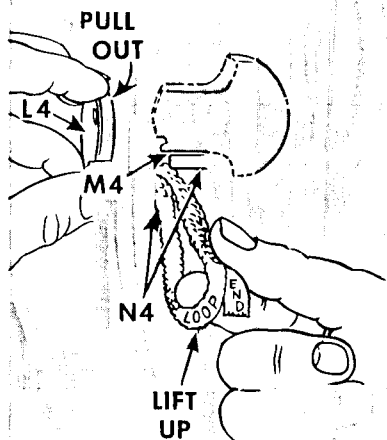


Fig. 59. Removing
Oil-Removing Wick
Assembly 147056

11. Turn machine pulley over toward the operator, until the needle bar crank is in the position shown at **M4**, Fig. 59.
12. Lift wick LOOP up and off lower presser bar bushing and lift wick END out of oil pool behind needle bar bushing, as shown in Fig. 59.
13. Simultaneously push upward against wick and wick holder at **N4**, while pulling outward gently on hinge plate and cover **L4**, as shown in Fig. 59, removing hinge plate and cover with oil-removing wick and holder body from the machine.

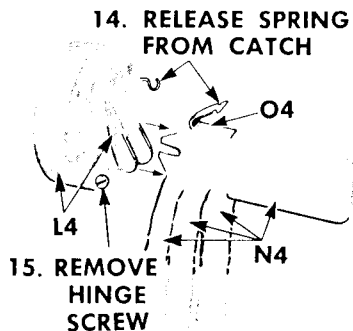


Fig. 60. Removing
Oil-Removing Wick from
Assembly 147056
(Showing Oil-Removing Wick,
Wick Holder Body and Spring 147108)

14. Release end of spring from catch on the holder body **O4**, as instructed in Fig. 60.
15. Remove hinge screw, as instructed in Fig. 60.
16. Oil-removing wick and holder **N4** may then be removed from hinge plate and cover **L4**, as shown in Fig. 60.

TO REPLACE OIL-REMOVING WICK ASSEMBLY

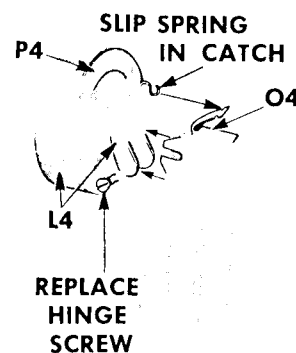


Fig. 61. Replacing
Oil-Removing Wick
in Assembly 147056

Oil-removing wick assembly should be replaced in the following manner:—

1. Insert open end of holder body **O4**, Fig. 61 into hinge plate and cover **L4**.
2. Replace and securely tighten hinge screw as instructed in Fig. 61.
3. Slip end of spring into catch on holder body **O4**, as instructed in Fig. 61.
4. Place gasket **P4**, Fig. 61 on hinge plate and cover **L4**.
5. Align the screw holes in the gasket **P4** with the screw holes in the cover **L4** and insert the four screws **K4**, Fig. 62 through cover and gasket to hold the gasket in place.

CAUTION: Before inserting a new oil removing wick, it must be saturated with oil.



Fig. 62. Replacing Oil-Removing Wick and Holder
in Head of Machine

6. Turn machine pulley over toward operator until needle bar crank is in the position shown at **M4**, Fig. 62.
7. Fold oil-removing wick along the side of the holder body, as shown in Fig. 62 and insert oil-removing wick, holder and hinge plate into head of machine.

8. Place index finger under wick and holder body and simultaneously pull the oil-removing wick, as required, sliding the hinge plate and cover **L4** fully into its recess in the head of the machine, as shown in **Fig. 63**.

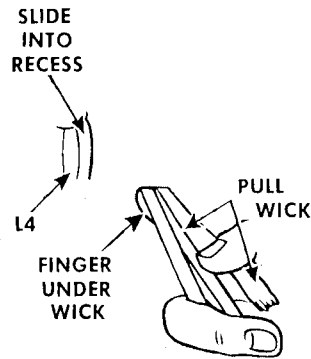


Fig. 63. Adjusting Wick in Machine

9. Securely tighten the four screws **K4**, **Fig. 62**.

10. Check the entire assembly to make certain that the holder body **O4**, **Fig. 61** hinges freely under the needle bar crank.

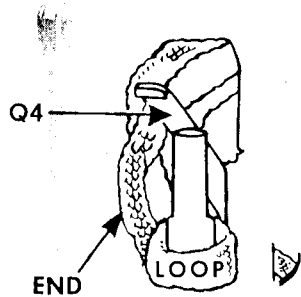


Fig. 64. Location of Loop and End of Wick in Head of Machine

11. Replace END of wick behind tension releasing lever **Q4** and into oil pool behind lower needle bar bushing, as shown in **Fig. 64**.
12. Replace LOOP behind and under tension releasing lever **Q4** and then out over lower presser bar bushing, as shown in **Fig. 64**.
13. Replace presser bar and lifter assembly, part for part, in the reverse order of their removal as instructed in Steps 2 to 9 on **page 41**.
14. Replace face plate, as instructed on **page 19**.

TO REMOVE THE ARM SHAFT

The horizontal arm shaft should be removed from the arm of the machine in the following manner:—

1. Remove the arm side shield and wick, as instructed on **page 39**.
2. Remove the thread take-up oil guard, as instructed on **page 39**.
3. Remove the needle bar, upper needle bar bushing, presser foot and presser bar, as instructed on **page 35**.
4. Remove entire thread take-up lever assembly, as instructed on **page 36**.
5. Remove the oil-removing wick, as instructed on **pages 41** and **42**.
6. Set the machine at any stitch length **except the longest or the shortest** (see instructions on **page 17**) to **prevent binding** of the arm shaft during removal and replacement.
7. Loosen the four screws in the arm top cover and remove the arm top cover.
8. Remove the oil lead that is fastened to the casting just beneath the arm top cover.

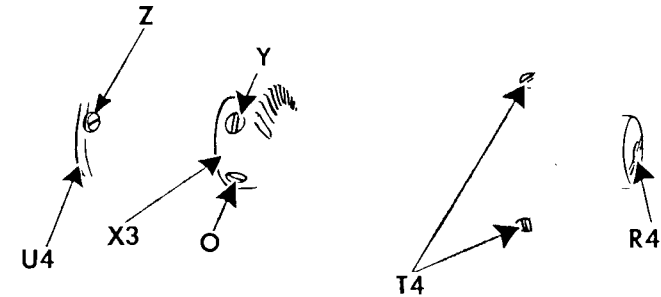


Fig. 65. Loosening the Feed Eccentric

9. Remove the feed timing screw **Y**, **Fig. 65** and loosen the set screw **O**, **Fig. 65**, in the feed-lifting-eccentric-and-bevel-gear, **X3**, **Fig. 65**.
10. Remove the timing screw **Z** and loosen set screws in the feed eccentric **U4**, **Fig. 65**.
11. Remove arm shaft screw **R4**, **Fig. 65** from machine pulley end of arm shaft.
12. Loosen the two set screws **T4**, **Fig. 65** and remove the machine pulley.
13. Turn the needle bar crank until it is in the position shown at **M4**, **Fig. 66**, to prevent crank from disturbing the three wick loops in holder **W4**, **Fig. 66**, during removal of arm shaft.

CAUTION: The feed timing bevel gears at **S3** have been lapped together at the factory and **should be kept in mesh**, as instructed in **Fig. 67**, throughout the removal and replacement of the arm shaft.

14. While maintaining position of needle bar crank, as described in **Step 13** on **page 45**, hold the blade of a large screwdriver between the arm casting and the feed eccentric **U4**, as shown in **Fig. 67**, to keep the bevel gears in mesh and push the end of the arm shaft **X4**, **Fig. 67** into the bushing **Z4**, **Fig. 67**.

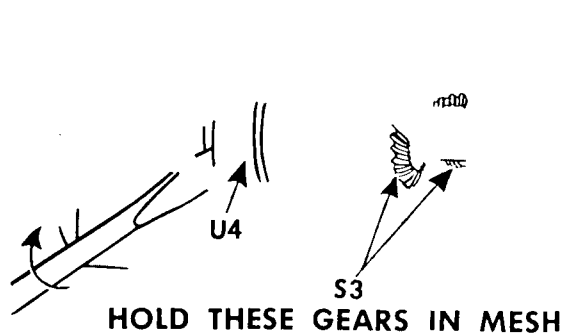


Fig. 67. Removing the Arm Shaft

15. Using another shaft, of the same diameter as the arm shaft on these machines, push the arm shaft **X4** further through the machine (still keeping the gears at **S3** in mesh). This temporary shaft must be pushed sufficiently far into the machine to **hold the entire gear and feed eccentric mechanism in position** upon it until the arm shaft is replaced.
16. Finally grasp the needle-bar-crank-end of the arm shaft firmly and pull the arm shaft straight out of the machine.

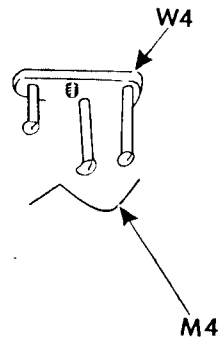
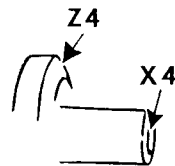


Fig. 66. Position of Needle Bar Crank, During Removal of Shaft



TO REPLACE THE ARM SHAFT

CAUTION: — Make certain that the OIL-REMOVING WICK ASSEMBLY is **out** of the machine.

1. Insert the machine-pulley-end of the arm shaft into the arm shaft bushing at the head of the machine arm.
2. Make certain that the needle bar crank is turned to the relative position shown in **Fig. 66** to clear the three wick loops in holder **W4**.
3. While still holding the bevel gears at **S3** in mesh, with a screwdriver, as shown in **Fig. 68**, push the arm shaft **X4** straight through the machine arm, the feed eccentric **U4** and the feed-eccentric-and-bevel-gear, **X3**, **Fig. 68**. (A light tapping with the palm of the hand, against the needle bar crank end, may be required.)

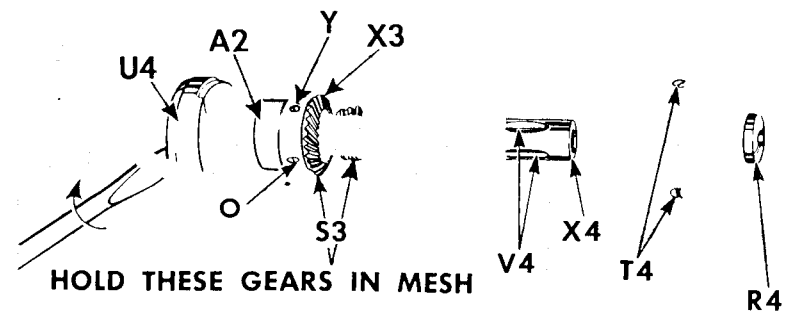


Fig. 68. Replacing the Arm Shaft

4. Replace machine pulley so that the two set screws **T4** will locate over the two grooves **V4**, **Fig. 68** on the shaft and securely tighten set screw **T4**.
5. Replace and tighten the arm shaft screw **R4** sufficiently to remove all end play of the shaft **without binding**. Test the arm shaft for freedom in rotation.
6. Move bevel gear **X3** toward machine pulley and securely tighten feed timing screw **Y**.
7. Place the first finger of one hand on one side of the arm shaft and the first finger of the other hand on the other side of the arm shaft so that both fingers contact the bevel gear (on vertical shaft) that mates with the gear **X3**. Feel for slight backlash. If there is no backlash, loosen timing screw **Y** and set screw **O**. Lightly tap gear **X3** away from mating gear until there is just a slight amount of backlash. Then securely tighten timing screw **Y** and the set screws in gear **X3**. Recheck the backlash.
8. Using a screwdriver, as shown in **Fig. 68**, move feed eccentric **U4** as close as possible to the connecting rod **A2**, **Fig. 68** and tighten the timing screw and two set screws in eccentric **U4**.

9. Check the adjustment and timing of parts disturbed and correct where necessary, according to the instructions on **pages 18 through 30**.
10. Replace the oil-removing wick assembly, as instructed on **pages 43 and 44**.
11. Replace thread take-up, as instructed on **page 35**.
12. Replace presser bar and presser foot, as instructed on **page 35**.
13. Replace the upper needle bar bushing and the needle bar, as instructed on **page 35**.
14. Replace thread take-up oil guard, as instructed on **page 39**.
15. Replace the arms side shield and wick, as instructed on **page 39**.
16. Replace the oil lead beneath the arm top cover.
17. Replace the arm top cover and tighten its four screws.
18. Replace the face plate and tighten its four screws.

CAUTION TO MECHANICS

Machines of Class 251- are made with extreme precision in machining and assembly, and the "Superfinish" process provides microscopically smooth bearing surfaces. Therefore, special care should be taken not to permit any misalignment or cause any scratches or nicks on the bearing surfaces by careless assembly or handling of parts. Any such damage might render the machine incapable of the long trouble-free service for which it is designed.

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