

# **SINGER**

**147-100, -101, -102, -103**

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

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

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

**TYPE B** — MANUFACTURING MACHINE OIL, HEAVY GRADE

*When a stainless oil is desired, use:*

**TYPE D** — MANUFACTURING MACHINE OIL, STAINLESS, HEAVY GRADE

## OTHER **SINGER** LUBRICANTS

**TYPE E** — STAINLESS THREAD LUBRICANT

For lubricating the needle thread of sewing machines for stitching fabrics or leather where a stainless 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 or in 55 gallon drums.

**GEAR LUBRICANT**

This specially prepared grease is recommended for gear lubrication on manufacturing sewing machines.

**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.**

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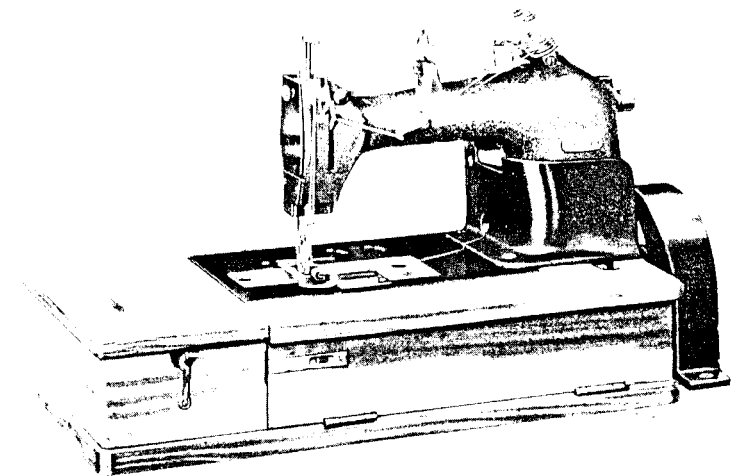
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## INSTRUCTIONS FOR USING AND ADJUSTING **SINGER**\* SEWING MACHINES 147-100, 147-101, 147-102 and 147-103

TWO NEEDLES AND TWO LOOPERS

TWO-THREAD CHAIN STITCH

AUTOMATIC OILING SYSTEM



Special attention is called to the lubricating instructions on pages 4 and 5

\*A TRADE MARK OF

THE SINGER MANUFACTURING COMPANY

## TO ALL WHOM IT MAY CONCERN:

The improper placing or renewal of the Trade Mark "SINGER" or any other of the Trade Marks of The Singer Manufacturing Company (all of which are duly Registered Trade Marks) on any machine that has been repaired, rebuilt, reconditioned, or altered in any way whatsoever outside a SINGER factory or an authorized SINGER agency is forbidden.

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### THE IMPORTANCE OF USING **SINGER**\* PARTS AND NEEDLES IN **SINGER** MACHINES

The successful operation of SINGER machines can only be assured if SINGER parts and needles are used. Supplies are available at all SINGER Shops for the Manufacturing Trade, and mail orders will receive prompt attention.

SINGER Needles should be used  
in SINGER Machines.  
These Needles and their Containers  
are marked with the  
Company's Trade Mark "SIMANCO.\*" 1

Needles in Containers marked  
"FOR SINGER MACHINES"  
are NOT **SINGER** made needles. 2

## DESCRIPTION

These machines have two needles and two loopers and make the two-thread chain stitch. The distance between the needles may be from  $\frac{3}{32}$  to  $\frac{1}{2}$  inch, as ordered.

They have an automatic system of lubrication, and the arm rotary shaft is counterbalanced and equipped with ball bearings for the intermediate and rear bearings adjacent to the balance wheel.

**Machine 147-100** is used for lap seam felling shirt sleeves of light weight material and for work of a similar nature. Number of stitches to the inch is 10 to 25.

**Machine 147-101** is used for lap seam felling shirt sleeves of light or medium weight materials; also for two line stitching knickers, play suits, etc. Number of stitches to the inch is 6 to 25.

**Machine 147-102** is used for lap seam felling medium and medium-heavy work shirts, jumpers, overalls and work of a similar nature. It has a needle bar stroke of  $1\frac{3}{16}$  inches and stitches material up to  $\frac{1}{32}$  inch in thickness. Number of stitches to the inch is 6 to 18.

**Machine 147-103** is used for lap seam felling medium and medium-heavy pants, overalls and automobile seat covers. It has a needle bar stroke of  $1\frac{3}{8}$  inches and stitches material up to  $\frac{1}{4}$  inch in thickness. Number of stitches to the inch is 6 to 18.

### To Set Up the Machine

Before placing the machine on the iron base, see that the rubber insulating bushings are in place in the four holes in the machine bed, and that the four felt pads are over the studs in the corners of the base. Place the machine on these pads, with the four studs through the rubber bushings.

### CAUTION

After setting up, do not start the machine until it has been thoroughly oiled as instructed on pages 4 and 5.

### Speed

**Machine 147-100** should be driven at a speed not exceeding 3900 stitches per minute for the first two or three days, after which it can be driven up to its maximum speed of 4300 stitches per minute, depending upon the nature of the work and the ability of the operator.

Machines 147-101 and 147-102 should be driven at a speed not exceeding 3700 stitches per minute for the first two or three days, after which it can be driven up to its maximum speed of 4000 stitches per minute, depending upon the nature of the work and the ability of the operator.

Machine 147-103 should be driven at a speed not exceeding 3600 stitches per minute for the first two or three days, after which it can be driven up to its maximum speed of 3800 stitches per minute, depending upon the nature of the work and the ability of the operator.

### To Oil the Machines

These machines are equipped with an oiling system which automatically delivers the proper amount of oil to the principal bearings of the machine. See large diagrams, pages 14 and 15.

Oil in the reservoir in the arm is picked up by a scoop in the connecting rod, and lubricates the various bearings inside the arm by splash. A cup within the arm catches some of this oil, and connecting pipes and wicks distribute it to the principal bearings outside the arm.

In order that this system may operate, it is absolutely necessary that the following instructions be observed to the letter. Failure to do this may result in serious damage to the mechanism of these machines.

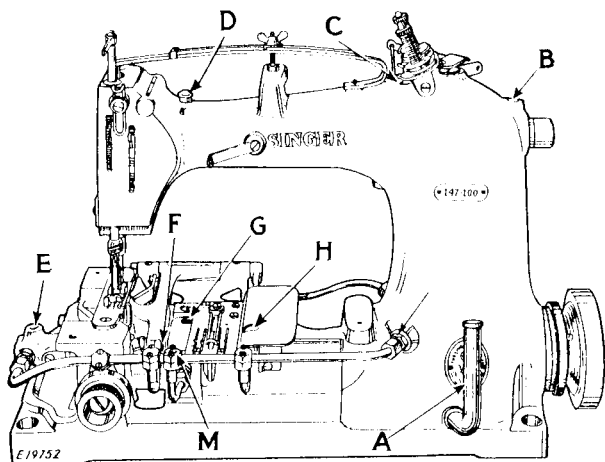


Fig. 2. Priming Points at Front of Machine

Use "TYPE B" or "TYPE D" OIL, sold only by Singer Sewing Machine Company. See inside front cover for descriptions of these oils.

A machine new from the factory, or one that has not been operated for some time, must be serviced as follows:

1st. Turn aside the cover N, Fig. 5 and pour oil through the filler P until it reaches the oil level mark on the gauge in tube A, Fig. 2. The oil in this tube indicates the oil level in the reservoir.

2nd. Fill oil holes B, C, D, E, G, Fig. 2 and O, Fig. 3 level-full of oil.

3rd. Fill the main oil pipe to overflowing through oil hole M, Fig. 2. This primes the various oil wicks and is very important.

4th. Apply oil at holes J, K, L, Fig. 5.

5th. Fill trough on connecting rod at H, Fig. 2.

6th. Fill trough on feed lifting eccentric at F, Fig. 2.

7th. Apply oil at holes marked oil.

8th. Apply 2 drops of oil to upper needle bar bushing.

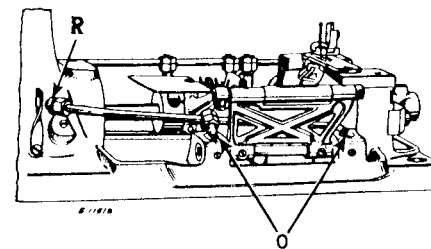


Fig. 3  
Priming Points at Rear of Machine

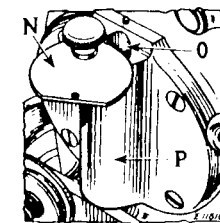


Fig. 4  
Oil Reservoir Vent  
at Rear of Machine

A machine in daily use must be oiled as follows:

1st. Move aside the lid N, Figs. 4 and 5 of oil reservoir vent P, Figs. 4 and 5 and apply oil to hole O, Fig. 4 until it stands about  $\frac{1}{16}$  inch from top of oil level cup A, Fig. 2. The oil in this cup indicates the oil level in the reservoir.

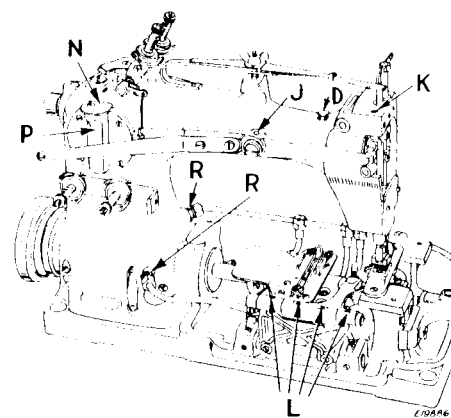


Fig. 5. Regular Oiling Points at  
Rear of Machine

Never allow the level of the oil to go more than  $\frac{1}{4}$  inch below oil level mark on the gauge, when the machine is at rest.

2nd. Fill oil cup D, Fig. 5 level-full twice daily, or as required.

3rd. Apply oil twice daily to all oil holes marked OIL, or as required.

### SPECIAL NOTICE

The letter "o" which is marked on each of the oil pipe couplings R, Fig. 5 and R, Fig. 3 must always be at the top.

## Needles

Needles for Machine 147-100 are of Class and Variety 62 x 47 and are made in sizes 13, 14, 16, 17, 18 and 19.

Needles for Machine 147-101 are of Class and Variety 62 x 43 and are made in sizes 13, 14, 16, 17, 18, 19, 21 and 22.

Needles for Machine 147-102 are of Class and Variety 62 x 45 and are made in sizes 9, 11, 12, 14, 16, 17, 18, 19, 21, 22, 23, 24 and 25.

Needles for Machine 147-103 are of Class and Variety 62 x 51 and are made in sizes 19, 21, 22 and 23.

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. The use of rough or uneven thread, or thread which passes with difficulty through the eye of the needle, will interfere with the proper operation of the machine.

Orders for needles must specify the **quantity** required, the **size** number, also the **class** and **variety** numbers separated by the letter **x**.

The following is an example of an intelligible order:  
"100 No. 16, 62 x 47 Needles."

The best stitching results will be obtained when using the needles furnished by Singer Sewing Machine Company.

### To Set the Needles

Turn the balance wheel over from you until the needle bar moves up to its highest point, and loosen the two set screws in the needle clamp. Place each needle up into the needle clamp as far as it will go, with the single continuous groove toward you, then tighten the two set screws.

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## Upper Threading of Machines 147-100 and 147-101

(See Fig. 6)

Pass the threads from the unwinder through the holes 1 and A in the tension thread guides and between the tension discs 2 and

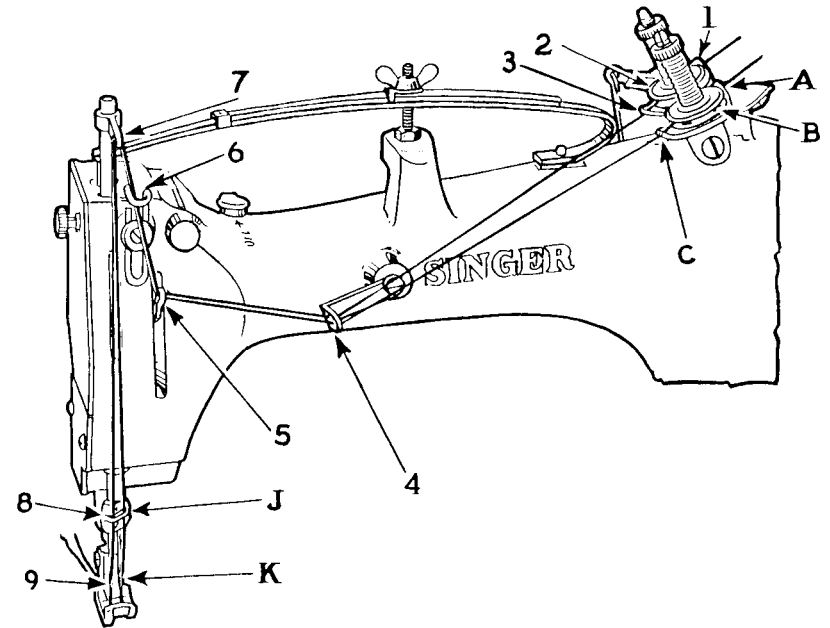


Fig. 6. Upper Threading of Machines 147-100 and 147-101

B at the top of the machine, through holes 3 and C in the tension thread guides, down through eyelets in the thread guide 4, through eyelet in thread controller 5, up and through auxiliary thread take-up wire 6, through the holes in thread take-up 7, down through holes 8 and J in the needle clamp and from front to back through eyes of needles 9 and K.

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

## Upper Threading of Machines 147-102 and 147-103

(See Fig. 6A)

Pass the threads from the unwinder through the holes 1 and A in the tension thread guides and between the tension discs 2 and

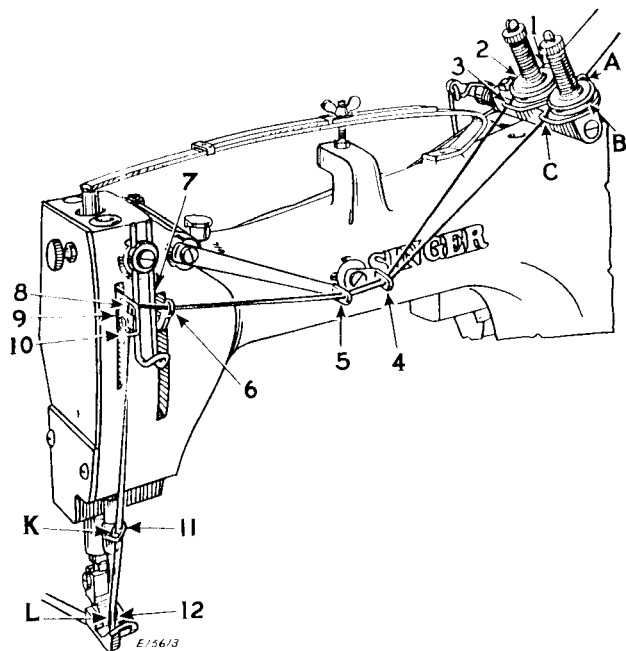


Fig. 6A. Upper Threading of Machines 147-102 and 147-103

B at the top of the machine, through holes 3 and C in the tension thread guides, down through eyelets in the thread guide 4 through eyelets in slack thread regulator 5, through eyelet in thread controller 6, across front of auxiliary thread take-up wire 7 and through eyelets in thread take-up 8, under thread take-up plate 9, into holes of thread guide 10, down through holes 11 and K in needle clamp and from front to back through eyes of needles 12 and L.

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

## Under Threading

Operator Standing at the Front of the Machine

(See Figs. 7 and 8)

Turn the balance wheel over from you until the needle bar moves to its lowest point, then turn the knob L, Fig. 8 to the left as far as it will go. This will bring the loopers into position for threading.

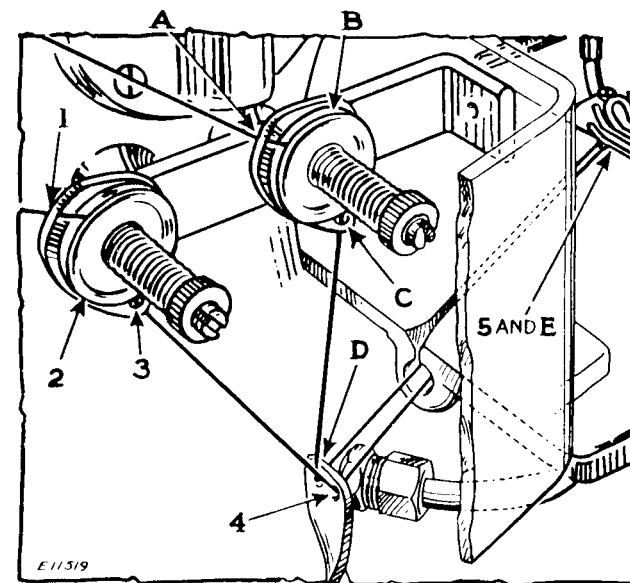


Fig. 7. Threading the Loopers

To thread the back looper, pass the thread from the unwinder through hole 1, Fig. 7 in the right hand tension bracket and over between tension discs 2 at the back of the machine, through hole 3 and down through back eyelet 4 in the thread guide that stands up from the base of the machine. Pass the thread through the hole in the cloth plate guard and through the slot in the cloth plate. Then pass the thread over the first guide and into the second guide of eyelet 5, Fig. 8, under stripper 6, into the first guide and over the second guide of eyelet 7, through hole 8 in the heel of the looper and from you, through eye 9 of the looper.

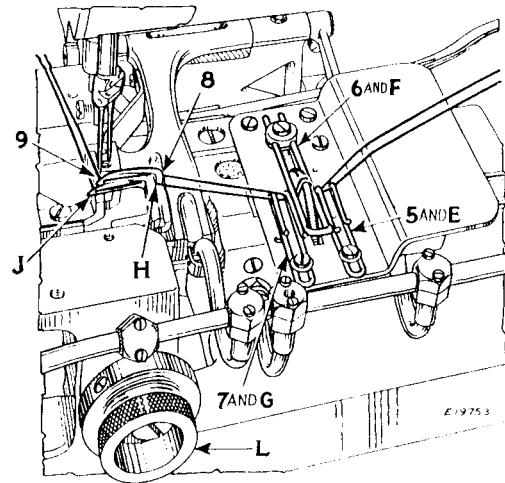


Fig. 8. Threading the Loopers

To thread the front looper, or the one nearest to you, pass the thread from the unwinder through hole **A**, Fig. 7 in the left hand tension bracket, over between tension discs **B** at the back of the machine, through hole **C** and down through front eyelet **D** in the thread guide that stands up from the base of the machine. Pass the thread through the hole in the cloth plate guard and through the slot in the cloth plate. Then pass the thread through eyelet **E**, Fig. 8, under stripper **F**, under eyelet **G**, through hole **H** in the heel of the looper and from you through eye **J** of the looper.

Allow about two inches of thread to hang free from the eye of each looper with which to commence sewing and turn the knob **L**, Fig. 8 back into sewing position.

#### To Regulate the Tensions

The tension on the needle threads is regulated by the thumb nuts above the tension discs at the top of the machine. The needle thread requires sufficient tension to set the stitch properly in the goods.

The tension on the looper threads is regulated by the thumb nuts on the tension brackets at the back of the machine. The tension on the looper threads should be light, but sufficient to control the threads.

#### To Regulate the Pressure on the Material

The pressure of the presser foot on the material is regulated by means of the wing nut **D**, Fig. 19, page 23, at the top of the machine. To increase the pressure, turn the wing nut **D** downward. To decrease the pressure, turn the wing nut upward.

#### To Regulate the Length of Stitch

The length of stitch is regulated by the large screw **A**, Fig. 9 which projects beyond the body of the feed eccentric on the rotary

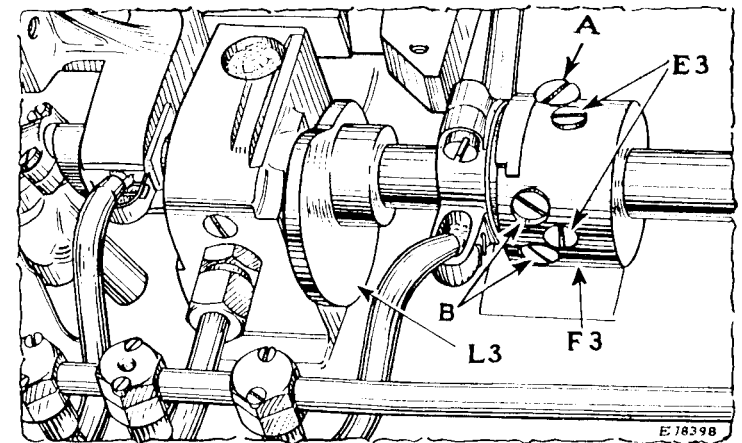


Fig. 9. Regulating the Stitch Length

shaft. To increase the length of stitch, loosen the clamping screws **B**, Fig. 9 and turn the large screw **A** over to the left or outward. To shorten the stitch, turn the large screw **A** over to the right or inward. When the desired length of stitch is obtained, securely tighten the clamping screws **B**.

**NOTE:** If the machine is equipped with a movable needle guard, the guard must be reset as instructed on page 19 whenever the stitch length is changed.

## INSTRUCTIONS FOR ADJUSTERS AND MECHANICS

### To Set the Loopers the Correct Distance from the Centers of the Needles

When the needle bar is at its lowest point, the distance from the center of the front needle to the point of the front looper

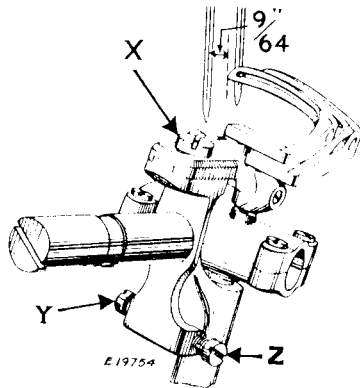


Fig. 10. Looper Setting

should be  $\frac{9}{64}$  inch. If the distance is less than  $\frac{9}{64}$  inch, loosen the right hand screw Z, Fig. 10 in the looper bracket and tighten the left hand screw Y, Fig. 10 in the looper holder bracket. If the distance is more than  $\frac{9}{64}$  inch, loosen the left hand screw Y and tighten the right hand screw Z. When the correct distance from the center of the front needle to the point of the front looper is obtained, see that the two screws Y and Z are securely tightened.

### To Change the Sidewise Position of the Loopers in Relation to the Needles

The loopers should be set to come equally close to the needles on their forward and backward strokes. To change the sidewise position of the loopers in relation to the needles, loosen the screw X, Fig. 10 and move the looper holder, as required, then securely tighten the screw X.

### To Set the Needle Bar in the Correct Position

Turn the balance wheel over from you until the points of the loopers, on their forward stroke, reach the centers of the needles.

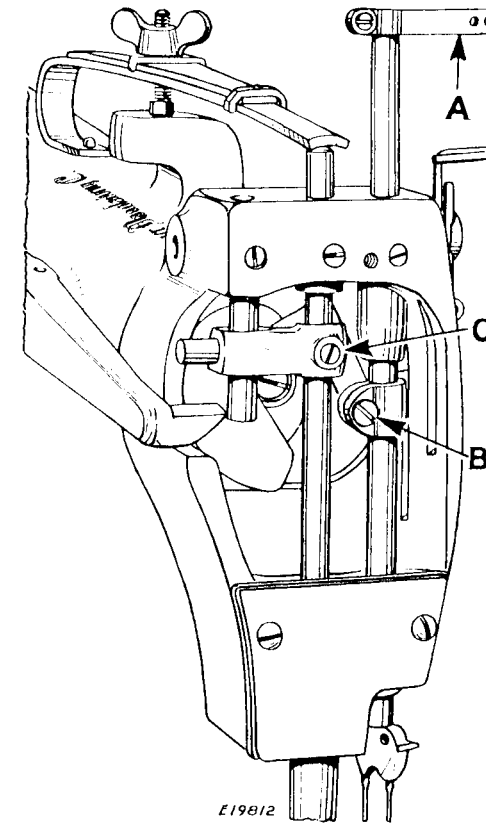
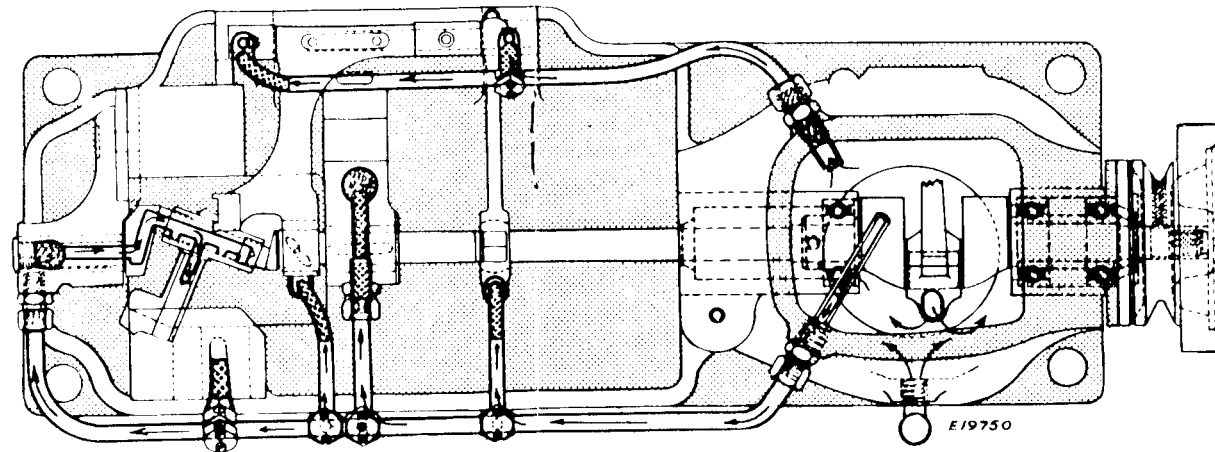
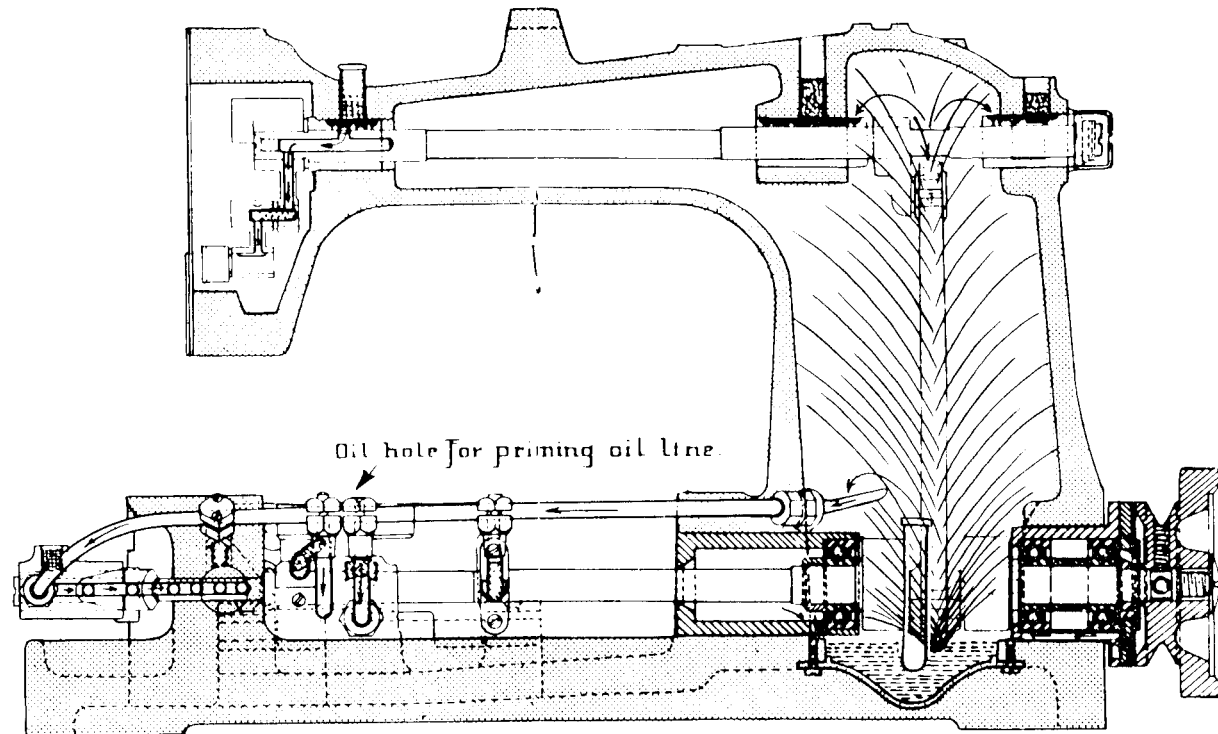


Fig. 11. Setting Needle Bar, Machines 147-100 and 147-101

When the loopers are in this position, the eyes of the needles should be about  $\frac{1}{8}$  inch below the points of the loopers so that the eyes of the needles and eyes of the loopers will be in perfect alignment when they pass each other on the loop taking stroke. In case the needle bar is not set at the correct height, loosen the screw C, Fig. 11 in the needle bar connecting stud and move the needle bar up or down, as required, then securely tighten the screw C.



Diagrams  
of Machine showing  
wicks and bearings  
oiled by automatic  
splash, also bearings  
oiled by gravity  
through tubes on  
outside of the  
machine.



### To Set the Feed Dog at the Correct Height

When the feed dog is at its highest position, approximately the full depth of the teeth should project through the slots in the throat plate. The height of the feed dog is determined by the stop screw **B2**, Fig. 12 which may be turned to the right or left as required after removing the feed dog. Note that the feed dog should always rest upon the stop screw **B2**.

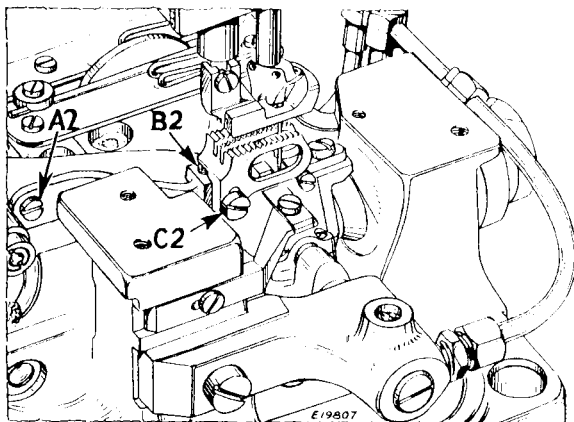


Fig. 12. Feed Dog Adjustments

### To Level or Tilt the Feed Dog

The feed dog may be leveled, or tilted to any desired position after loosening feed dog screw **C2**, Fig. 12 and screw **A2**, Fig. 12.

When the feed dog is in the desired position, adjust the feed dog stop screw **B2**, so that the feed dog rests upon it. Then tighten feed dog screw **C2**, and screw **A2**.

### To Set the Needle Thread Take-up on Machines 147-100 and 147-101

When the needle bar is at its lowest point, the needle thread take-up **A**, Fig. 11, page 13, should be set so as to have about  $\frac{1}{16}$  inch clearance from the upper needle bar bushing.

### To Set the Needle Thread Take-up on Machines 147-102 and 147-103

The needle thread take-up **D**, Fig. 13, page 17 is usually set so that the bottom of the take-up is flush with the bottom of its holder.

### To Adjust the Slack Thread Regulator on Machines 147-102 and 147-103

The slack thread regulator **C**, Fig. 13 on the front of the machine should be set so that when the loopers are shedding

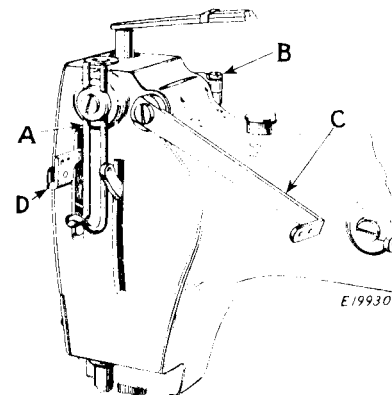


Fig. 13. Setting Slack Thread Regulator, Machines 147-102 and 147-103

the needle loops on their backward stroke, the thread will not snap off the points of the loopers nor be drawn through the tension discs. To set the slack thread regulator, it is best to start with the regulator in a low position and then continue raising the regulator until the loopers back out of the needle loops with a little tension on the thread. To adjust, loosen the clamping screw **B**, Fig. 13 and raise or lower the slack thread regulator as may be required, then securely tighten the clamping screw **B**.

### To Adjust the Auxiliary Thread Take-Up

The auxiliary thread take-up **A**, Fig. 13 at the front of the machine should be set so that it takes up the slack of the needle threads after the loopers have shed the needle loops and as the needle bar finishes its downward stroke and the stitch is set. To change the position of the auxiliary thread take-up, loosen the screw which holds it in position and raise or lower it, as required, then tighten the screw.

For some threads it will be necessary to set the auxiliary thread take-up at a height different from that required by others, owing to the differences in finish, twist, elasticity, etc.

### To Adjust the Under Thread Guides

The purpose of the thread guides **B**, Fig. 14 is to position the threads on the rotary take-up. The guides **B** should be set about flush with the front edge of the stripper plate as shown in Fig. 14.

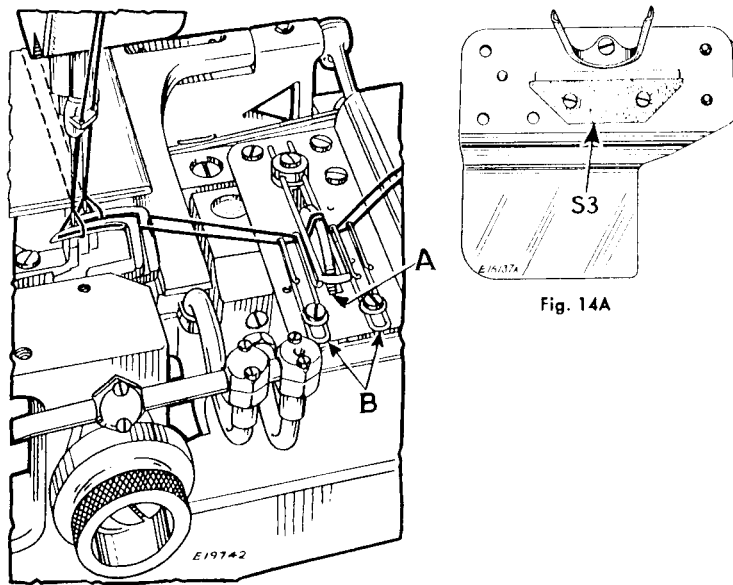


Fig. 14. Under-Thread Adjustments.

### To Time the Under Thread Take-up

The looper thread take up should be set to contact the thread just as the looper is commencing its backward stroke or loop shedding motion and to keep the thread taut until the point of the needle, on its downward stroke, has entered the triangle formed by the looper blade, the looper thread and the needle loop as shown in Fig. 14. The looper thread take-up **A** can be correctly timed after loosening the screw which holds it in position on the rotary shaft.

### Under Thread Rotary Take-up Guard (Fibre)

The underside view, shown in Fig. 14A, of the stripper plate shows the fibre guard **S3** attached. The take-up should be set in close contact to this guard to prevent the ends of the thread, in case of breakage, from being carried around the take-up.

### To Set the Movable Needle Guard

The function of the needle guard **D2**, Fig. 15 is to prevent the needle from springing into the path of the looper when the looper is on its forward stroke. If the machine is equipped with a movable needle guard, the guard must be reset each time the stitch length is changed.

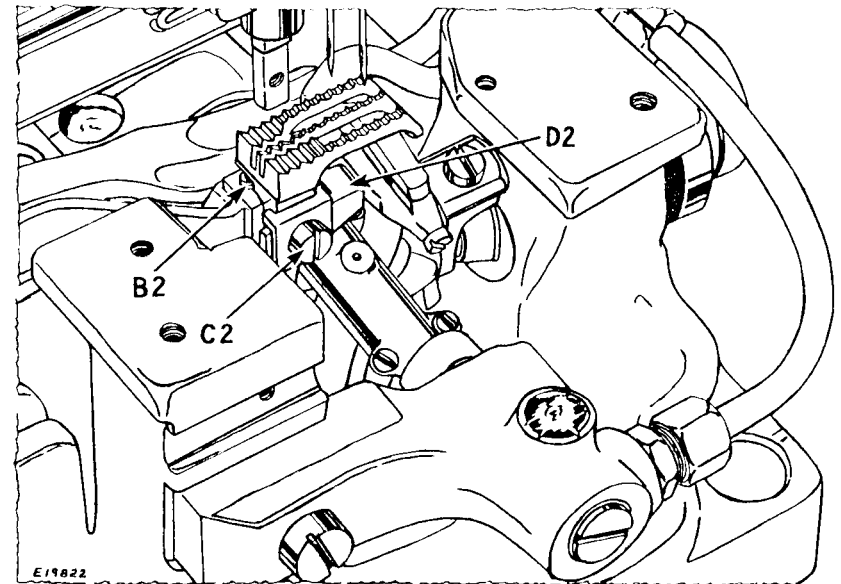


Fig. 15. Movable Needle Guard

Use caution when setting the movable needle guard as it is attached to the feed bar and should be set only when the feed is all the way forward and the needle is on its upstroke.

To set the movable needle guard, loosen screw **C2**, Fig. 15 and move the needle guard **D2** toward or away from the needle so that the guard is as close as possible to the needle without actually touching it.

Press the feed dog down upon the stop screw **B2**, Fig. 15, then tighten the screw **C2**.

### To Set the Stationary Needle Guard

The stationary needle guard should be set as close as possible to the needle without actually touching it. To set the stationary needle guard, loosen the set screw **L**, Fig. 15A, in the needle guard holder and move the guard **C**, Fig. 15A, to or from the needle, as may be required, then securely tighten the set screw **L**.

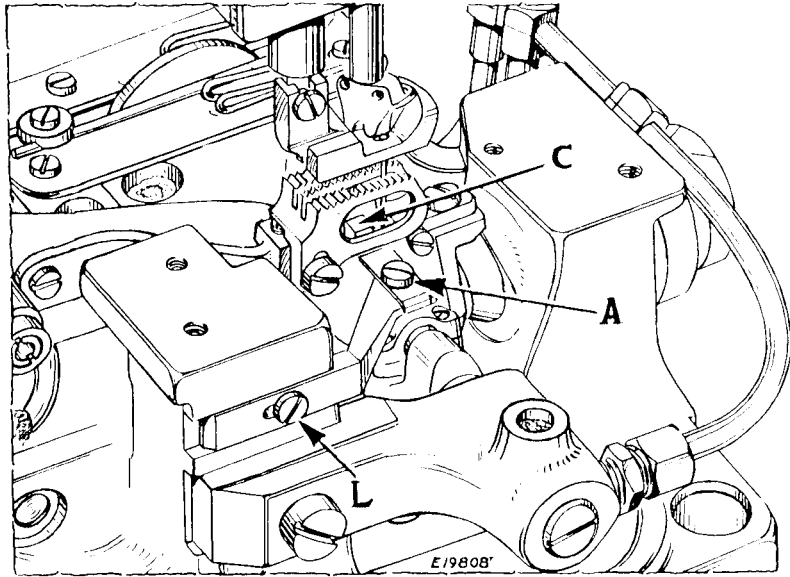


Fig. 15A. Stationary Needle Guard

The stationary needle guard can be adjusted sidewise to clear the feed dog after loosening the screw **A**, Fig. 15A.

The function of the needle guard is to prevent the needle from springing into the path of the looper when the looper is on its forward stroke.

### To Time the Feed

For correct timing of the feed, the first two of the three screws **J**, Fig. 16 must be tightened against the two flats on the rotary shaft. The first of these three screws is the one nearest the stitch regulator screw **A**, Fig. 16, the second being the one which follows the first when the balance wheel is turned over from the operator. After tightening these two screws against their flats, tighten the third screw against the shaft. Then time the under thread take-up, as instructed on page 18.

### To Change the Amount of Needle-Avoiding Motion of the Looper

The amount of sidewise movement of the looper is regulated by moving the rotary shaft endwise, toward the needle for less sidewise motion

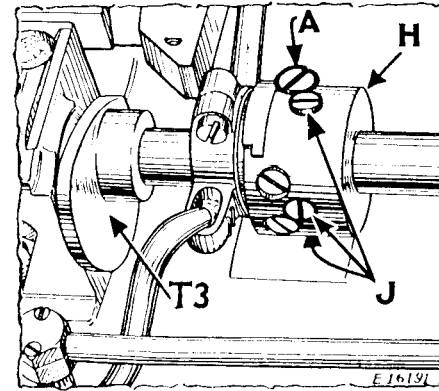


Fig. 16. Looper Adjustments.

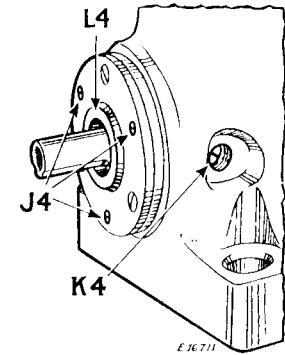


Fig. 17. Rotary Shaft.

and away from the needle for more sidewise motion. The looper should pass as close to the needle as possible on its forward and backward stroke, without touching the needle. To adjust, loosen the set screw in the under thread take-up which holds it in position on the rotary shaft; also loosen the three set screws **J**, Fig. 16 in feed eccentric **H**, Fig. 16, and loosen the two screws **E**, Fig. 20, page 24 in the rock shaft crank. Take off the balance wheel by loosening the two set screws in the groove and removing the cap screw. Loosen ball bearing case screw **K4**, Fig. 17. To move the rotary shaft toward the needle, turn three position screws **J4**, Fig. 17 uniformly inward, and tap ball bearing case **L4** until desired amount of sidewise motion is obtained. To bring the shaft away from the needle, turn the three position screws outward, as evenly as possible, then tighten ball bearing case screw. Replace balance wheel. Turn the balance wheel a few times by hand to allow rock shaft and feed eccentric to align themselves, then securely tighten screws **E**, Fig. 20 against their flats; time the feed eccentric **H**, Fig. 16 as instructed below, then time the under thread take-up as instructed on page 18.

### To Centralize the Feed Dog in the Throat Plate Slots

The feed dog should be centered in the throat plate slots, so that it moves equi-distant from both ends of the slots during its feeding movement.

To centralize the feed dog, loosen clamp screw **B**, Fig. 18 and rotate the hinge pin **D**, as required. Then tighten clamp screw **B**.

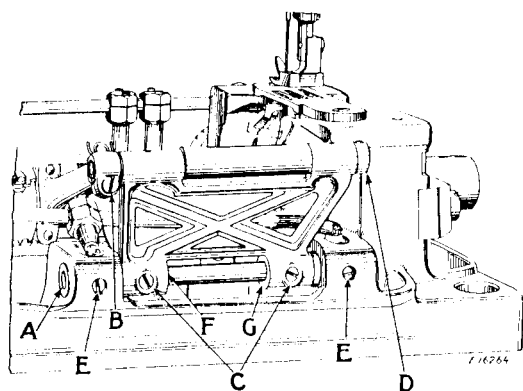


Fig. 18. Feed Dog Adjustments.

### To Align the Feed Dog in the Throat Plate Slots

Loosen the three screws **J**, Fig. 16, page 21 in the feed eccentric **H**, Fig. 16, also loosen the two set screws **E**, Fig. 18 in the feed rocking frame bushings. Then tap the inside edge of the feed frame lug at **F** to move the feed dog to the left, or tap at **G** to move it to the right.

Take out excessive end play by tapping the opposite bushing toward the feed frame, but use caution when making this adjustment as there should always be a slight amount of end play between the two bushings.

### To Adjust the Needle Thread Tension Releaser

The function of the needle thread tension releaser is to release the tension on the needle threads when the presser foot is raised. If

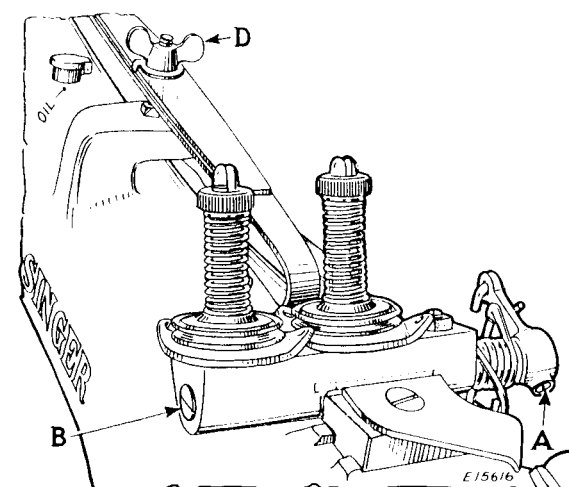


Fig. 19. Needle Thread Tension Releaser

the tension releaser does not release the threads when the presser foot is raised, or if the tension is partially released when the presser foot is down, loosen the set screw **A**, Fig. 19 and turn the shaft **B**, Fig. 19 to the right or left until the correct adjustment is obtained, then tighten the set screw **A**.

### To Remove and Replace the Feed Mechanism

Remove the presser foot, throat plate and feed dog. Loosen the clamp screw **B**, Fig. 18, page 22 in the feed connecting rod and slip the feed bar hinge pin **D**, Fig. 18 out far enough to release the connecting rod. Loosen the two set screws **C**, Fig. 18 in the feed rocking frame and remove the hinge pin **A**, Fig. 18. The feed assembly can now be removed from the machine.

After replacing the feed mechanism, the feed dog should be centred in the slots in the throat plate by loosening the clamp screw **B** and rotating the hinge pin **D**, as required.

### To Remove the Arm Rock Shaft

Remove the face plate and needles, then unscrew the needle clamp from the needle bar. Loosen set screw **B**, Fig. 21 and remove thread take-up **A**, Fig. 21, (Machines 147-102 and 147-103). Loosen screw **C**, Fig. 21 and remove the needle bar from the top of the machine.

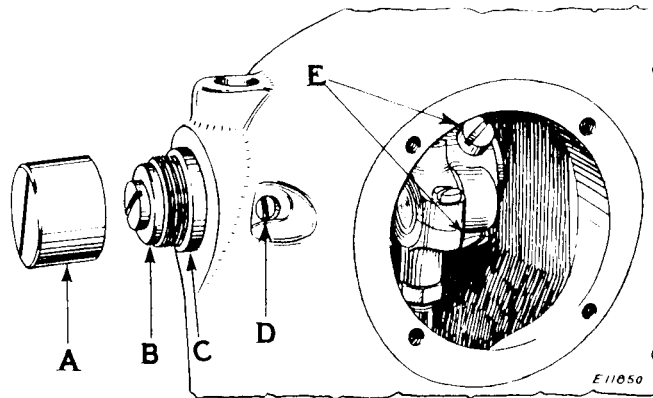


Fig. 20. Removal of Arm Rock Shaft

Remove the presser foot and screw, then loosen screw **D**, Fig. 21 and take out the presser bar from the top of the machine. Loosen screw **H**, Fig. 21 and remove presser bar guide **J**, Fig. 21, and presser bar lifting bracket **E**, Fig. 21. Take out the needle bar connecting link. Take out screw **G**, Fig. 21 and remove foot lifting lever **F**, Fig. 21.

Remove cap **A**, Fig. 20 and screw and washer **B** at the end of the rock shaft. Remove the round cover plate at the back of the arm, carefully saving the gasket. Loosen the two screws **E**, Fig. 20 in the rock shaft crank and with the connecting rod at the mid-way point, withdraw the rock shaft from the needle bar end of the arm.

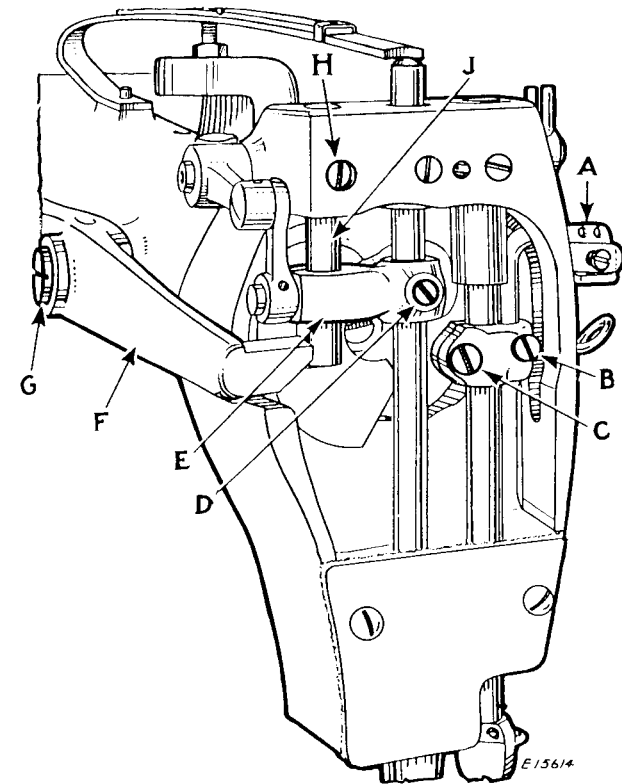


Fig. 21. Removing Needle Bar, Machines 147-102 and 147-103.

### To Replace the Arm Rock Shaft

See Fig. 20

When replacing the rock shaft, have the connecting rod at the mid-way point. Replace screw and washer **B**, Fig. 20 in the end of the shaft, then turn the balance wheel a few turns by hand to allow the rock shaft crank to align itself before tightening the two screws **E** on their flats.

The amount of end play in the rock shaft is regulated by loosening set screw **D** and moving bushing **C** endwise. Use caution when making this endwise adjustment, as there should be a little end play in the rock shaft when cold to allow for expansion which takes place when the machine is warmed up.

### To Remove the Loper Mechanism

Take out the screw E, Fig. 22 and remove the looper holder with the loopers. Take out the screw L, Fig. 22 and remove the needle

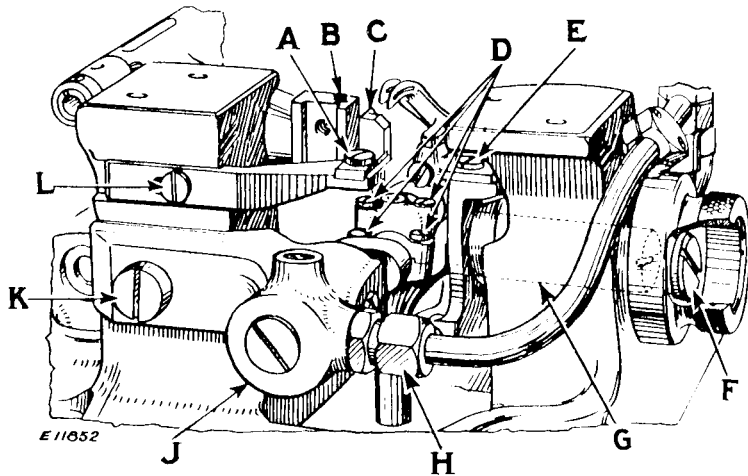


Fig. 22. Loper Mechanism

guard holder. Take out the four screws D, Fig. 22 in the looper shaft connection and remove the cap. Remove the cap screw F, Fig. 22, then insert a screw driver into the hole and unscrew the shaft G, Fig. 22 from the looper carrier. Remove the looper assembly from the machine.

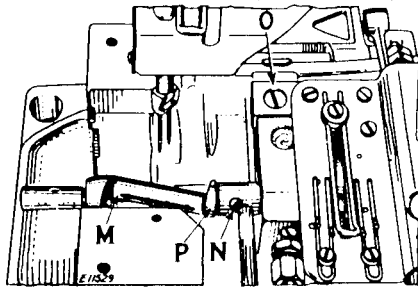


Fig. 23. Removing Loper Shaft

### To Remove the Loper Shaft

To remove the looper shaft M, Fig. 23 from the machine, first remove the feed bar. Unscrew the oil pipe coupling nut H, Fig. 22, take out the screw K, Fig. 22 and remove the bracket J, Fig. 22, then turn the balance wheel until the looper shaft screw N, Fig. 23 is at the top. Take out this screw and remove the looper shaft from the rotary shaft by tapping the flange of the feed eccentric P, Fig. 23 with a piece of brass.

### To Remove the Arm Rotary Shaft

Remove the presser foot, needle, cloth plate, throat plate and feed dog. Take out screw E, Fig. 22 and remove the looper holder

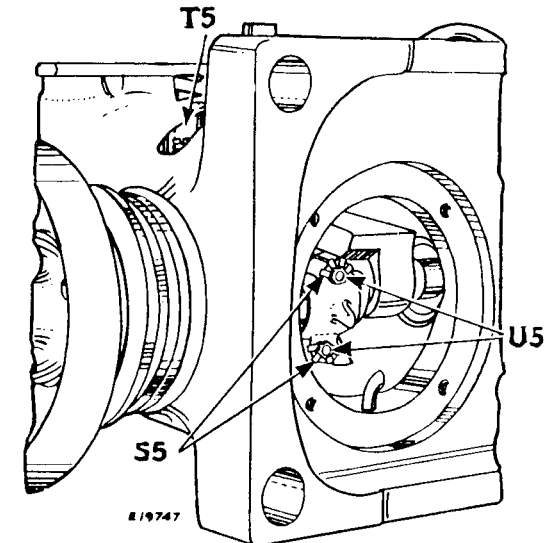


Fig. 24. Removing Arm Rotary Shaft

together with the looper. Take out screw O, Fig. 23 and remove the stripper plate and bracket. Loosen the clamp screw B, Fig. 18, page 22 in the feed connecting rod and slip out the feed bar hinge pin D, Fig. 18 and remove the feed bar. Remove the screw N, Fig. 23 which holds the looper shaft to the rotary shaft. Remove the oil sump at the under side of the machine bed, being careful to prevent injury to the gasket. Through the opening thus exposed (see Fig. 24) take out the two hexagon nuts U5, Fig. 24 together with the lock washers S5, Fig. 24, and remove the connecting rod cap. Loosen the three set screws J, Fig. 16, page 21 in the feed eccentric H, Fig. 16, also loosen the set screw in the hub of the looper thread take-up T3, Fig. 16. Loosen the ball bearing case screw T5, Fig. 24 and tap the inside rim of the balance wheel to remove the rotary shaft together with the ball bearing case.

### To Replace the Arm Rotary Shaft

See Fig. 24

When making replacement, tighten the three set screws **J**, Fig. 16 in the feed eccentric **H**, Fig. 16 in the order mentioned under "To Time the Feed" page 20. Make certain that the flat of the ball bearing case is in such position that the ball bearing case screw **T5**, Fig. 24, will be tightened against it.

To replace the connecting rod cap, first have the two cap screws in place, then apply the lock washers **S5**, Fig. 24, then the hexagon nuts **U5**. Do not tighten these nuts too much as this would cause binding of the shaft. When the nuts **U5** have been properly tightened, bend up the lugs of the washers **S5**. Also make sure, in replacing the sump, that the gasket is properly in place, to prevent leakage of oil, before tightening the four fastening screws.

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