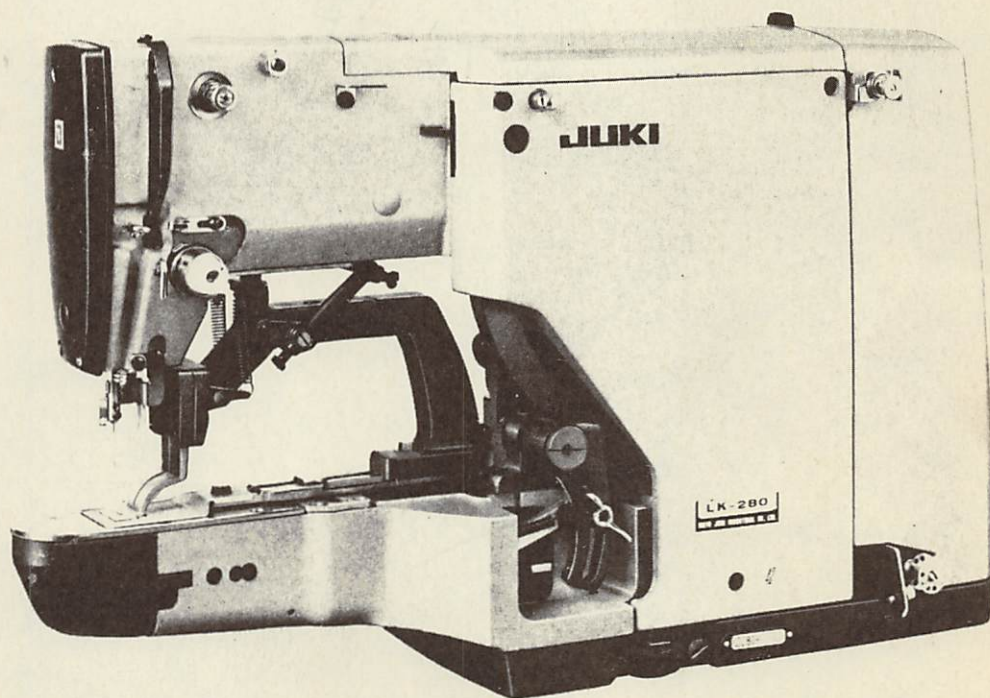


**JUKI**

**LK-280**

HIGH SPEED, SINGLE NEEDLE, LOCKSTITCH BARTACKING  
INDUSTRIAL SEWING MACHINE

**ENGINEERING MANUAL**



**TOKYO JUKI INDUSTRIAL CO., LTD.**





# MODEL LK-280 ENGINEERS MANUAL

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(STANDARD ADJUSTING FIGURES)

1. Stop-motion angle  $53^{\circ}$

- \* At the point 5.5mm( $7/32''$ ) lower than the highest point of the needle bar. (Fig.1)

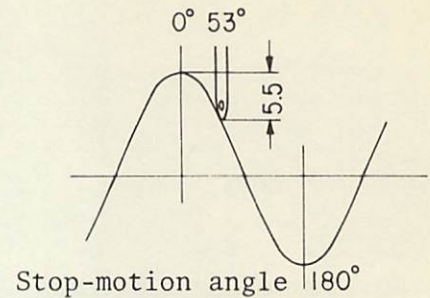


Fig.1

2. Matching the feed cam

- \* Feeding stops when the needle point is lowered to 7~10mm( $9/32'' \sim 25/64''$ ) above the throat plate.

(Refer to Fig.15 page 8, page 20 3)

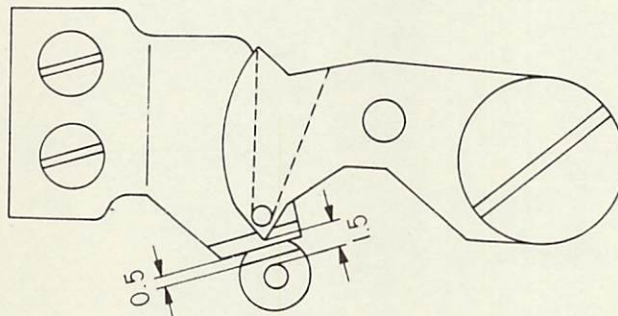


Fig.2

3. Matching the thread trimming knife

- \* At the stop-motion time, the clearance between the thread handling device of the knife and end of needle hole is 1.5mm( $1/16''$ ).

4. Installing position of shuttle race spring

- \* Left right position.....Needle should jibe with the center of groove
- \* Fore aft position.....Rear end of needle should jibe with the angle (A) (Fig.3)

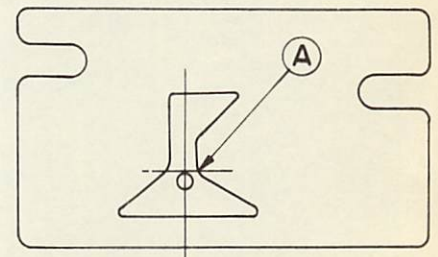


Fig.3



## 5. Matching the needle and the shuttle race

### \* Height of needle bar

Match the upper mark line of needle bar with the bottom end of the needle bar lower bushing. (Fig.4-a)

(Note) In case thick thread

(over #30) is to be used, raise the height 0.5mm(1/64") higher than standard.

### \* Matching the shuttle

When the lower mark line of needle bar and the bottom end of needle bar lower bushing are jibed, the center

of the needle and the blade point of shuttle should match. (Fig.4-b)

\* Clearance between the needle and shuttle Should be 0.05~0.1mm(Fig.4-c)

\* Clearance between the needle and driver

Should be 0mm.....Make the front end surface of the driver as a guide to prevent curving of needle. (Fig.4-d)

\* Clearance between the driver and shuttle should be 0.3(1/100")~0.5mm(1/64") (Fig.4-b)

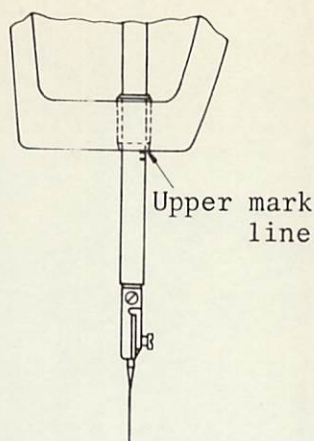


Fig.4-a

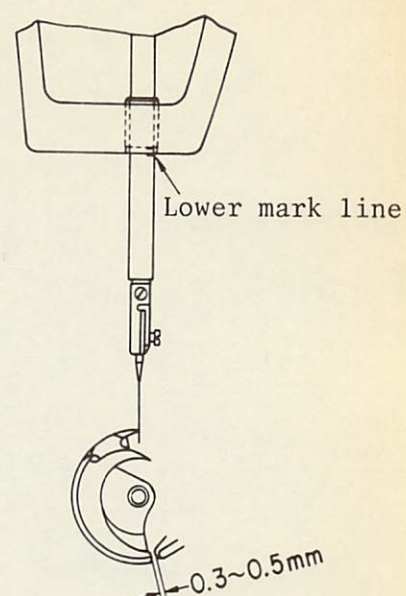


Fig.4-b

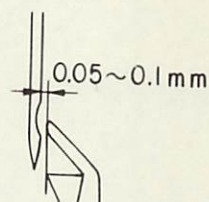


Fig.4-c

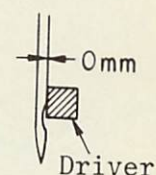


Fig.4-d

### 6. Position of work clamp foot

- \* 42-stitch large bartacking machine

The 26th stitch falls  
on the matching center  
of work clamp foot.

- \* 28-stitch large  
bartacking machine

The 18th stitch falls  
on the matching center  
of work clamp foot. (Fig.5)

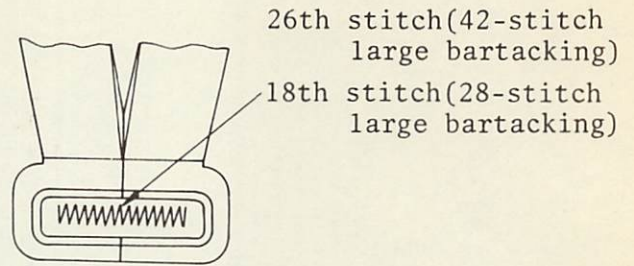


Fig.5

7. Position of wiper

- \* At the stop-motion time, wiper is at the position 13mm(33/64") to the right of needle.
- \* When the wiper passes by the needle point, the clearance should be 1.5mm(1/6"). (Fig.6)

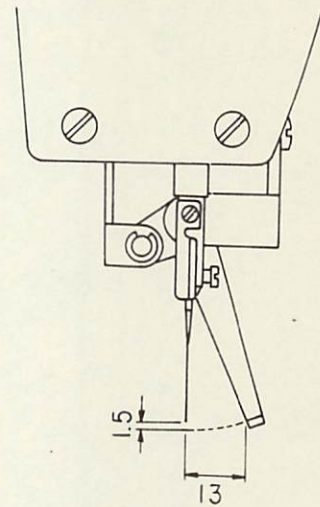


Fig. 6

### 8. Position of safety adjusting plate

- \* At the stop-motion time:  
Left right clearance (A)---0.3mm(1/64")  
Top & bottom clearance (B)---0.3mm(1/64")  
(Fig.7)

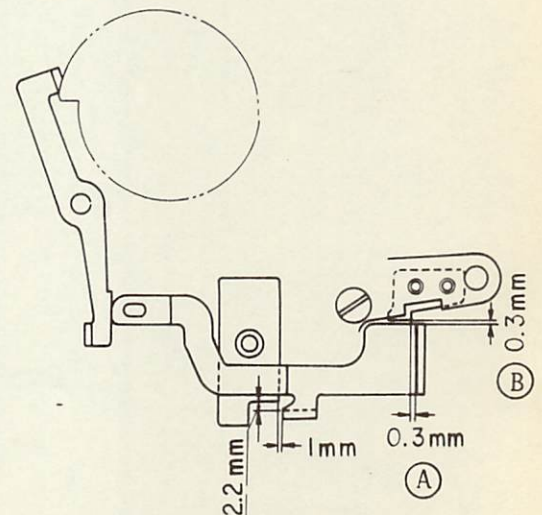


Fig. 7



## 9. Position of stop-motion

### \* Position of stop-motion regulating cam

At the stop-motion time, clearance between the stop-motion regulating cam and the roller should be 0.5mm(1/64"). (Fig.8)

### \* Position of stop-motion frame

At the low speed rotation time, clearance between the stop-motion cam and the stop link rod latch should be 3mm(1/8"). (Fig.9)

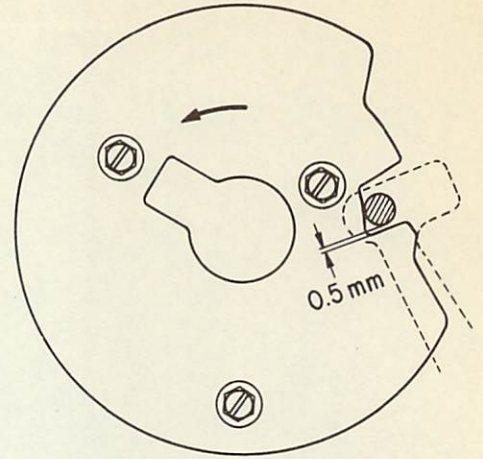


Fig.8

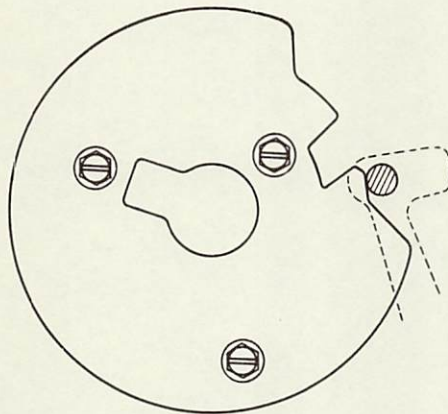
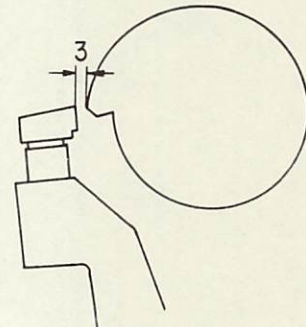


Fig.9



## 10. Position of speed decreasing components

\* The moving range of (A) at both idle running and at high speed running of the pulley should be 0.9~1.1mm(1/32~3/64") (Fig.10)

(Note)

Adjust the driving pulley pressing plate so that when (B) is rotated to start driving and when it changes from low speed to high speed, that (C) makes 1/4 rotation.

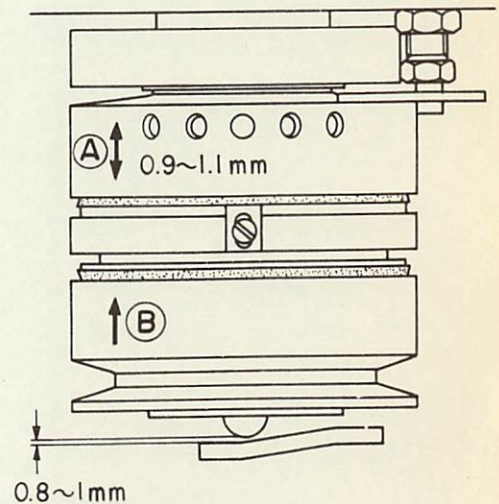


Fig.10

11. Timing of thread tension release

- \* When the needle thread loop of the last stitch has slipped out from the corner of bobbin case, thread tension disc No.2 is released.
- \* The tension release latch at rotating time is separated from the outer rim of the feed cam by  $0.2 \sim 0.3 \text{ mm}$  ( $1/128''$ ). (Fig.11)

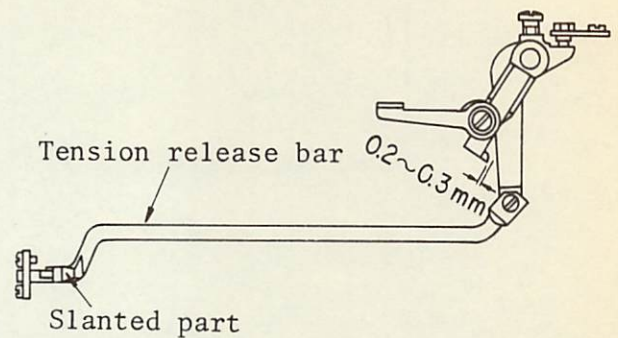


Fig.11

12. Position of bobbin winder assembly (Fig.12)

- \* When the bobbin winder is in idle condition, as seen from above, make adjustment so that the outer rim of the bobbin winder wheel brim will be in contacting position with the V-belt as shown in Fig.12.

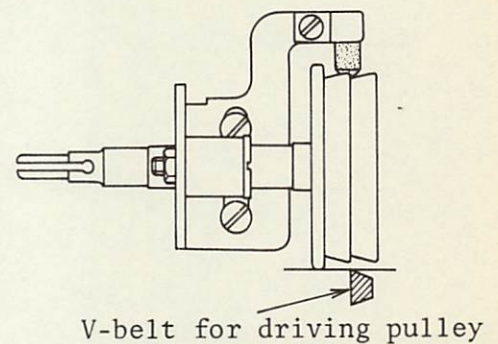


Fig.12



13. Relation between motor pulley and belt(Power source cycle and number of rotations are marked on the pulley)

Power source	Sewing speed	Max. dia. of pulley		Driving belt		Pressure decreasing belt	
50 Hz	2000 spm	99.5Ø	B7101280000	47inch	MTJVM004700	35inch	MTJVM003500
	1700 spm	87.5	B710128000B	46	MTJVM004600	34	MTJVM003400
60 Hz	2000 spm	84	B7102280000	46	MTJVM004600	34	MTJVM003400
	1700 spm	74	B710228000B	46	MTJVM004500	35	MTJVM003400.

14. Relation between needle,needle hole guide,sewing specifications

Sewing specs.	Needle size	Needle hole guide		Sewing garments
Extreme light weight	DP x 5 #11	D2426282C00		Knit goods,tricot,undergarments
Synthetic materials	#14(super)	Standard B2426280000	Bartacking pattern D242684M00	Men's suits,ladies' suits, casual wear
Standard	#16	"	"	" " " "
Heavy weight materials	#18	"	"	Work uniforms,coats, etc.
Extreme heavy weight	DP x 5 #19 #21 DP x 17 #19 #21	B242628000B		Jean pants,cold-preventing clothes

(Note) 1) For sewing extreme heavy weight materials,use B181728000B for shuttle race ring  
2) DP x 17 #21 is about 4.5mm(11/64") longer than DP x 5 #21



## (CORRECTIVE MEASURES FOR FAULTY STITCHES)

This chapter will treat on the corrective measures on faulty stitching symptoms such as thread slippage, thread breakage, skip-stitching, needle breakage and inadequate thread trimming.

### (I) Thread slippage

- \* Faulty stitching symptoms.....This is a faulty condition by which the needle thread slips out from the needle at first or second stitch before any sewing shape is formed.
- \* Principal reasons
  - \* Stitches skip at the first stitch.
  - \* Inadequate length of the trimmed needle thread.
  - \* Inadequate adjustment of the thread take-up spring.
  - \* Bobbin thread is too short.

#### \* Corrective measures

##### 1) Prevent the skip-stitching of the first stitch.

- \* Verify if the shuttle race and the needle are in correct relationship. If not, adjust according to the standard correcting procedure.
- \* Lessen the clearance between the needle and the shuttle.

Loosen the clamp screw for shuttle race, and adjust by rotating the shuttle race adjusting shaft and make the clearance to 0.05~0.1mm. However, if this clearance becomes too small, the needle might hit the blade point of the shuttle and might be damaged. Use caution. (Fig.13)

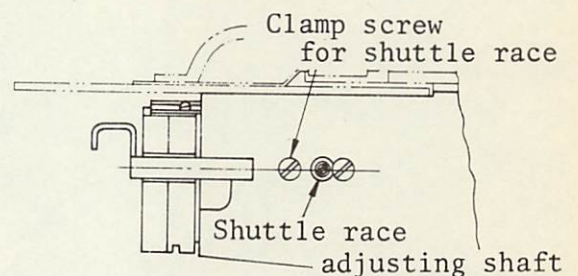


Fig.13





- \* Inadequate rotation of the shuttle.

When the shuttle does not rotate smoothly, lap it well.

Also, sometimes thread hards get stuck to the surface of the shuttle race.

Watch carefully.

- \* Prevent "concaving" and "convexing" of the sewing cloth.

To prevent these faulty conditions, it would be best, normally, to process the work clamp foot with a concave shape(  ) and the work clamp foot lowering plate with a convex shape(  ) as shown in Fig.14.

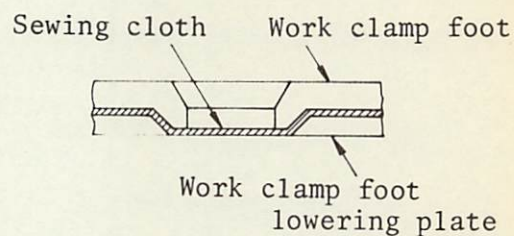


Fig.14

- \* Watch the phase of the feed cam.

Watch carefully and see if the feed has completely stopped when the needle has started to pierce the surface of the sewing cloth. Should the needle be "floating", loosen the feed cam guide and adjust the feed cam.

After moving the feed cam, be sure to adjust the stitch number controlling cam and tension releasing timing. (Fig.15)

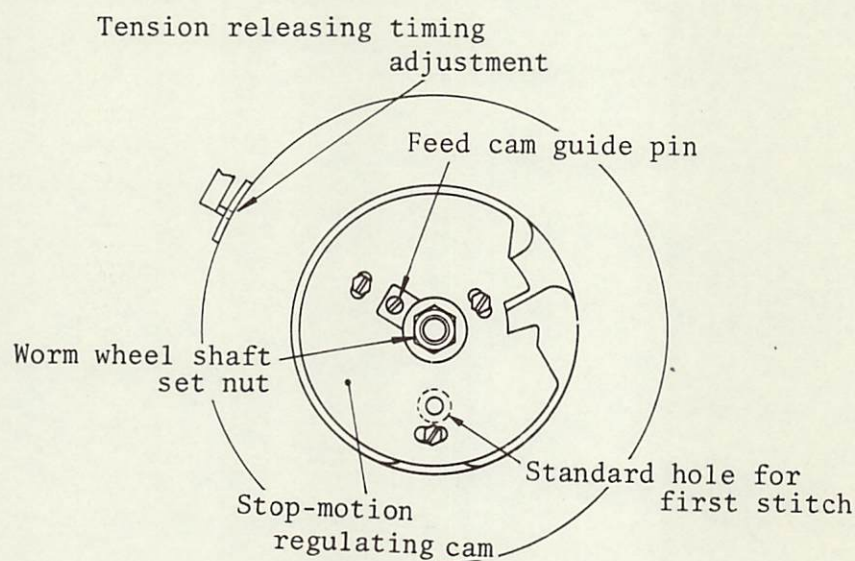


Fig.15

- 2) Insufficient length of trimmed needle thread

When the length of the needle thread after it is trimmed is too short, the thread will slip out from the needle eye at the time of needle piercing the cloth at first stitch. (Fig.16)

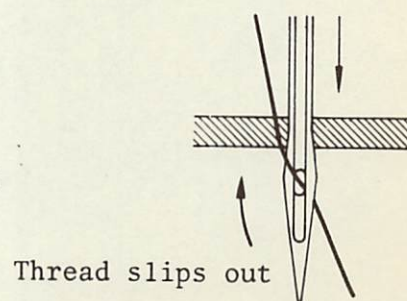



Fig.16



- \* The standard length of trimmed needle thread is 35~40mm(1-3/8~1-37/64").
  - \* When the tension release timing is late, the thread will be trimmed too short or the thread will slip out from the needle.  
Adjust the timing by means of tension release lever.  
(Refer to Fig.47, page 43 ).  
Conversely, if the timing is too fast, the trimmed length will be sporadic or too long.
  - \* When the tension disc No.1 pressure is too strong, the thread will be trimmed too short.
  - \* When the counter knife is too high, the thread will be trimmed before the thread is trimmed at the  part of the moving knife, so generally both needle thread and the bobbin thread will be trimmed short. The most appropriate tolerance between the needle hole guide and the counter knife is 0.1~0.15mm.
  - \* If the clearance of 1.5mm between the end of needle eye and the thread handling device of the counter knife is widened, the length of trimmed needle thread will become shorter.
- 3) Inadequate adjustment of the thread take-up spring
- \* When the moving range of the thread take-up spring is too big, the counter knife will pull in the needle thread immediately after the thread is trimmed. Consequently, the length of thread from the needle to the thread end becomes insufficient, causing the thread to slip out. (Fig.17)

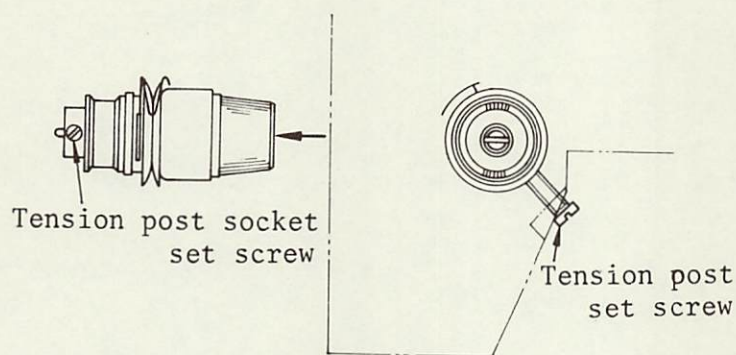


Fig.17



- \* When the moving range of the thread take-up spring is too big, loosen the thread tension post No.2 set screw and rotate the entire thread tension controller toward counter-clockwise direction.
- \* When the take-up spring is strong, loosen the tension post socket set screw, insert a screw driver to the arrow place and rotate it toward counter-clockwise direction.

(Note)

When the tension disc is released, be sure to see that the matching point of the tension release pin is positively at midway of the slanted part. If the matching point is at parallel part, sometimes the tension release bar does not return properly.

#### 4) Inadequate length of bobbin thread

- \* If the length of the bobbin thread coming out from the bobbin corner is too short, sewing shape can not be formed.
- \* The standard length from the bobbin corner is 2.2cm(7/8"). (Fig.18)

If it's short, slightly widen the clearance between the counter knife and the needle hole guide.

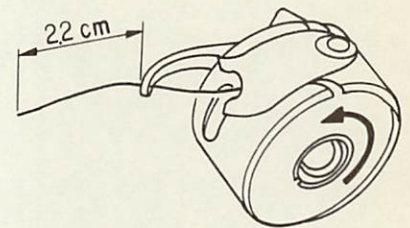


Fig.18

- \* If the difference of level between the counter knife and the needle hole guide is too high, the bobbin thread will be sucked in by the counter knife and will be trimmed short.
- \* If (A) part of the shuttle race spring is bruised, it will invite bobbin thread breakage. Polish it with some abrasives. (Fig.19)

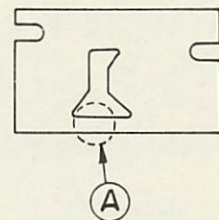


Fig.19

- \* To prevent forcing out of the bobbin thread due to idle spinning of the bobbin, use the exclusive bobbin case for LK-280 model.



(II) Thread breakage

(A) Thread breakage during stitching operation

\* Faulty condition.....Here, it means the breaking of the needle thread and the bobbin thread in the middle of stitching operation.

\* Principle reasons.....\* Shuttle is bruised

\* Thread bites into the shuttle

\* Bruise of the driver

\* Too small clearance between the driver and the shuttle

\* Bruise of the needle hole guide

\* Needle hits the work clamp foot

\* Bruise of the needle

\* Too much tension of thread when needle is piercing the cloth

\* Corrective measures

1) Bruise of the shuttle(Fig.20)

\* The (A) part is where the bruise is formed due to the hitting of the needle with the blade point of the shuttle and the blade point becomes like a shape of a knife.

Smooth this part with a whetstone and finish it with some abrasives and by retreating the position of the shuttle race somewhat, prevent hitting of the needle.

However, if it's retreated too much, skip-stitching may result. Also, even if with the above preventative measures the blade point of the shuttle can not be corrected, verify and see that the dimension of the slant line part of the rear side of the shuttle race ring is same as shown in Fig.21.

If the dimension is insufficient, smooth it out with a whetstone.

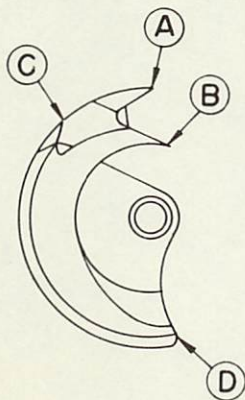


Fig.20

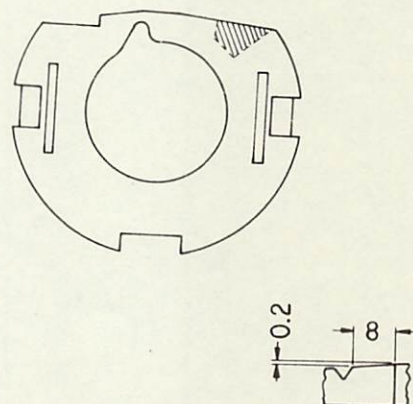


Fig.21



- \* The (B) part is the place where bruise is formed when the needle becomes curved or broken and when the needle thread slips out the thread is damaged or broken.

This is the most frequently occurring bruise, so special attention should be given.

- \* The (C) part is the place where bruise is formed when the shuttle is to be exchanged and its blade point gets caught or when the needle is broken. This does not occur often but when it is bruised, it is practically impossible to stitch.

- \* The (D) part is the place where the thread is damaged at the time of slipping out of the thread, causing the thread to be broken. This, too, does not happen so frequently but when synthetic thread is to be used, be extremely careful.

## 2) Biting into the shuttle

- \* When the position of the shuttle race spring is bad, the needle thread is not properly disposed and bites into the shuttle race. Set the spring to the correct position as shown in Fig.3.
- \* When the R of the (A) part of shuttle blade point is too great, the biting fault results. Exchange the shuttle with large R with a smaller R. (Fig.22)
- \* The installed dimension of (B) part of the shuttle race is 7.5mm(19/64") but if this becomes smaller, proper disposition of the needle thread becomes inadequate and the faulty biting in results. Watch carefully. (Fig.23)



Fig.22

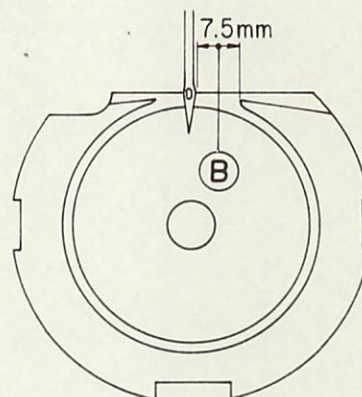


Fig.23



3) Bruise of the driver

- \* Verify if there is or there is not any bruises on the entire circumference of the shuttle driver spring. In high speed sewing, any bruise on the driver spring spells deathknell to the stitching operation. This is especially true of the thread path finish of both sides of A part and its neighbor area. (Fig.24)

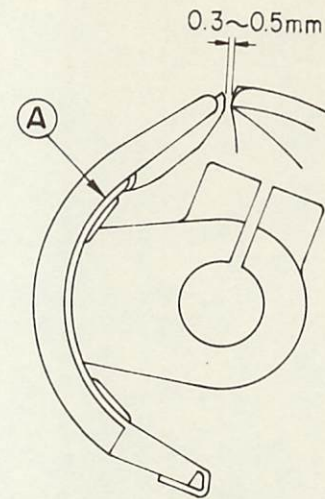


Fig.24

4) Too small clearance between the driver and the shuttle

- \* The standard clearance between the shuttle and the driver is 0.3~0.5mm (1/64 ~1/32").

When this clearance is too small, the needle thread does not slip out well, causing thread breakage or the needle thread to become extremely too long. Conversely, if the clearance is too big, the sound of the shuttle gets too high. (Fig.24)

- \* The clearance between the driver and the shuttle should be measured when the blade point of shuttle came to the bottom position.

5) Bruise of the needle hole guide

- \* When the needle breaks, invariably bruise is formed to the needle hole guide. Also, if abrasion is formed on the needle, polish the guide with an oil wick containing lapping agent, and it will be smooth.

6) Needle hits the work clamp foot

- \* When the fore and aft feed amount is increased, sometimes when the installed position of the work clamp foot is bad, the needle will hit the inside of the work clamp foot and cuts the thread.
- \* If the needle should hit the work clamp foot and bruised it, polish it with some kind of sand paper and smooth it out.

7) Bruise of the needle

- \* If the needle is bruised, it invites thread breakage.  
Be sure to verify the clearance between the needle and the shuttle and also if the driver is guiding the needle.



8) Tension of thread when needle is piercing the cloth

- \* Make the thread take-up spring's stroke to small scale (6~8mm) (15/64~5/16") and also make the pressure of the spring to about 30~50gr at the start of pulling.

(B) Thread breakage at thread trimming time

- \* Faulty condition.....This is a faulty condition by which the needle thread or the bobbin thread is cut at the last stitching time without performing the normal thread trimming process.
- \* Principal reasons.....\* Defective thread releasing timing
  - \* Moving knife is bruised
  - \* Height of counter knife
  - \* Shuttle race spring is bruised
  - \* Inadequate finish of thread path of lower surface of needle hole guide
  - \* Position of moving knife

\* Corrective measures

1) Defective measures

- \* When the thread releasing timing is too slow and the thread is cut with the tension disc holder not in releasing condition, thread breakage occurs.
- \* The relationship between the thread releasing timing and the needle thread is shown below. (Fig.25)

	Condition of needle thread	Tension release lever
1	Too long	Lower down
2	Scattering	Lower down
3	Short & jumps up	Raise up
4	Cut in midway	Raise up

When adjustment is impossible either at above or below the thread release adjusting shaft, move the thread release notch.



2) Moving knife is bruised (Fig.26)

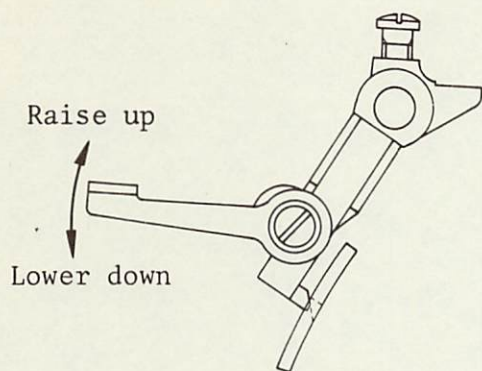


Fig.25

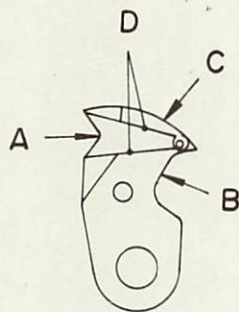


Fig.26

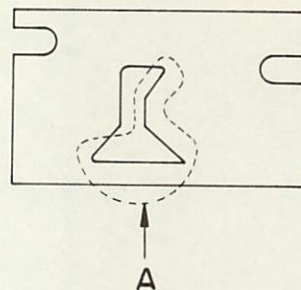



Fig.27

\* When there is bruise along the thread passing parts(A,B,C,D), thread breakage occurs. In such a case polish the parts with some abrasives.

3) Height of counter knife

\* When the height of the counter knife is too high, the thread touches the counter knife before it is cut at the  part of the moving knife and causes thread breakage.

(Refer to Fig.29 & 30 for standard height)

4) Shuttle race spring is bruised(Fig.27)

\* When there is bruise on the A part of Fig.27, thread breakage occurs. In such a case polish it with some abrasives.

5) Inadquate finish of thread path of lower surface of needle hole guide

\* When the thread path of the lower surface needle hole guide is bad the moving knife catches the thread and feed it out at the thread trimming time and the thread will be scraped at the corner and will be cut. Be careful and correct this fault. (Fig.28)

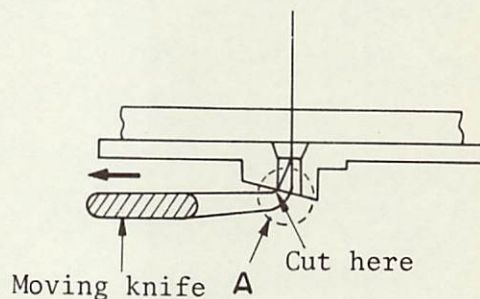


Fig.28

6) Position of moving knife

\* When the needle thread passes the shuttle at the last stitch, if the tension seems to be too strong, make the matching clearance with the moving knife somewhat larger. (Standard is 1.5mm(1/16"), refer to Fig.2 ).



### (III) Inadequate thread trimming

\* Faulty condition.....This is a faulty condition in which even though stitching is completed, either the needle thread or the bobbin thread is not trimmed or the needle thread is extremely too long or too short.

- \* Principal reasons.....
- \* Inadequate cutting power of the knife
    - \* Too small clearance between the needle hole guide and the moving knife
    - \* Inadequate matching clearance with the moving knife
    - \* Inadequate position of the shuttle race spring
    - \* Skip-stitching of the last stitch

\* Corrective measures

#### 1) Inadequate cutting power of the knife

\* When the moving knife or counter knife is extremely abraded or the blade is all gone or when the knife is brand new and the cutting surface is inadequate, the cutting power of the knife becomes inadequate.

A somewhat braded new moving knife cuts better than a brand new moving knife.

\* Relative dimensions of various parts (Fig.29)

##### (1) Height of counter knife

Should be 0.5mm(1/64") above the bottom surface of throat plate

##### (2) Difference of level between counter knife and needle hole guide

Counter knife should be 0.1mm higher(1/256") (Refer to Fig.28)

##### (3) Moving knife and counter knife

Should be biting by 0.25mm(1/100") (Refer to Fig.28)

##### (4) Rattle of moving knife toward up and down direction

Should be 0.05(1/512")~0.1mm(1/256") at the tip of moving knife

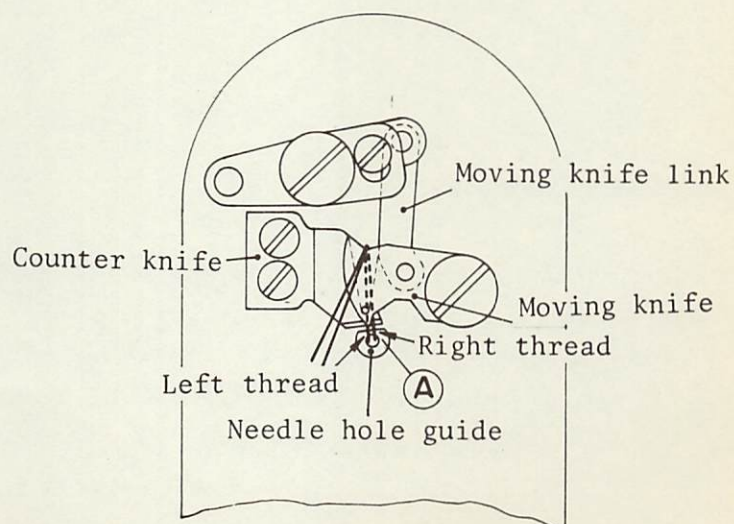
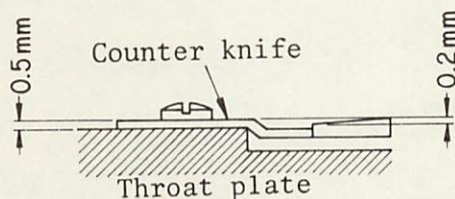


Fig. 29

Fig. 29



- \* When the right thread is not trimmed

Adjust the counter knife so that the slant of the counter knife will be less than 0.2mm(1/128") (Fig.29).



- \* When the left thread is not trimmed

Reverse the above procedure and make the slant of the counter knife more than 0.2mm. (1/128")

Please note that the counter knife is constructed to be easier for adjustment by making the blade, except the blade point, rather soft, so have this in mind when adjusting.

## 2) Too small clearance between the needle hole guide and the moving knife

- \* As seen by Fig.30, the (A) part of the needle hole guide is cut diagonally by 0.5mm(1/64"), but if this clearance is too small, the thread will be pinned between the moving knife and the needle hole guide and thus, the length of the needle thread after trimming will be exceedingly long or sometimes it will be torn, resulting in this faulty stitching condition.
- \* When the thread is trimmed normally, the thread does not remain in the shuttle race but if there are any remaining thread left in the shuttle race, the defective places can be classified in following order according to the condition of the remaining thread: (Refer to Fig.30)

Shape of the remaining thread	Trimmed place
	B part of moving knife
	C part of shuttle race spring

## 3) Inadequate matching of the moving knife

- \* When matching of the moving knife is inadequate, the thread is not caught thus correct thread trimming can not be performed. Watch and match it correctly.
- \* Correct moving route of the moving knife is for its thread handling device (A) to pass the inside end of the inner side of the needle hole. (Fig.30)

- Needle thread
- Bobbin thread

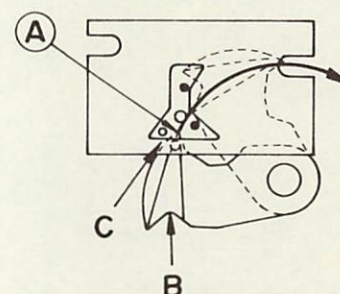


Fig.30



4) Inadequate position of the shuttle race spring

- \* When the position of the shuttle race is bad, the same faulty condition as in the case of inadequate matching of the moving knife occurs. Adjust it to the proper position of the shuttle race spring. (Fig.3)

5) Skip-stitching of the last stitch

- \* When the stitches skip at the last stitch, the needle thread does not get caught by the knife and thus the thread will not be trimmed. Adjust the needle and the shuttle. (Fig.4)

#### IV. Needle breakage

- \* Faulty condition.....This means the needle breaks in the middle of sewing operation

- \* Principal reasons....\* Insufficient guide of front surface of the driver

- \* Inadequate timing of feed

- \* Bruise on needle hole guide

- \* Needle hits the work clamp foot

- \* Inadequate assembling of moving knife

- \* Corrective measures

1) Insufficient guide of front surface of the driver

- \* As shown in Fig.4-d, unless the needle is guided at the front end surface of the driver, the needle may be curved when it pierces the cloth and hits the shuttle to cause needle breakage.

Therefore, adjust so that the needle will be guided by means of the driver.

2) Inadequate timing of feed

- \* When the cloth feed movement does not stop before the needle pierces the cloth and thus needle starts to "flow", needle breakage occurs. Refer to Fig.15 and adjust the feed timing.

The standard adjustment is to match so that the feeding stops when the needle point has come down to 7~10mm(9/32~25/64") above the throat plate.



### 3) Needle hole guide

- \* A needle, once broken, sometimes bruises inside surface of the needle hole guide or due to the curving of the needle when piercing the cloth, may bruise the needle hole guide. Unless this bruise is smoothly removed, the needle point will be caught again by the bruise causing needle breakage.

The needle hole is heat-treated harder than the needle and so it should not bruise so easily, but in case it is bruised to a greater degree, exchange it with a new one.

Also, as there are many kinds of needle hole guide in combination with needles are available depending on the usage, please refer to page 6 No.14 and use correct ones.

### 4) Hits the work clamp foot

- \* If the needle hits the work clamp foot, needle breakage occurs, so when changing the stitch size, apply extreme caution.

### 5) Inadequate assembling of moving knife

- \* When removing the knife components, if the installation of the moving knife connecting link is forgotten and the needle is dropped, the needle will hit the moving knife causing the needle to be broken or the moving knife will be bruised. Be careful.

(Fig.31)

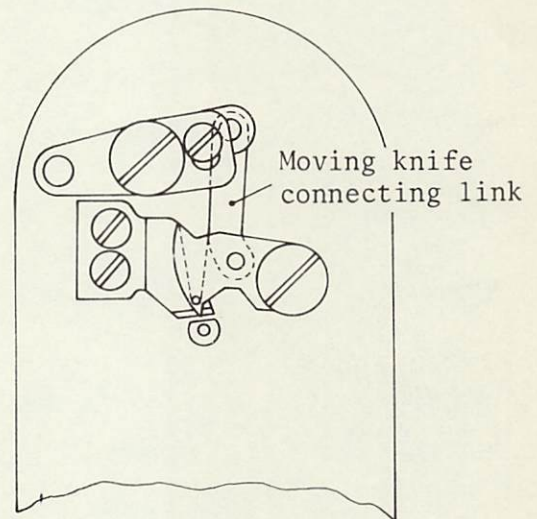


Fig.31

## (V) Cautions on sewing synthetic materials with synthetic thread

Extreme caution should be exercised for sewing synthetic or mixed synthetic materials with synthetic thread as under:

### 1) Thread breakage due to heat

Due to the resistance of the cloth at piercing time, the needle gets over-heated to cause the cloth to be cut or stick by melting, following corrective measures should be taken:



- \* Change to a pulley for synthetic materials(50Hz B710128000B, 60Hz B710228000B).  
Sewing speed should be 1,700 s.p.m.
  - \* Use silicon oil lubricant.(Refer to INSTRUCTION BOOK on "How to thread the machine", page 5 and No.7, page 4)
  - \* Use super needle for synthetic materials.
  - \* If a fine needle is used, piercing resistance will be less and will be more effective.
- 2) To prevent the thread from splitting finely
    - \* During the sewing, if the thread should split finely or breaks, move the frame thread guide A toward left and make the thread take-up lever stroke bigger.
  - 3) Thread releasing at start of sewing
    - \* When thread releasing occurs at the start of sewing, adjust the timing of the feed.  
For adjustment, refer to the chapter on "Matching the feed cam" and make adjustment so that the feed stops near the 10mm(25/64") range to be effective.
  - 4) Bruise on the shuttle driver spring
    - \* In sewing synthetic materials, bruise is liable to be formed on the tail end of the thread slipping out side of the shuttle driver spring, so watch carefully. When this happens, smooth this out with buff, etc.
  - 5) Smooth out the thread path  
To enable the thread to pass smoothly, smooth out the thread path of the following parts:
 

* Shuttle driver spring	B1813280000
* Shuttle	B1818280000
* Shuttle race spring	B1815280000
* Needle hole guide	B2426280000
* Needle bar thread guide	B1405280000

#### (VI) Inadequate thread tension

- \* In case of inadequate thread tension
- 1) Adjust the timing of feed  
Within the range described on the chapter on "Matching the feed cam", adjust the timing of feed so that the feed stops nearer the 7mm(9/32") range to be effective. Then, the thread tension will become better.

2) Tension disc No.2 and thread tension spring

Make the tension of both of these parts and the tension of the thread will become better.

\* When the needle thread is intersecting

1) Adjusting the facing of the needle

Install the needle about  $5^{\circ} \sim 10^{\circ}$  toward left than the standard by rotating to left. However, if it's rotated too much, it might invite skip-stitching. Be careful.

Intersecting here

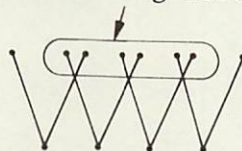


Fig.32



(CAUTIONS ON DISMANTLING OF PARTS)

1) How to remove the shuttle driver shaft with crank

- \* When pulling out the shuttle driver shaft, do not ever pull out the knock for shuttle driver shaft with crank.

This is because needle bearings are used for the rear bushing of the shuttle driver shaft with crank and will damage the needle bearing.

In pulling out the shuttle driver shaft with crank, remove the shuttle driver and the oscillating rock shaft hinge pin and pull them out toward rear.

2) How to remove the main shaft

- \* The main shaft can be pulled out without removing the speed decreasing device. Remove the counterweight, feed cam driving worm, shuttle drive connecting rod, main shaft thrust collar, brake release cam roller, driving pulley pressing plate, and stop-motion tension spring and by tapping the rear bushing lightly, pull them out toward rear.

When speed decreasing device must be removed for some reason, first remove the knock pin screw then insert a thick screw driver between the stop-motion cam, as the stop-motion cam is set tight with an adhesive agent, then remove it.

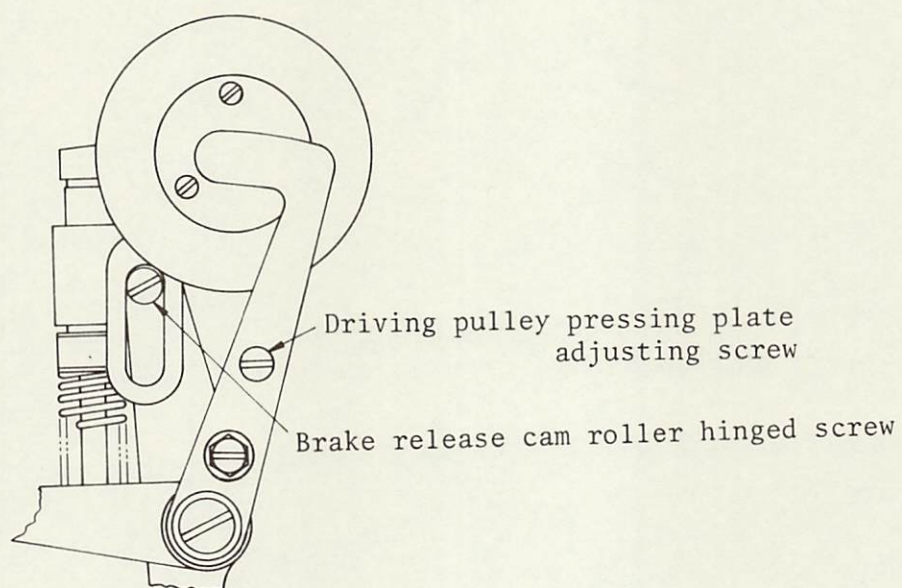


Fig.33

3) When the speed decreasing device is removed

Be sure to remove the needle as it might collide with the moving knife and become damaged.



(HOW TO TIGHTEN THE RATTLE)

1) How to eliminate the rattle of the main shaft

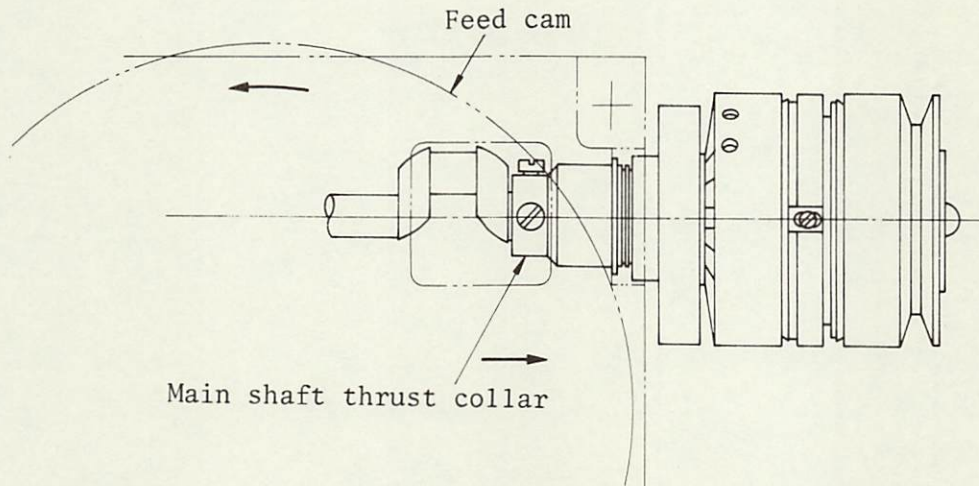


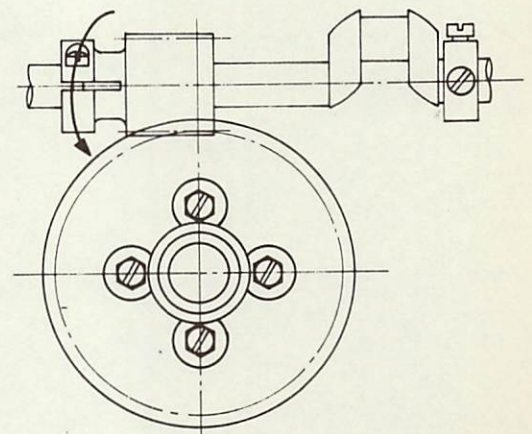
Fig.34

- \* When the machine becomes old and rattle begins to be formed toward the shaft direction of the main shaft, the feed and the tension releasing timing will be greatly affected. To tighten and eliminate this rattle, move the main shaft thrust collar toward the arrow direction while rotating the feed cam strongly toward the arrow direction. (Fig.34)
  - \* Most appropriate rattle toward the main shaft direction should be 0.01~0.04mm.
  - \* After tightening the rattle, re-adjust the feed cam, stitch regulating cam and tension releasing timing.
- 2) How to eliminate the rattle of feed cam driving worm and feed cam driving worm wheel

- \* When rattle is formed on the feed cam driving worm parts, the feed and the tension releasing timing will be greatly affected just in the case of the rattle of the main shaft.

To eliminate this rattle, remove the cover of the top surface of the frame and loosen the 2 screws of the feed cam driving worm.

- \* Then, press down the feed cam shaft and rotate the feed cam driving worm toward the arrow direction so that the relation between the main shaft and the feed cam shaft will not become wrong. Then, the worm will move toward the rear bushing of the main shaft and the rattle will be eliminated. (Fig.35)





After adjustment, be sure to tighten the set screws.

(ADJUSTING METHOD OF VARIOUS DEVICES)

(I) Adjusting the starting and stopping (speed decreasing and stop-motion mechanisms)

(A) Adjusting method

1) When the machine does not rotate at high speed

- \* When the clearance of the driving pulley pressing plate is too big, the machine will rotate at low speed but it does not rotate at high speed or slips. So, in such a case rotate the driving pulley with the hand and when the roller came to the position as shown in Fig.36a, adjust the driving pulley pressing plate adjusting screw so that the brake cork ring rotates idly  $1/4 \sim 1/2$  turns.

(Fig.36, 36a)

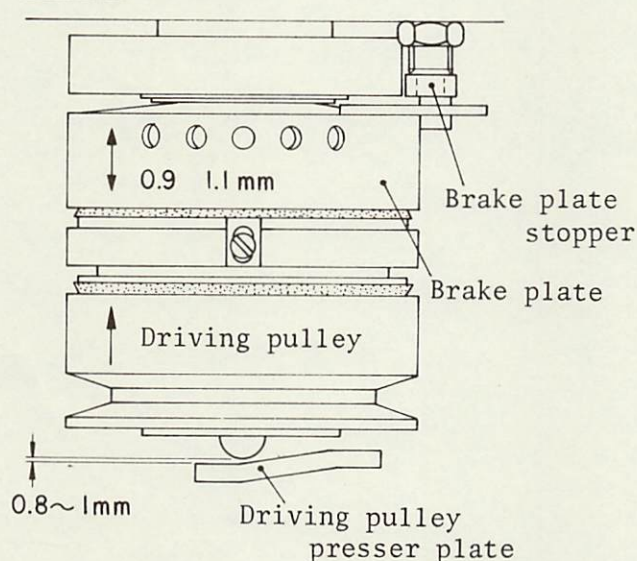


Fig.36

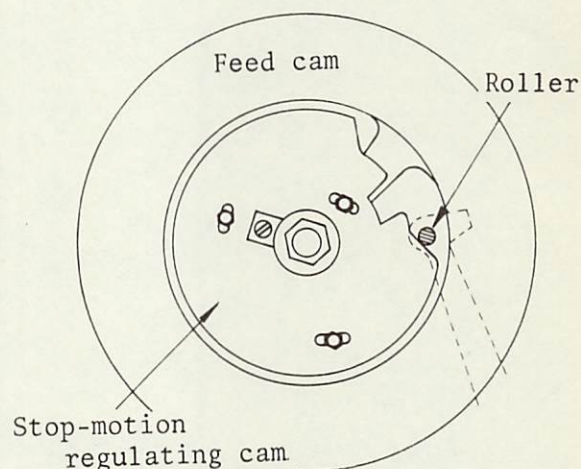


Fig.36a

- \* At the assembling time, when the ball (44 Page 33) for the main shaft came off from the main shaft, the ball gets caught in-between and the clutch surface does not become even with the main shaft so apply grease to the ball for main shaft and assemble so that it won't fall off from the main shaft.

2) Inadequate starting

- \* When the position of the starting lever stopper is bad, even if the starting pedal is stepped on, the machine does not start or depending on the way the pedal is stepped on, sometimes the machine skips the low speed and jumps into the high speed.



Adjust the position of the starting lever stopper so that at the low speed sewing, the clearance between the stop-motion regulating cam and the stop-motion regulating cam roller comes to 1mm (  $\frac{3}{64}$ " ) to enable the stopper to function effectively. (Fig.37)

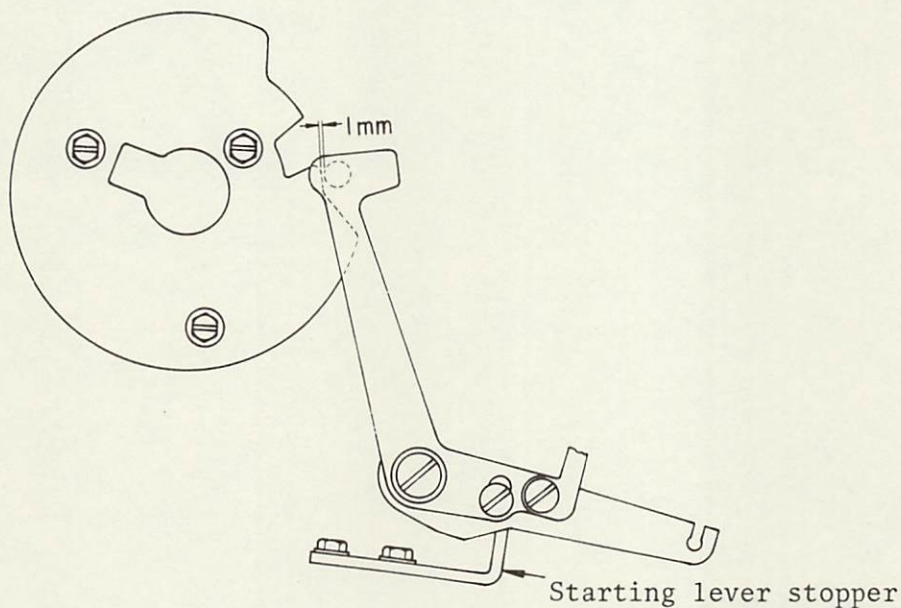


Fig.37

\* When the clearance between the stop-motion regulating cam groove and the roller is big at the stop-motion time, they might catch each other at starting time or make a "bump-bump" noise sometimes, so make the clearance to 0.5mm. (  $\frac{1}{64}$ " ) (Fig.38)

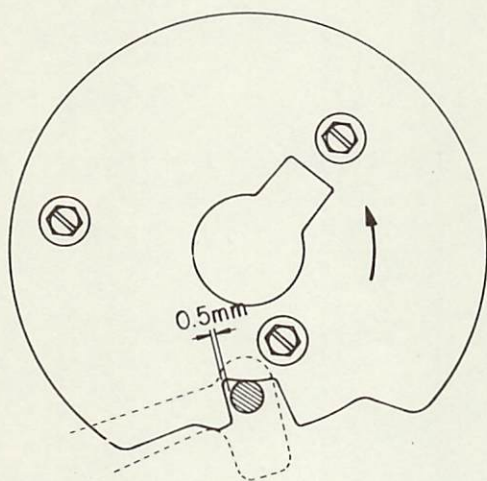


Fig.38

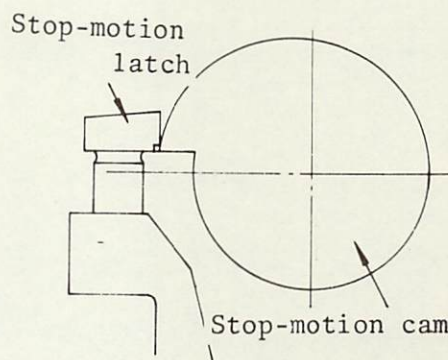


Fig.38'



- \* If an unusual torque should bear on the machine during running, the machine might stop running when the low speed running is to be switched over to high speed running. Adjust the machine so that no unusual torque is borne by the machine.

### 3) When the machine does not run at low speed

- \* When the floating amount(rise) of the brake plate is too big, the biting of the brake clutch becomes inadequate and slips.

So, adjust the brake plate stopper so that the floating amount at either idle running or at high speed running comes to 1.5mm(1/16") and make the floating amount of all parts even. And, after that, as shown in Fig.38', adjust the brake cork ring fore and aft so that the stop-motion latch begins to rotate idly when it reaches the extreme outer rim of the stop-motion cam at the stop-motion time.

When the brake cork ring is observed to be stopping momentarily at the start of driving and at stop-motion time, the brake is perfectly functioning and the machine is running at low speed.

If the brake cork ring is too far worn out to be adjusted, exchange it with a new one.(Fig.36, Fig.38')

- \* In case the brake spring is too weak, it too will slip, so either adjust the height of the spring to 8mm(5/16") or exchange it with a new one.
- \* When oil and grease etc. are sticking to the brake cork ring it might slip and will not enter into low speed, so wipe them off with alcohol. This holds true to driving clutch also in which case if oily matter sticks to it, it produces a slipping sound.

(Note) Do not use thinner or trichloroethane as they impede the function of the brake cork.

- \* When the returning power of the spring for the the main shaft is weak, the driving clutch does not separate and the machine will not rotate at low speed. In such a case, either exchange the spring or insert a washer into the hole of the main shaft and adjust the strength of the spring. Also, if the tension of the driving belt is too strong, sometimes the spring will not return, so adjust the tension of the belt.

### 4) Generation of unusual noise

- \* When the clearance of the pulley pressing plate is too narrow, the driving clutch will enter at low speed running, causing the outer ring inside the bearing to slip out. As a result, the ball will be bruised and unusual noise will generate during idle running. Therefore, when the machine is to be run at high speed, refer to 1) of this chapter and make proper adjustment.



\* Unusual noise from the cork

When the surface of the cork of the clutch is oscillating, the contacting area of the cork is small and when starting is stopped, sometimes an unusual noise like a squeaky sound generates.

\* The cause of this sound at starting time is 38 of Fig.39-1.

\* The cause of this sound at stopping time is 223 of Fig.39-1.

To correct this unusual sound, remove the cork and with a sand paper make the contacting surface wider.

\* Even if dust gets into the grease or the quality of grease has become inferior, the ball will be bruised. So be careful when assembling.

Use grease of lithium group consistency No.2 for this purpose.

\* Even though the stop-motion hook is caught in the stop-motion cam, if the timing is such that the brake plate is biting into the cork, then even if the main shaft is trying to rotate at low speed, it can not rotate because the stop-motion cam is interlocked to the hook and thus the ball bearing will be bruised and the sound of speed decreasing device becomes loud. In such a case, refer to page 26 3) and make proper adjustment.

5) Generation of unusual heat

\* If the floating amount of the brake is not uniform at both idle running of the pulley and at high speed running, this unusual heat generates. In such a case, refer to para.3) of this chapter on "When the machine does not run at low speed" and make proper adjustment. This also happens when the oscillation of the cork is big and in this case refer to the above para. on "Unusual noise from the cork" and correct this defect.

\* If too much grease is poured into the ball bearing for decreasing the speed or hard grease(high consistency number) is used at assembling time, unusual heat generates also. In such a case, apply grease of lithium group consistency No.2 very lightly to the outer ring inside the ball bearing and apply about 1/5 of capacity of the driving ring long hole(8 places).

\* How to apply grease

Refer to the following chapter on "Assembling the speed decreasing unit".

6) Stop-motion sound is big (Fig.39)



- \* When the clearance between the stop-motion lever and the stop ring rod latch is small, the stop link rod latch hits the stop-motion lever by the shock produced by the stop-motion and generates sound, so adjust the clearance between the stop ring rod latch and the stop-motion lever to 14mm(9/16").
- \* Correct stop-motion timing can be obtained by adjusting the stop-motion regulating cam so that, at the last stitch, the stop ring rod latch cam part enters into stop-motion at the same time as it passes the stop ring rod latch.
- \* Also, at the end of sewing, the high speed running suddenly stops without entering into low speed step, thus generating shock sound. In such a case, refer to the para.3) above on "When the machine does not run at low speed" and make proper adjustment.

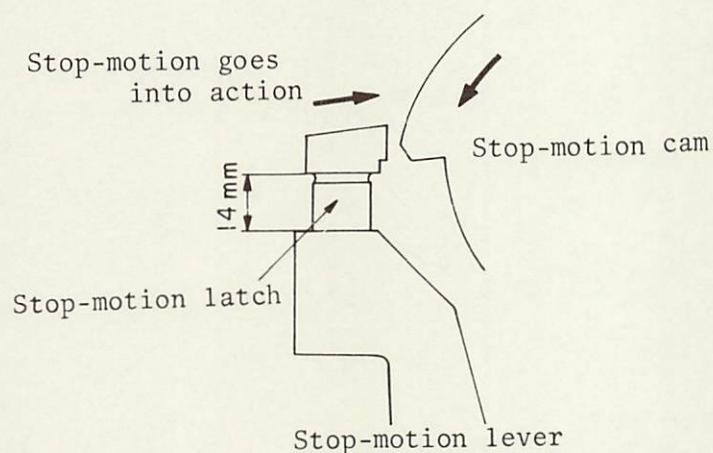
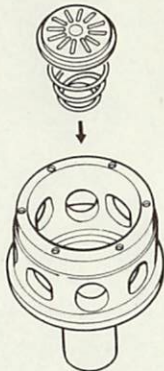
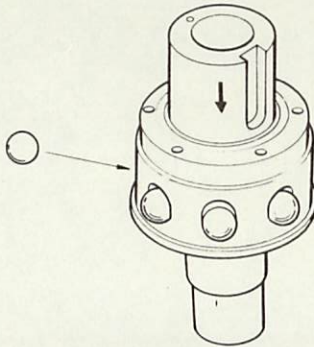
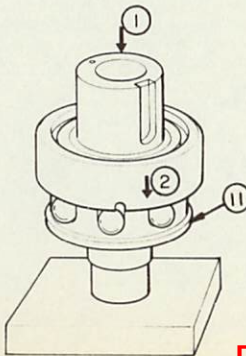


Fig.39

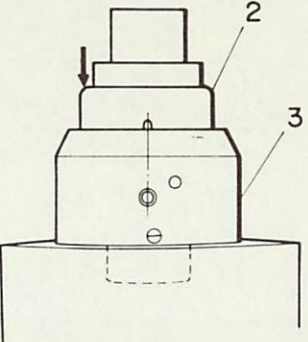
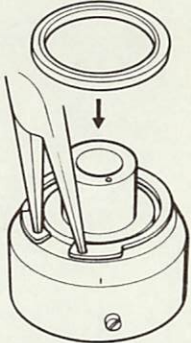
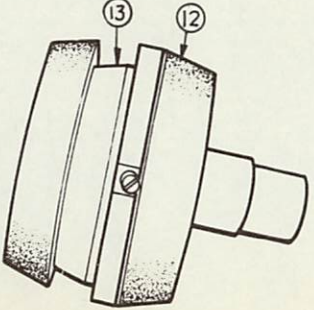


(B) Assembling the speed decreasing unit

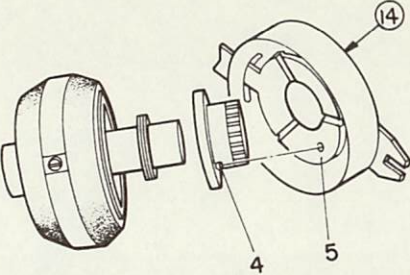

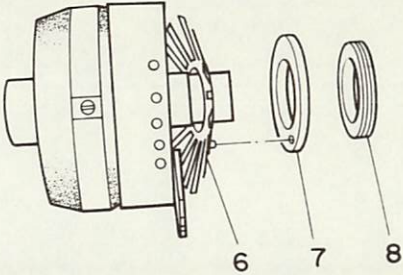

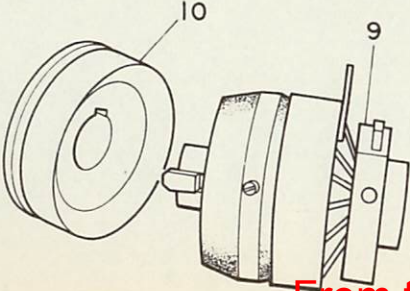
This chapter treats only the assembling order, so for names, construction etc. of parts, refer to the parts list for LK-280 and the construction diagram.

Assembling order	Cautions on assembling	Cautions on dismantling
1 	<ol style="list-style-type: none"><li>1. Note that all parts are concentric.</li><li>2. Apply grease to the needle bearing parts.</li><li>3. Refer to (21) Fig.39-1 for inserting the thrust ring.</li></ol>	
2 	<ol style="list-style-type: none"><li>1. Apply grease to 8 long holes to about 1/5 capacity and set the balls.</li><li>2. If too much grease is applied, heat will generate, so watch carefully.</li><li>3. Verify that there are no dust or foreign matter in the balls or inside and outside rings.</li></ol>	<ol style="list-style-type: none"><li>1. Verify that there are no bruises on the balls and inside and outside rings.</li><li>2. If something is wrong, exchange them with new ones.</li></ol>
3 	<ol style="list-style-type: none"><li>1. Put the lower end on top of the base and by pushing (1) push in (2). ((11) and (2) may be clipped in-between by a plier).</li><li>2. Watch out for the balls which may jump out.</li><li>3. Verify that all parts are concentric. (Pass them through the shaft)</li></ol>	<ol style="list-style-type: none"><li>1. By pushing (1) and by gouging between (2) and (11), with a screw driver remove (2).</li><li>2. Watch out for the balls which might jump out.</li></ol>



Assembling order	Cautions on assembling	Cautions on dismantling
<p>4</p> 	<ol style="list-style-type: none"> <li>1. Insert needle and thrust ring to ③ and by setting the outer circumference of the bottom surface, insert the arrow part of ② evenly.</li> <li>2. Be sure that the groove of ② and the center of the outer set screw ③ match each other.</li> <li>3. Attach outer set screw to ③ so that ② will not rotate.</li> <li>4. Order of thrust ring is explained in page . . . . .</li> </ol>	<ol style="list-style-type: none"> <li>1. After removing the outer set screw of ③ , pull out ② .</li> <li>2. Hold the outer rim of ③ and by lightly hitting it from the opposite side of insertion, pull it out ② .</li> </ol>
<p>5</p> 	<ol style="list-style-type: none"> <li>1. Assemble in order of circular clip and oil seal. Be sure that the circular clip is completely inserted into the groove.</li> <li>2. As oil seal is very sensitive to heat, do not use bruised or dented ones.</li> </ol>	<ol style="list-style-type: none"> <li>1. When pulling out the oil seal, it is likely to be bruised or dented so have new one ready for replacement.</li> </ol>
<p>6</p> 	<ol style="list-style-type: none"> <li>1. In attaching the corks, 6 cork setscrews of left side of the figure should be tightly screwed in.</li> <li>2. Eliminate all bruises on the inside diameter of ⑫ and circumference of ⑬ so that they can be easily interlocked.</li> </ol>	



Assembling	Cautions on assembling	Cautions on dismantling
<p>7</p> 	<ol style="list-style-type: none"> <li>1. Apply grease to the needle.</li> <li>2. Assemble so that the  part of (4) will be inserted to the hole of (5).</li> <li>3. Apply plenty of grease to 3 places of the groove of (5) (figure shows the back side) and 3 holes of (14).</li> <li>4. After assembling, verify that (5) moves smoothly.</li> </ol>	
<p>8</p> 	<ol style="list-style-type: none"> <li>1. Insert the  part of (6) to the hole of (7).</li> <li>2. Apply grease to the needle.</li> </ol>	
<p>9</p> 	<ol style="list-style-type: none"> <li>1. When (9) is to be inserted, (8) is liable to be caught to the hinged part of the shaft, so be sure that it is concentric.</li> <li>2. Be sure to verify that 10 returns smoothly by means of the spring and balls inside the main shaft.</li> </ol>	



#### HOW TO REFILL THE GREASE

- \* Refill the grease at least once in 2 years.
- \* Use grease of lithium family of consistency No.2.
- \* How to refill

Remove (10) and after removing the spring and balls in the main shaft, fill up the holes with grease and push in hard with screw for refilling the grease. (Fig.54).

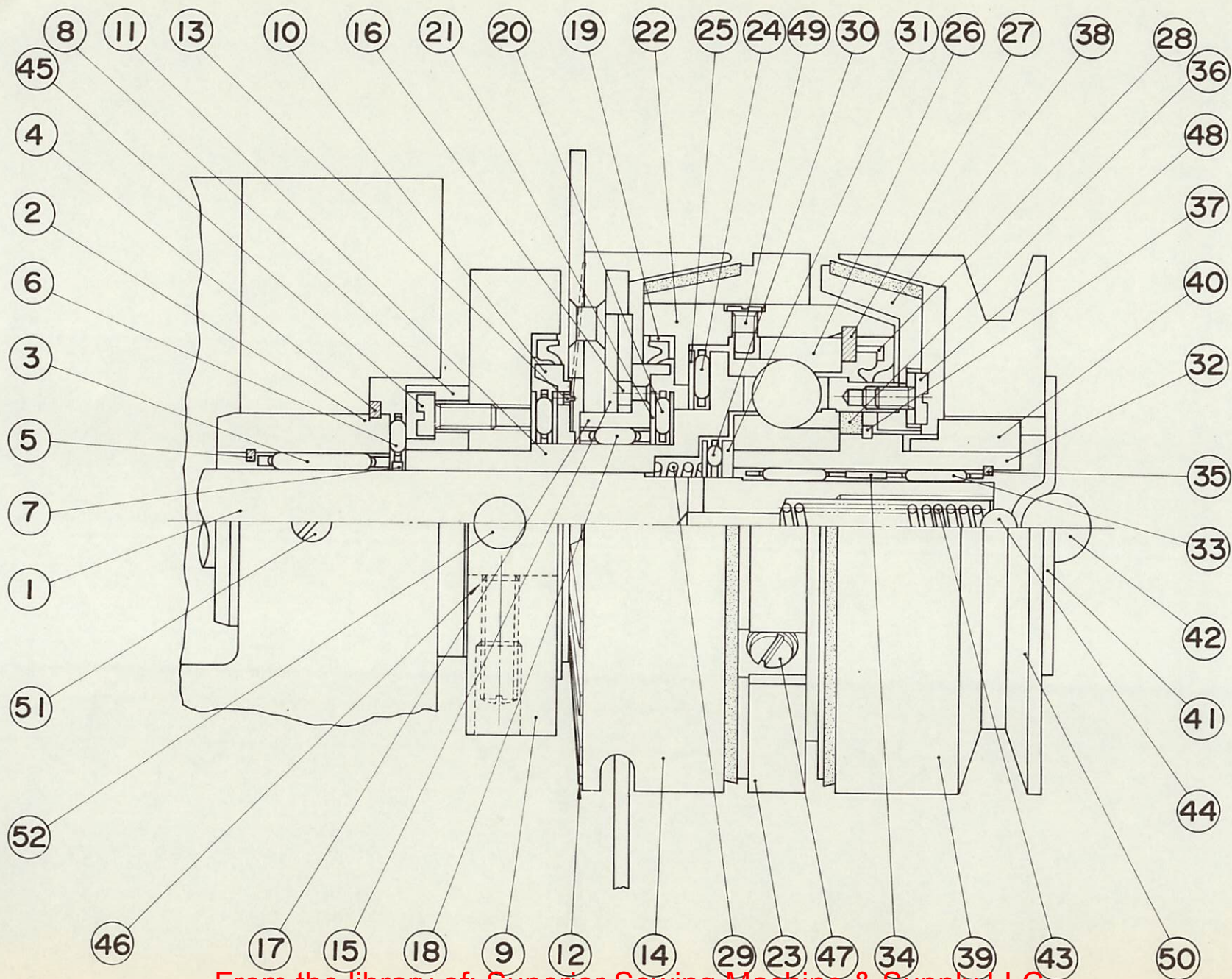
Repeat this process 3 times and about 2 CC of grease will be refilled into the speed decreasing device.

#### NAMES OF GREASE TO BE USED

ESSO kerosene -----Listan 2. Beacon 2

SHELL kerosene-----Albania



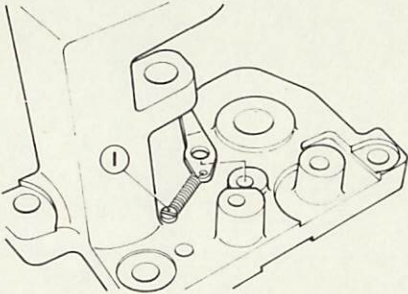
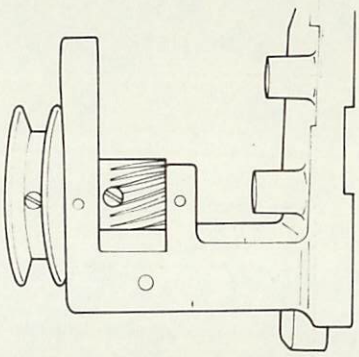
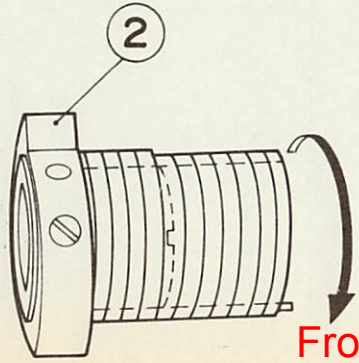




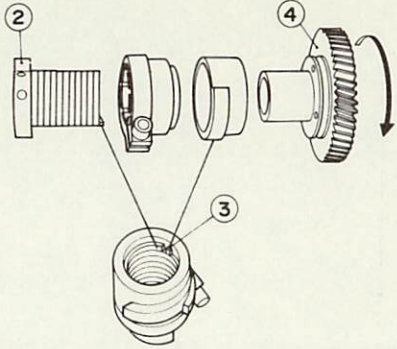
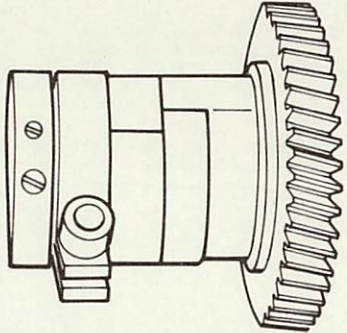
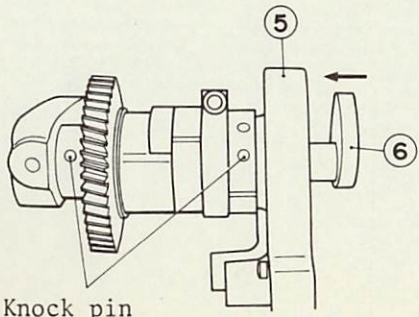
(II) Adjusting the pedal pressure decreasing unit

(A) ASSEMBLING METHOD

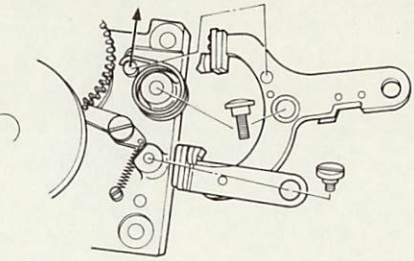

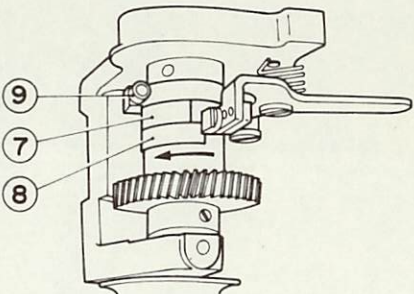
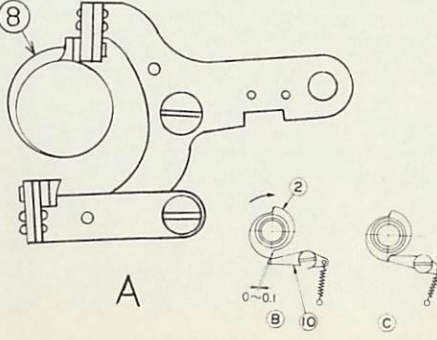
When the assembling method is clearly understood, the adjustments are easy, so the assembling method will be treated here first.

Assembling order	Cautions on assembling	Cautions on disassembling
1 	1. Attach a screw ① for catching the spring.	
2 	1. Install pulley and pressure decreasing gear(small). Be sure that there is no rattling on thrust.	1. Verify existence or non-existence of bruise on the gear surface. This also applies to the pressure decreasing gear(large).
3 	1. Install by rotating until the end surface contacts the spring washer ②. 2. Apply sufficient grease to the inner rim of the interlocking part of the spring.	1. Remove the spring by rotating it toward the arrow direction.



Assembling order	Cautions on assembling	Cautions on dismantling
<p>4</p> 	<ol style="list-style-type: none"> <li>1. Assembling in the order as shown by the above sketch.</li> <li>2. After matching the end of spring with ③ as shown by the figure, assemble by rotating ④ toward the arrow direction.</li> <li>3. Apply sufficient grease to the outer and inner rim of ④ except the gear wheel part.</li> </ol>	<ol style="list-style-type: none"> <li>1. When removing the pressure decreasing gear(large), rotate it toward the arrow direction also.</li> </ol>
<p>5</p> 		
<p>6</p>  <p>Knock pin</p>	<ol style="list-style-type: none"> <li>1. Set it to ⑤ as shown in the above sketch and insert ⑥.</li> <li>2. Hammer in knock pins to 2 places.</li> <li>3. Remove scratch from the hole part of knock pin of ⑥.</li> </ol>	<ol style="list-style-type: none"> <li>1. To pull out the ⑥, first pull out the knock pin, loosen the screw and by tapping ⑥ lightly, pull it out toward the reverse direction of the arrow.</li> </ol>



Assembling order	Cautions on assembling	Cautions on dismantling
<p>7</p> 	<ol style="list-style-type: none"> <li>1. Wind the  part which is caulked to the lever(rear side in the figure), catch it to the R part and set it to the lever by push-opening toward the arrow direction.</li> <li>2. Verify if the lever moves smoothly.</li> </ol>	
<p>8</p> 	<ol style="list-style-type: none"> <li>1. Adjust as follows: When 8 comes to No.9-A position, the pressure decreasing gear(large)will rotate idly and adjust 7 and 8 at the same time toward the arrow direction so that 2 comes to such position of No.9-B or C, as shown in the sketch.</li> <li>2. After the adjustment, tighten the 9 screw. If the tightening is inadequate, the phase becomes incorrect.</li> </ol>	
<p>9</p> 	<ol style="list-style-type: none"> <li>3. Rotate the pulley toward the normal direction and verify if 9 is stopped when the pressure decreasing gear(large) is rotating idly by touching it with the hand. If it is wiggling, it means the No.9-B and C are defective, so re-adjustment must be made.</li> </ol>	



## (B) ADJUSTING METHODS

1) When the work clamp foot does not work properly

### {i} Verification of phase of various parts

The correct phase under the condition as shown in Fig.41 should be as shown in Fig.40.

{ii} If there is a clearance between ⑦ and ⑧, they do not operate properly, so loosen the screw with hexagonal holes and adjust so that there is no clearance. If too much thrust rattle is given, gear noise will emanate, so watch carefully.

{iii} Verification of work clamp foot lifting lever  
When returning spring of the work clamp foot lifting lever is too weak or there is a clearance, the reaction of the lever is dull and sometimes the work clamp foot does not return properly.

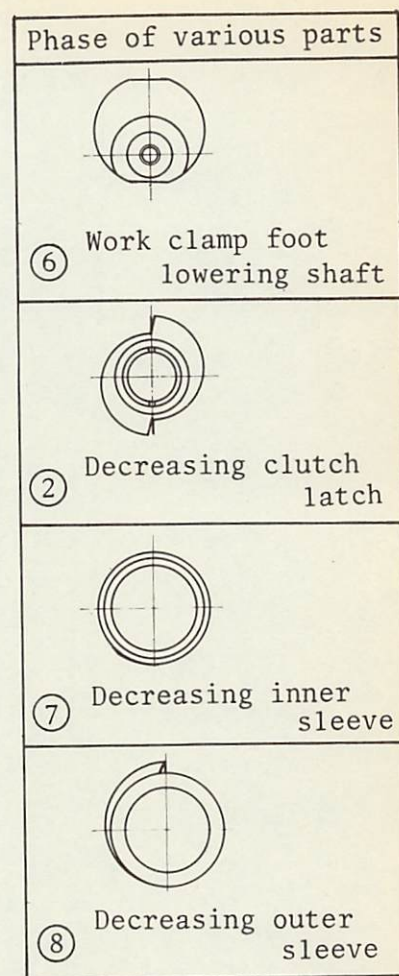


Fig.40

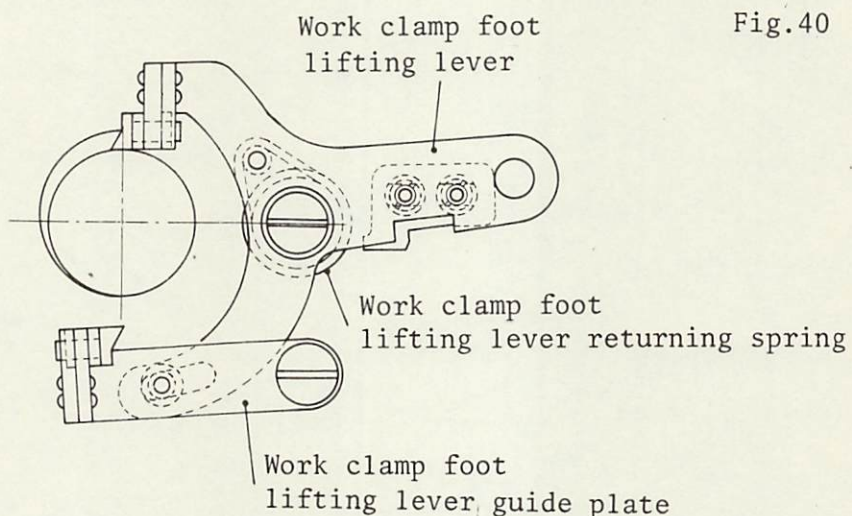


Fig.41



2) When noise generates

(i) In case of gear noise

\* Verify the respective thrust rattle of large and small gears.

When the thrust rattle is big, gear noise generates.

\* Also, when dust or foreign matter is stuck on the gear surface, gear noise generates. So watch carefully.

(ii) In case of tearing noise

\* Verify that all components conform to the relationship of No.9-A~C.

If this relationship is inadequate, a tearing noise emanates.

3) Other malfunctions

\* Following 3 malfunctions can be considered but it is opined that occurrence of these malfunctions is very slight.

(i) Large gear. Abrasion of interlocking part of spring.

\* Diameter of shaft. If it becomes less than 19.2  $\phi$ , exchange it with a new one.

(ii) Unusual condition of clutch spring

\* When the inside diameter became over 18.9  $\phi$  or when the spring power is weakened, exchange it with a new one.



### (III) Adjusting the thread trimming device

#### 1) Matching the moving knife

\* The correct position of the moving knife is as follows:

At the stop-motion time, the clearance between the tail end of the moving knife and the end of the needle hole should be 1.5mm(1/16").

\* When this position is incorrect, loosen the thread trimming lever connecting screw and by moving the thread trimming lever(small) back and forth adjust to the correct position. (Fig.42)

Thread trimming lever  
connecting screw

Thread trimming lever(small)

Moving knife link

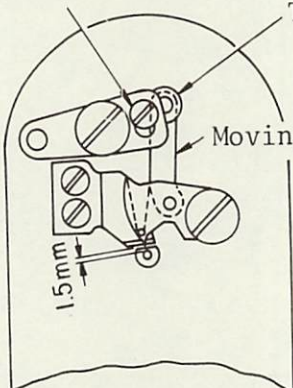


Fig.42

#### 2) How to adjust the thread trimming device

The correct movement of the moving knife is performed between  $215^{\circ} \sim 357^{\circ}$  of the last stitch but if the moving knife activates between the low speed sewing area or when thread trimming is not performed due to the stroke of the moving knife is too small or for any other reason if unusual defect occurs, remove the speed decreasing device and verify if all the related components of the thread trimming device are dimensionally correct.



(1) Verification of position of cam arm releasing plate No.1

Release the stop-motion lever tension spring, match the cam roller A to the minimum radius position of cam roller and as shown in Fig.43 contact a slide caliper and when the distance between the stop link rod latch and the end of the main shaft is made to 23mm(29/32"), verify if the clearance between the cam arm releasing plate and the cam roller B is 0.5mm(1/64"). (Fig.43)

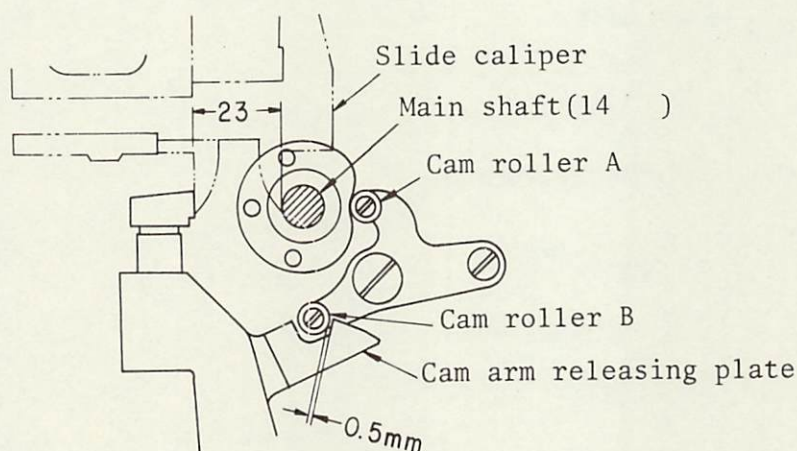


Fig.43

- \* If this clearance is bigger than 0.5mm(1/64"), the tension releasing amount of cam roller A becomes less and at low speed sewing, sometimes the moving knife is forced to activate.
- \* If this clearance is less than 0.5mm(1/64"), it becomes impossible to obtain the stroke of the moving knife which is necessary for thread trimming and therefore sometimes it happens that the thread is not trimmed.

(2) Verification of position of cam arm releasing plate No.2

With the stop-motion lever tension spring in set condition, and when the stop-motion regulating lever is placed at the position shown in Fig.44, verify that there is a clearance of 0.7~0.8mm(1/32") between the outer circumference of the maximum radius of the thread trimming cam and the cam roller as shown in Fig.45.

- \* When this clearance is big, the starting pedal becomes heavy.
- \* Conversely, when this clearance is less, sometimes the moving knife activates in the low speed sewing zone.



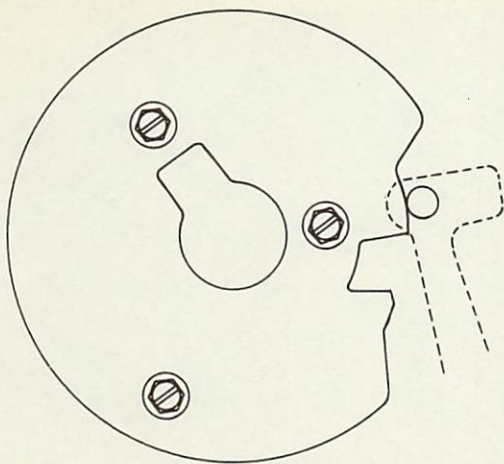


Fig.44

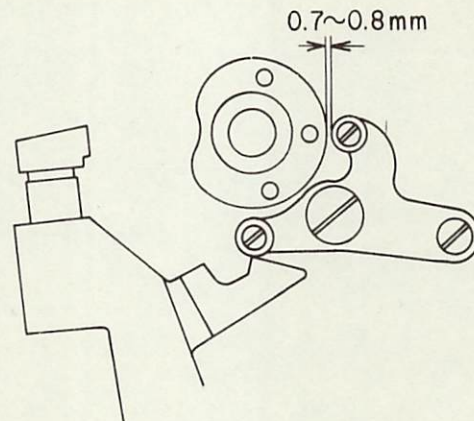


Fig.45

All of above related dimensions are carefully checked at the time of assembling to prevent malfunctions but should any malfunctions occur in the open market due to inadvertant inadequate dimensions, exchange the stop-motion lever(B26012800A0). The cam arm releasing plate is set to the stop-motion lever by screw, knock pins and adhesive agent to produce correct dimensions, so it is very difficult to take it out. Also, when the knife activates within the low speed zone and an emergency measure must be taken, adjust the clearance between the stop link rod latch from 3mm(1/8") to 4mm(5/32"), as shown in Fig.46. This is an emergency measure to prevent the knife from moving but consider this purely as an emergency measure only.

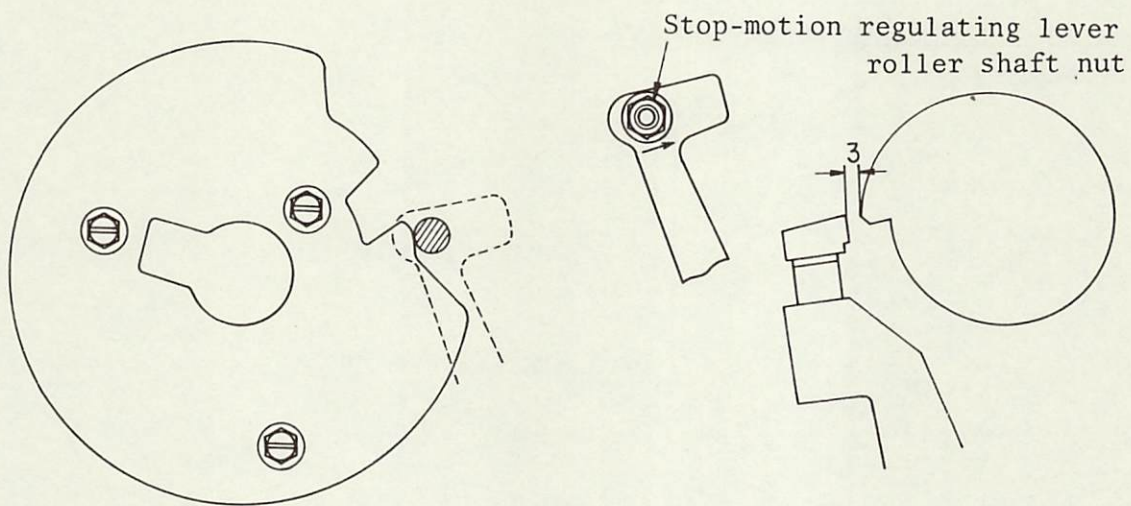


Fig.46



(3) Verification of tension spring for knife driving rod

- \* Verify if the tension spring for knife driving rod is functioning normally. When this spring is not set properly or worn out and the necessary spring pressure of  $4.53\text{kg} \pm 0.5\text{kg}$  (overall length 99mm(3-57/64")) can not be obtained, it is impossible to obtain normal function of the moving knife and thread trimming becomes inadequate. Therefore, it is very important to verify the condition of the tension spring.

(IV) Adjusting the position of the stop-motion lever

- \* As shown in Fig.46, the correct position of the stop-motion lever at the time of low speed sewing zone, the clearance between the stop-motion cam and the stop latch should be 3mm(1/8"). When this relative position is wrong, such malfunctions as inadequate thread trimming, inadequate movement of speed decreasing components and inadequate action of the safety device, etc. occur. Therefore, verify the correct position of this stop-motion lever.
- \* The position of the stop-motion lever can be adjusted by loosening stop-motion regulating lever roller shaft nut and move the stop-motion regulating roller shaft to right and left within the area of the long groove. If it's moved toward the arrow direction, the clearance between the stop-motion regulating cam and the stop link rod latch becomes wider. When you do this, leave the stop-motion lever tension spring in the set condition.

(V) Adjusting the thread tension release

- \* The standard adjustment is for the thread tension release lever to be set so that when the last stitch needle thread loop has slipped out from the corner of the bobbin, the No.2 tension disc will be released. However, when the following phenomenon occurs, insert a screw driver from the hole on the upper left side of the cam cover, loosen the tension release hinge screw and adjust by raising the tension release lever up and down. (Fig.47)



The standard length of the needle thread is 35~40mm(1-3/8"~1-37/64")

No.	Condition of needle thread	Tension release lever
1	Too long	Lower it
2	Disarranged	Lower it
3	Jumps up in short length	Raise it
4	Breaks in midway	Raise it

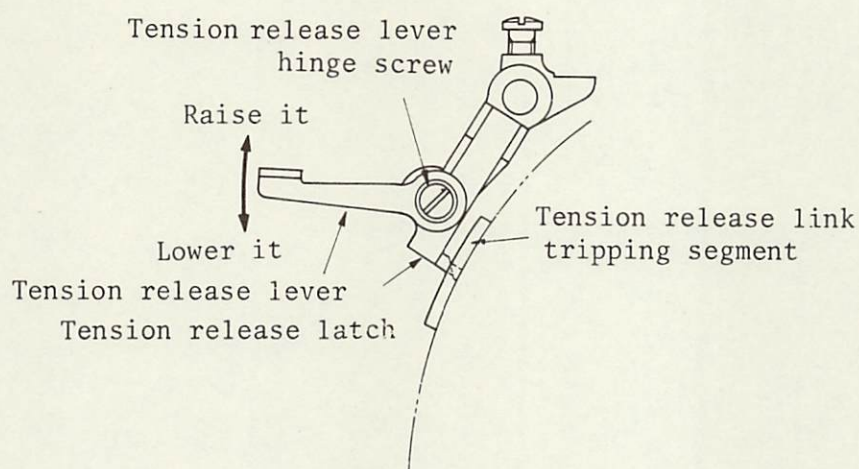


Fig.47

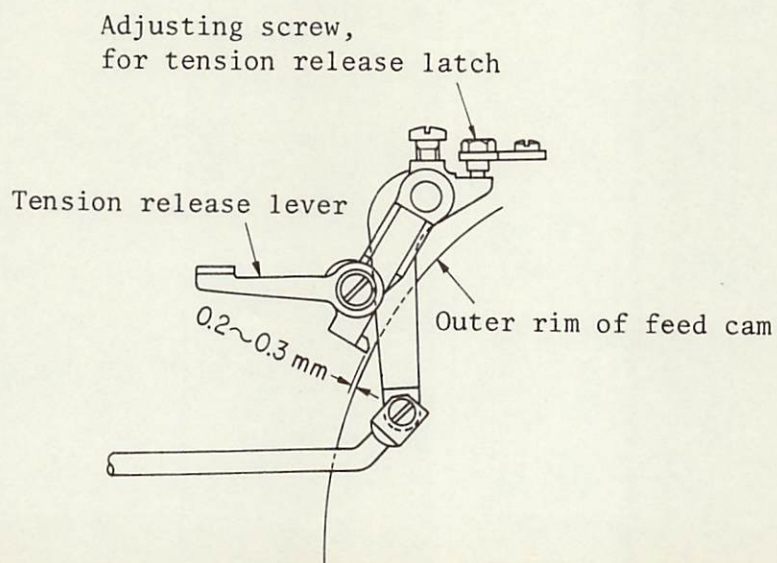


Fig.48



- \* Adjust the end of the tension release latch by means of the tension release latch adjusting screw so that during the running of the machine, there will be a clearance of  $0.2 \sim 0.3\text{mm}$  ( $1/128'' \sim 1/100''$ ) between the tension release latch end and the feed cam. (Fig.48)
- \* If the adjustment can not be made within the adjusting area of the tension release lever, adjust by means of tension release link tripping segment.

#### (VI) Adjusting the feed components

##### 1) Adjusting the bartacking length

- \* If the hinge nut is loosened and raised up, the bartacking length will become shorter and if it's lowered down, it will become longer. (Fig.49)

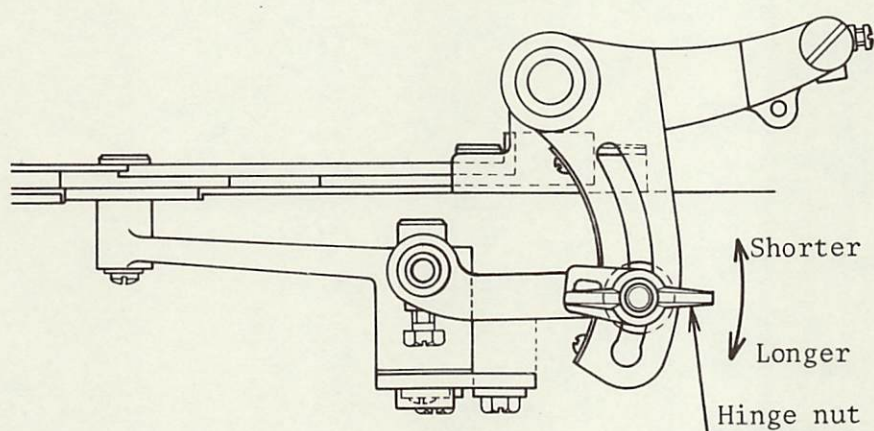


Fig.49

##### 2) Adjusting the bartacking thickness

- \* Loosen the feed regulator knob nut and by inserting a double face 14mm ( $9/16''$ ) spanner into the hexagonal part of the feed regulator knob, adjust the thickness of the bartack.

If it's rotated toward left direction, the bartacking thickness becomes thicker and if it's rotated toward right, it becomes thinner. (Fig.50)

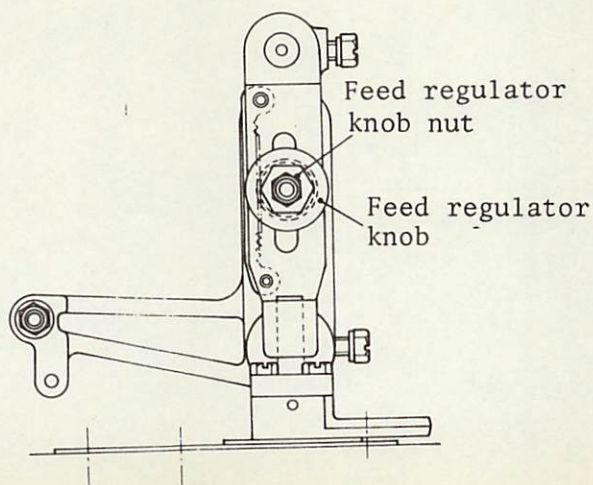


Fig.50



\* When the adjustment is completed, be sure to tighten the knob nut.

### 3) Adjusting the left and right indicating lines(Fig.51)

\* With the large bartacking machine of 42 stitches, the 26th stitch comes to the center of the stitches, so rotate the machine to the 26th stitch and verify that the matching point of the work clamp foot and the center of the needle are matching with each other.

(For bartacking machine of 28 stitches, 18th stitch is the center)

- \* If they are not matched with each other, loosen the feed across connecting driving stud(left) set screw and by inserting a bar into the open hole of the feed across connecting driving stud(left), rotate it to right and left and adjust.
- \* The standard concentric between the shuttle driver shaft with crank and the ball joint is 50mm(1-31/32") but please note that if it's lengthened, the stitches will be small and if it's shortened, the stitches will become big. (Fig.51)

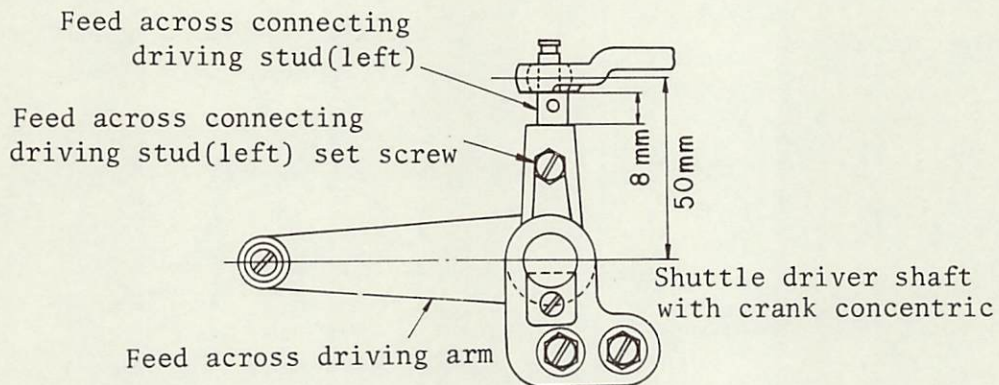


Fig.51

### 4) Adjusting the fore and aft indicating lines(Fig.52)

- \* Be sure to verify that the needle is dropping uniformly without hitting the work clamp foot or the feed plate.

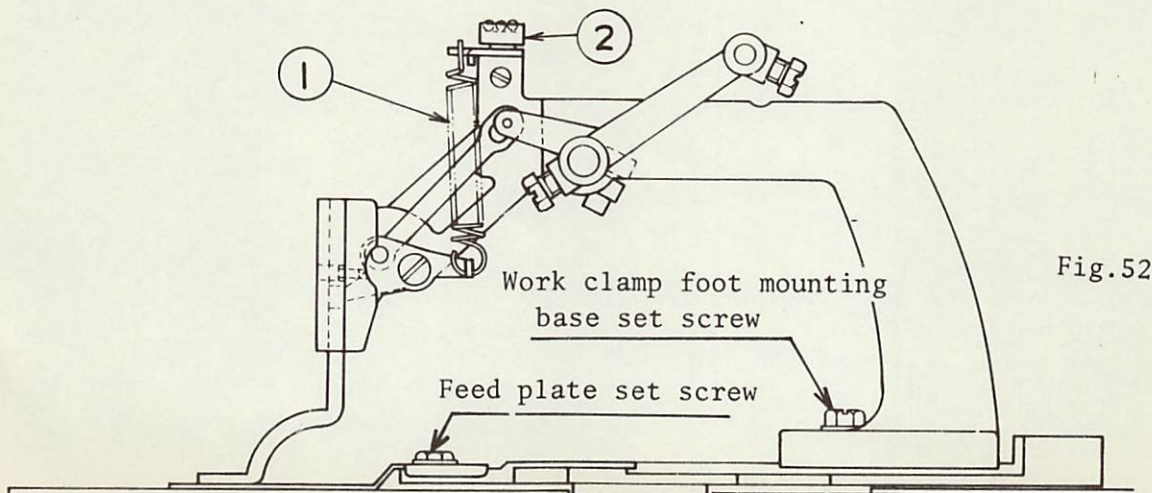


Fig.52



- \* If the fore and aft indicating lines are incorrect, loosen the feed plate set screw and the work clamp foot mounting base set screw and adjust the feed plate and the work clamp foot back and forth. After the adjustment, all set screws must be tightened securely but as the feed plate is made of aluminum material, be very careful when tightening.

(Caution)

When the spring ① of Fig.52 is taken off, be sure to create a clearance of 0.1~0.2mm(1/256"~1/128") between the ② and the lower surface of the cam. If there is no clearance here, the feeding becomes heavy.

(VII) Adjusting the shuttle race

- \* To adjust the fore and aft direction of the shuttle race, loosen the clamp screw of shuttle race on the right front side of the bed, rotate the shuttle driver shaft and adjust the fore and aft direction of the shuttle race. (Fig.53)

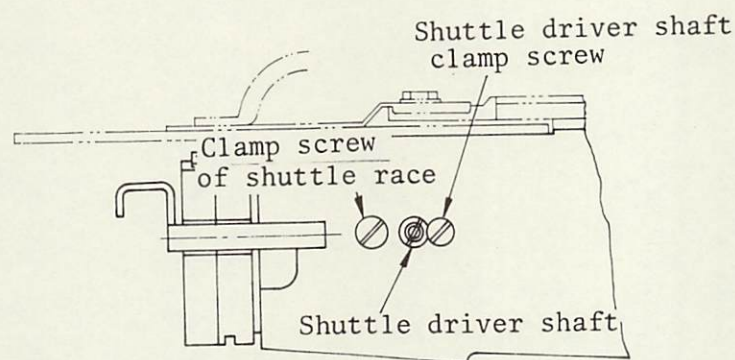


Fig.53

- \* When removing the shuttle race, note that unless the shuttle driver shaft is pulled out it can not be removed but if the shuttle driver shaft clamp screw is inserted into the hole of the shuttle driver shaft clamp screw and pulled out, it can be pulled out easily. Also, as the oil wick for lubricating the shuttle race is connected to the oil wick, which is coming out from the rear side of bed, with a metal tool, remove this metal and then pull out the shuttle race.
- \* In order to prevent scorching, a shuttle for exclusive use of LK-280 series is adopted but be sure when unpacking to oil one drop of oil to the race surface of shuttle and also about 1/10 of the oiler in the accessory box to the felt part of the bed installing base.



(VIII) Adjusting the height of the work clamp foot

- \* The height of the work clamp foot can be adjusted from 6~15mm(15/64~19/32") so adjust the height in consonance with the sewing materials.
- \* To make this adjustment, loosen the work clamp foot lowering fork stud set nut and rotate the stud. (Fig.54)
- \* To adjust the height, stop the machine with the work clamp foot in raised up condition(stop the motor when the work clamp foot has gone up by stepping on the pressure decreasing pedal) and in this condition it can be easily adjusted because the height of the work clamp foot can be observed while adjusting.

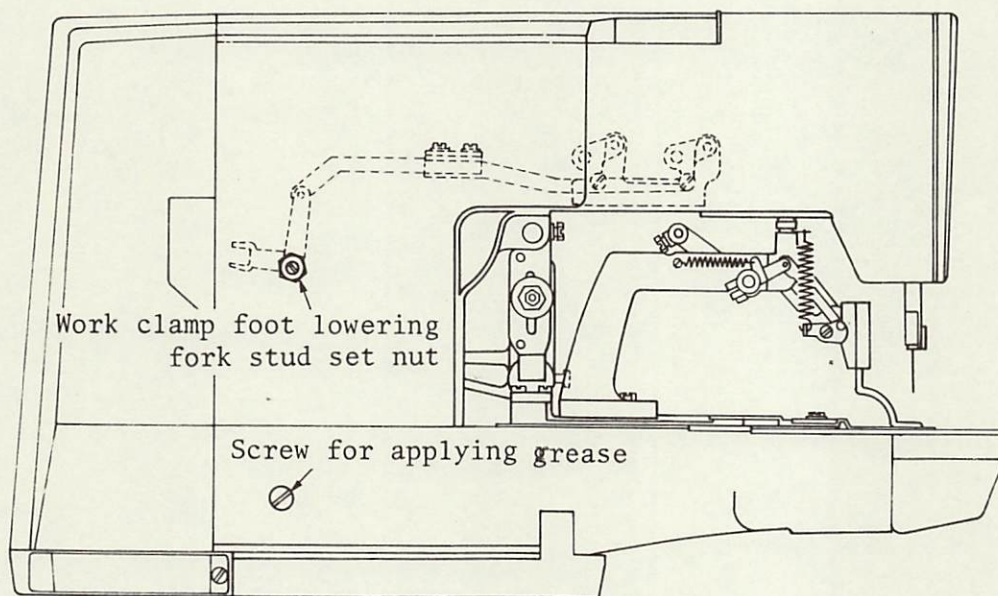


Fig.54

(IX) Adjusting the height of the wiper

- \* The standard position of the wiper should be for the wiper to be about 13mm(33/64") away from the needle at the stop motion time and when it passes the point of the needle, the clearance should be 1.5mm(1/16"). (Fig.55)
- \* To adjust the height of the wiper, loosen the screw of the wiper installing plate and adjust by moving the wiper installing plate up and down within the area of the long groove.
- \* In adjusting the height of the wiper, be extremely careful of hitting against the work clamp foot or the needle.

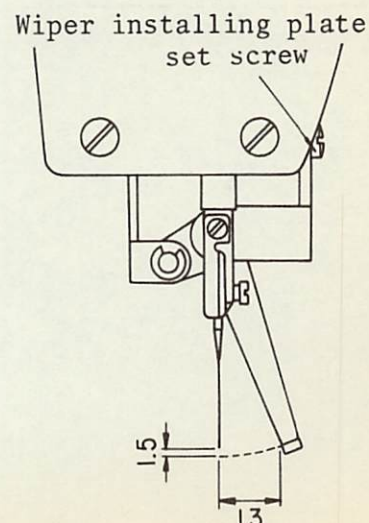


Fig.55



(X) Adjusting the safety device

- \* The correct adjustment of the safety device is as follows:

When the stop-motion activates, the stop-motion lever driving lever is pushed toward left and as a result the safety plate is pushed out toward right direction and a clearance of 1mm and 2.2mm( $3/64''$  and  $5/64''$ ) is created between the safety plate and the work clamp foot lowering slide plate.

At this time, make adjustment by loosening the safety adjustment plate set screw so that there will be a clearance of 0.3mm( $1/64''$ ) between the safety plate and safety adjustment plate. (Fig.56)

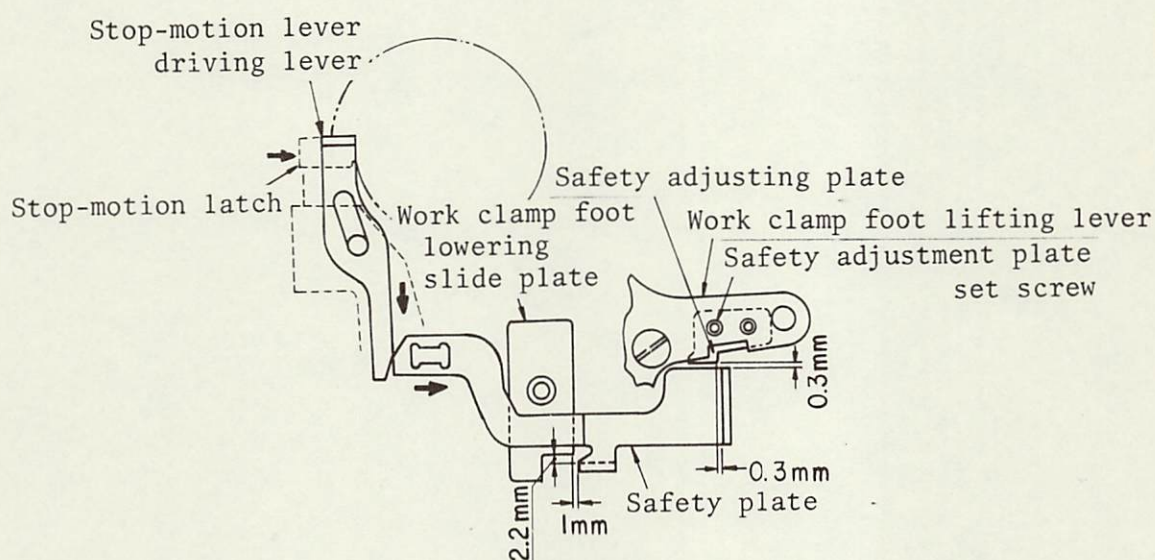


Fig.56

- \* Clearance between the work clamp foot lowering plate and safety plate

This clearance can not be seen as it is obstructed by the pedal pressure decreasing device, so verify by the following method:

First of all step on the pressure decreasing pedal, raise up the work clamp foot and while stepping on the pedal turn off the motor switch and after that release the pressure decreasing pedal.

Consequently, the work clamp foot will remain in raised up position.

Next, step on the starting pedal and at this instant verify if the clearance between the stop-motion cam and the stop link rod latch is 2.5~4mm( $3/32'' \sim 5/32''$ ) (Fig.57)

If this clearance is too big, cam and latch will come off and even during the rising of the work clamp foot, there is a danger of starting of the machine. In such a case, exchange the safety plate. After the verification, adjust the safety adjusting plate to the standard adjusted figure.

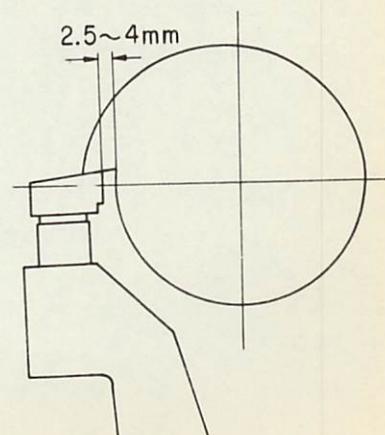


Fig.57



(XI) Adjusting the bobbin thread winder

- \* When the bobbin thread is not wound uniformly and leaning to one side(Fig.58), bend the bobbin winder base toward the arrow direction.

In the reverse case, bend it toward the opposite direction of the arrow and adjust to wind it evenly.

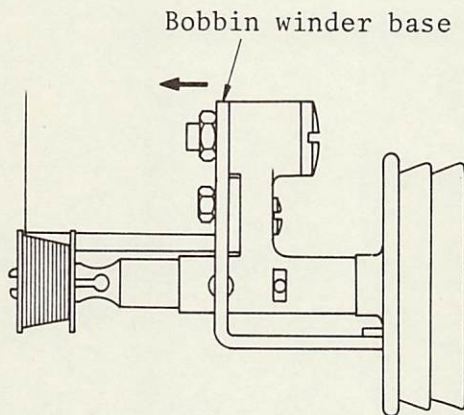


Fig.58

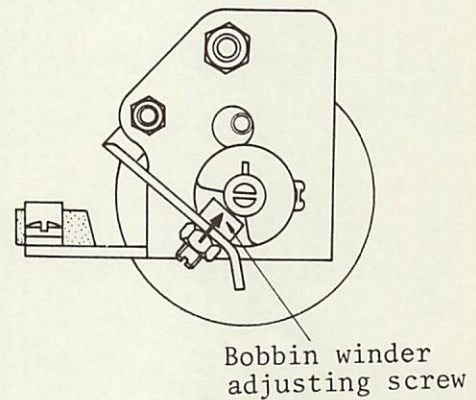


Fig.59

- \* The standard amount of wound thread is 80% of the bobbin diameter but if the amount is more than this, screw the bobbin winder adjusting screw toward the arrow direction and if it's less than this, reverse this action. (Fig.59)
- \* Bobbin case and bobbin  
In order to boost up the sewing efficiency of synthetic thread, LK-280 series has adopted a special dimension bobbin case and bobbin,  
Therefore, to prevent sewing malfunctions, be sure to use genuine JUKI parts only.

\* Bobbin case    B18282800A0

\* Bobbin            B1827280000



(XII) Adjustment of the V-belt

- \* First, adjust the tension of the driving pulley side by moving the slide base up and down and after that adjust the tension of the belt of the pedal pressure decreasing side by moving the pressure decreasing unit frame up and down.
- \* Be sure to adjust so that the tension of the pedal pressure decreasing side belt is somewhat loose than the belt of the driving pulley side.

(XIII) Dismantling the silicon oil tank

- \* When an oil other than silicon oil is poured into the silicon oil tank by error, open the cover on top of the frame with a screw driver, take out the cylindrical felt and suck out only the long felt inside, which is sticking out, with a rag.

In so doing, be careful for if the long, thin felt inside the silicon pipe is pulled out, it can not be re-inserted again.

So, do not ever pull this out.



## (XIV) Notable places on assembling and disassembling

## 1) Lock tight(nut lock) set parts

When assembling and disassembling the following parts, be sure to eliminate all oily substances and set with lock tight(nut lock).

No.	Category	Part Number	Part name	Qty.
1.	1100 (Exterior components) (1100-1199)	B1125280000 B1126280000 B3114771000	Tension thread guide Silicon oil pipe Thread take-up guide	1 1 1
2.	1500 (Work clamp foot components) (1500-1599)	SD0790431SP SD0640602SP SD0720331SP NS6150310SP	Work clamp foot lowering plate hinge screw Work clamp foot lowering link screw Hinge screw, for lowering lever Hinge screw, nut for lowering lever	2 2 1 1
3.	1800 (Shuttle driver shaft with crank components) (1800-1899)	SD0801021TP NS6660430SP PT0301600SH SS8110320SP	Crank rod hinge screw Crank rod hinge screw nut Shuttle driver shaft crank taper pin Shuttle driver shaft crank set screw	1 1 1 1
4.	2400 (Thread trimmer components) (2400-2499)	B2409280000 B2417280000 PS0300132KH SS6111140SP NS6120310SP SD0650305SP SD0790303SP	Knife driving bar connecting link mounting base Moving lever driving lever shaft Cam lever returning plate pin Cam lever returning plate set screw Knife driving bar nut Knife driving bar hinge screw Knife driving bar connecting link hinge screw	1 1 2 2 3 3 1



5.	2500 (Feed components) (2500-2599)	SS6110620TP	Work clamp foot lifting lever set screw	2
6.	2600 (Stop-motion mechanism components) (2600-2699)	B2602280000	Stop-motion lever installing shaft	1
		B2618280000	Stop-motion lever installing shaft	1
		NS6150440SP	Pressure spring adjusting nut(large)	1
		NS6150310SP	Pressure spring adjusting nut(small)	1
7.	3000 (Pedal pressure decreasing unit components) (3000-3099)	B3023280000	Pin, for stopper	2
		SD0640324TP	Stop-motion lever driving plate hinge screw	1

## 2) Grease applying places

When assembling or disassembling the following parts, be sure to apply grease (lithium group, consistency No.2). Refer to page for applying grease.

No.	Category	Part number	Part name	Remarks
1.	1200 (Main shaft, speed decreasing components) (1200-1299)	B12**280010	Speed decreasing assembly	Frictional surface except cork surface  2cc to be applied from main shaft every 2 years
2.	2500 (Feed components) (2500-2599)	B2534280000	Ball joint connection	Apply from the hole on left side of feed carrier bar
3.	2600 (Stop-motion mechanism components) (2600-2699)	B26162800A0	Stop-motion regulating lever	Tip of felt condition
		B2618280000	Stop-motion regulating lever shaft	Outer rim of the lever shaft



4.	3000 (Pedal pressure decreasing unit components) (3000-3099)	B3004280000	Pressure decreasing gear(large)	Inner rim groove part Grease from screw part of end of shaft
		B3014280000	Pressure decreasing shaft (Apply 2cc every 2 years)	

(MANUAL FOR REMODELLING THE SUBCLASSES)

(1) Model numbers and number of stitches

Model number	No. of stitches		Parts code	Remarks
LK-280	42	(When 1/2 worm is used)		Standard large bartacking machine
LK-282	28	14	L2	
LK-283	36	18	L3	
LK-284	42	21	L4	
LK-285	56	28	L5	
LK-286	64	32	L6	
LK-287	72	36	L7	
LK-288	84	42	L8	
LK-289	96	48	L9	
LK-290	108	54	LK	
LK-291	116	58	LL	
LK-292	128	64	LM	

(2) Relation of subclass numbers and the frame

Sub No.	No.1~499	Standard frame
Sub No.	Over No.500	Special frame

(3) Remodelling the subclasses

To remodel the standard machine to subclass machines, follow the arrow direction of page 54



REMODELLING WITHIN SAME STITCH NUMBER		
Exchanging Part	Remarks	
Feed cam		
Feed plate	Blank part available	Refer to usage of blank
Work clamp foot(right)	"	"
Work clamp foot(left)	"	"

SAME STITCH NUMBER, USED 1/2 WORM		
Exchanging Part	Remarks	
Feed cam		
Feed plate	Blank part available	Refer to usage of blank
Work clamp foot(right)	"	"
Work clamp foot(left)	"	"
Stop-motion regulating cam	Even within same stitch No. there are 2 kinds of worms used: partial or non-partial worm	Refer to stop-motion regulating cam
Tension release link tripping segment	Number changes with presence of partial or non-partial worm	Ex.96-- 46 stitches 1-- 2 ea. 48-- 96 2-- 1 ea.

REMODELLING BY COMBINING CHANGE OF NUMBER OF STITCHES		
Exchanging Part	Remarks	
Feed cam		
Feed plate	Blank parts available	Refer to usage of blank
Work clamp foot(right)	"	"
Work clamp foot(left)	"	"
Stop-motion regulating cam	Exclusive cam available depending on number of stitches	Refer to stop-motion regulating cam
Tension release link	Exclusive segment available depending on number of stitches	Refer to tension release tripping segment
Feed cam driving worm	Exchange it depending on number of stitches	Refer to feed cam driving worm and feed cam driving worm wheel
Feed cam driving worm wheel	"	"

#### REMODELLING OF SUBCLASSES

IN CASE SEWING SIZE IS COMBINED		
Condition: Remodelling from standard machine	Part name	Part No.
Remodelling the fore and aft direction of sewing size to over 6mm	Work clamp foot mounting base for large size	D2536L9SB00
	Feed plate spring	D2546L9SB00
Remodelling the fore and aft direction of sewing size to over 70mm	Feed across connecting rod(set)	D2524L7VV00
	Feed across driving arm	D2530L7VV00
Remodelling to make the bigger size	Feed plate spring	DS2545L4BB00
	Work clamp foot hook(right)	D2542L9SB00
	Work clamp foot hook(left)	D2543284K00

IN CASE CHANGING OF SIZE OF NEEDLE IS COMBINED			
Part name	Part No.	Size of needle	Remarks
Needle hole guide	D2426282C00	#11	Standard
	B2426280000	#14, #18	
	B242628000B	Over #19	
Shuttle race ring	B1817280000	#11 #18	Standard
	B181728000B	Over #19	
Needle bar	B1401L7VV00	DP-17 Over #19	Extreme heavy weight material Canton material of over 10 sheets thick
Needle bar thread guide	B1405L7VV00	" "	



(4) Relation between the stop-motion regulating cam and number of stitches

No. of stitches	Part No. of stop-motion cam	(When 1/2 worm is used)	Part No. of stop-motion regulating cam
For 28 stitches	D2612282A00	For 14 stitches	
For 36 stitches		For 18 stitches	
For 42 stitches	B2612280000	For 21 stitches	D2612284D00
For 56,64 stitches		For 28,32 stitches	D2612L5RU00
For 72,84 stitches	D2612L7VV00	For 36,42 stitches	
For 96,108,116 stitches		For 48,54,58 stitches	
For 128 stitches		For 64 stitches	

(5) Relation between feed cam driving worm, feed cam driving worm wheel and tension release link tripping segment with the number of stitches

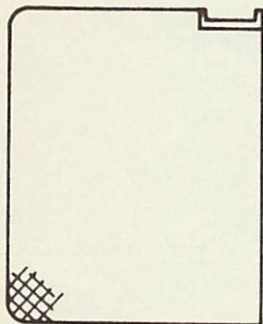
No. of stitches (1/2 worm used)	Part No. of worm	Part No. of worm wheel	Part No. of tension release link tripping segment
28 (14)	D2205282A00	D2204282A00	D2304282A00
36 (18)			
42 (21)	B2205280000	B2204280000	B2304280000
56 (28)	D2205L5RU00	D2204L5RU00	
64 (32)			
72 (36)	D2205L7VV00	D2204L7VV00	
84 (42)			
96 (48)			
108 (54)			
116 (58)			
128 (64)			



(6) How to use the blank feed plate and blank work clamp foot

i) Part numbers of blank work clamp foot and blank feed plate

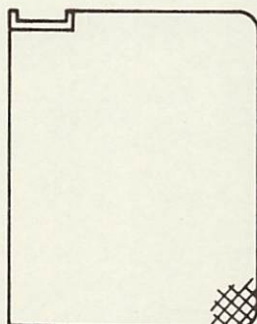
In case the stitching size is within the range of (vertical) 60mm(2-3/18") x (crosswise) 90mm(3-35/64"), use the following blanks:



D-2551-L9SBV0

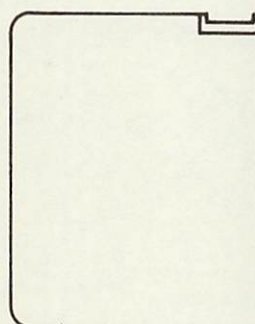
Large blank work clamp foot with right knurling tool

Usage: For heavy weight materials with large stitching size




D-2552-L9SBV0

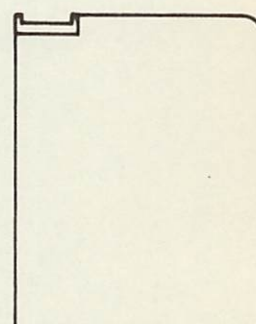
Large blank work clamp foot with left knurling tool



D-2551-L9SBW0

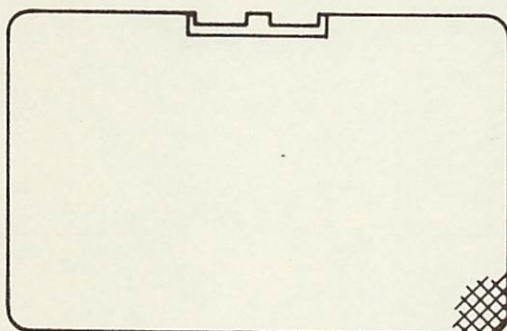
Large blank work clamp foot without right knurling tool

Usage: For light weight material with large stitching size to be used when  is attached to the backside of work clamp foot to prevent skip-stitching.



D-2552-L9SBW0

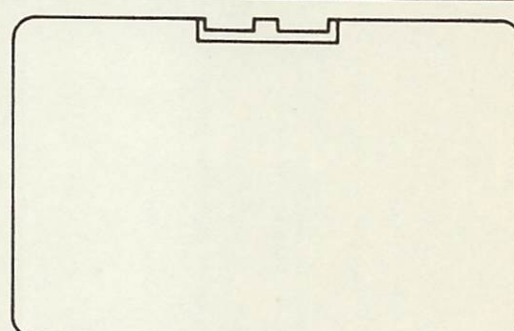
Large blank work clamp foot without left knurling tool



D-2551-L9SBX0

Large work clamp foot, right and left joined, with knurling tool

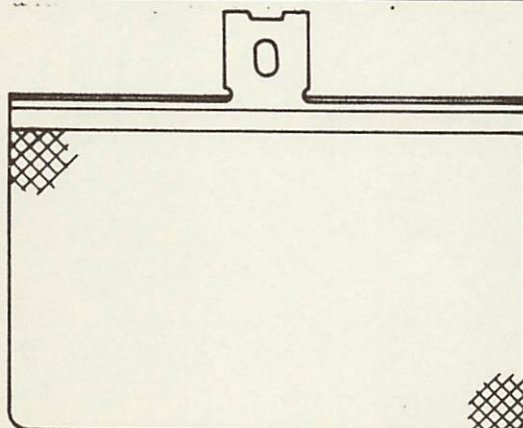
Usage: For heavy weight materials with large stitching size by using right



D-2551-L9SBY0

Large work clamp foot, right and left joined, without knurling tool

Usage: For light weight materials with large stitching size by using right and left joined together.



D-2519-L9SBY0

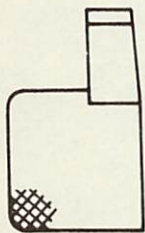
Large blank feed plate

#### CAUTIONS ON USAGE

- When the blanks on this page are to be used, it is necessary to use the following parts in combination :  
 D2536L9SBA0...Work clamp foot mounting base for large size  
 D2560L9SB00...Work clamp foot(right) slide plate  
 D2561L9SB00...Work clamp foot(left) slide plate  
 SS-1110640-TP. " " Set screw (2)
- Select the position of the work clamp foot mounting base set screw so that the center of the sewing shape can be placed at nearly the center of the blank work clamp foot.

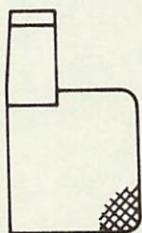


In case the stitching size is within the range (vertical) 18mm (45/64") x (crosswise) 50mm (1-31/32"), use the following blanks :



B-2551-280-0V0

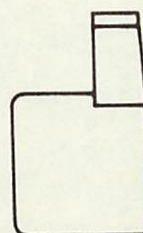
Blank work clamp foot with right knurling tool



B-2552-280-0V0

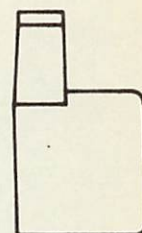
Blank work clamp foot with left knurling tool

Usage : For heavy weight materials with small stitching size




B-2551-280-0W0

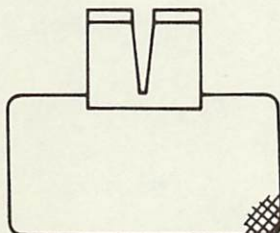
Blank work clamp foot without right knurling tool



B-2552-280-0W0

Blank work clamp foot without left knurling tool

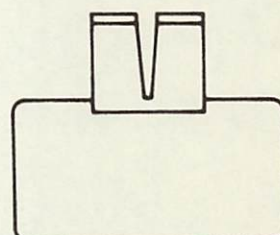
Usage : For light weight materials to be used when  is attached to the backside of work clamp foot to prevent skip-stitching



B-2551-280-0X0


Blank work clamp foot with right knurling tool and left and right foot joined together

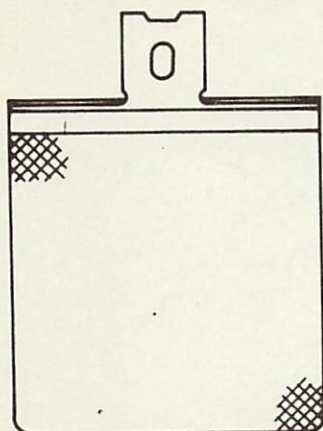
Usage: For heavy weight materials with right and left foot joined together



B-2551-280-0Y0

Blank work clamp foot without knurling tool and left and right foot joined together

Usage: For light weight materials with  attached to the backside of work clamp foot and used with right and left foot joined together



B-2519-280-0Y0

Blank feed plate

#### CAUTIONS ON OPERATION

1. Use the standard feed mounting base (B-2536-280-0A0) when all of the above blanks are to be used.
2. Select the position of the work clamp foot mounting base set screw so that the center of the sewing shape can be placed at nearly the center of the blank work clamp foot.
3. When using the blank with left and right foot joined together, use either one installing part only and cut off the other installing part or shave it off and don't use this part.



ii) How to process the work clamp foot

- ① By referring to Table 1, set the work clamp foot mounting base to the either screw holes of A,B,C of the work clamp foot plate, according to the fore and aft direction of the sewing size.

TABLE 1

	Fore and aft direction of sewing size	Set position of work clamp foot mounting base(refer to Fig.60)
Standard work clamp foot mounting base	0-18mm (23/32")	B
Oscillating work clamp foot mounting base	0-24mm (61/64")	A
	24-42mm (61/64"-1-21/32")	B
	42-60mm (1-21/32"-2-3/8")	C

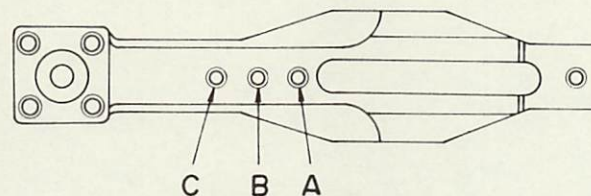


Fig.60

- ② Attach all respective blanks.
- ③ Process the needle by shortening it so that it will barely contact the upper surface of the work clamp foot and set it.
- ④ Drive the machine in this condition and make needle drop marks on the upper surface of the work clamp foot.
- ⑤ To process the shape of the needle drop part of the work clamp foot, process it 1mm larger than this needle drop mark and make a facing of  $30^{\circ}$  on the upper surface.
- ⑥ Also, as shown in Fig.61, if a protrusion is made on the lower surface of the work clamp foot, it will be very effective in preventing skip-stitching.

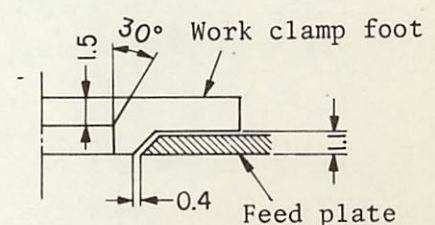
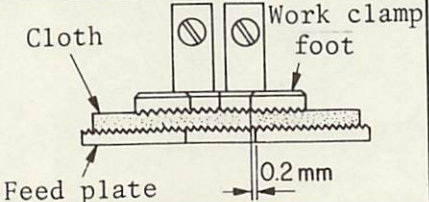
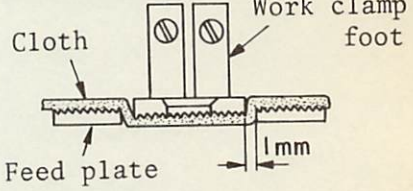


Fig.61



iii) Processing the feed plate

- ① As there are 2 kinds of shapes of the feed plate, select it in accordance with the sewing specifications and process it.

	A shape	B shape
Shape of feed plate		
Note	The needle drop hole shape of the feed plate should be larger by 0.2mm than the work clamp foot.	<ol style="list-style-type: none"> <li>1 The groove shape of feed plate should be 1mm larger than the outer shape of the work clamp foot.</li> <li>2 The outer shape of the work clamp foot should be as small as possible.</li> </ol>
Cloth thickness	Heavy weight material	Light weight material
Special features		<p>Trimmed thread is short. No bobbing of cloth.</p>



AO-10 UNIT (ONE PEDAL FOR LK-280)

(1) Cautions on assembling and disassembling

- 1) When the machine head is to be installed on the table for AO-10 unit, do not use nut and washer of the furthest rear screw of the 3 screws for installing the bed base, as the lever installing base which is attached to the bottom surface of the table, acts as a substitute for the nut. So, screw this in from the top of the table.
- 2) When installing the work clamp foot lifting chain, insert the work clamp foot lifting stud to the hole at the end of the work clamp foot lifting lever and set it with the stop ring. (Fig.61)

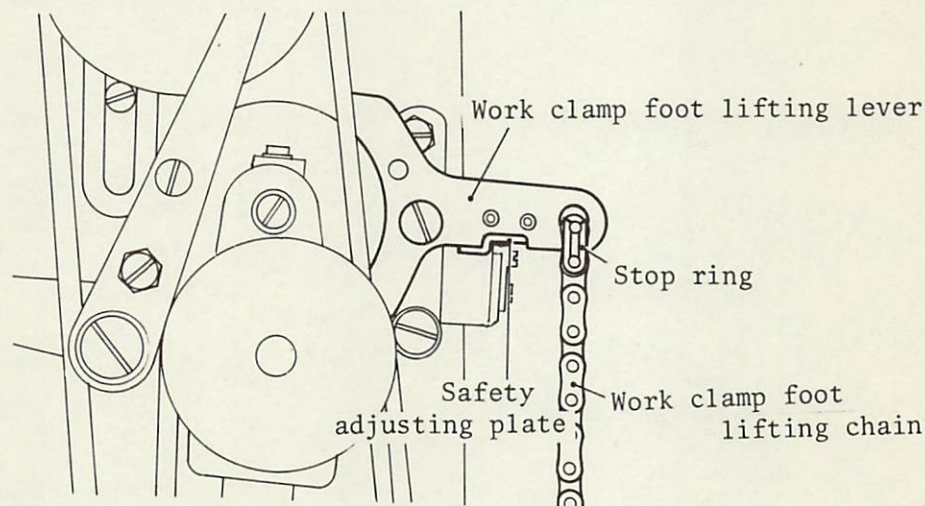


Fig.61

- 3) When installing the starting connecting bar, insert the connecting bar set hinge screws A , B to starting lever's hole and pedal lever's hole, respectively, and by screwing into the starting connecting bar and firmly tighten the nut. The hinge screws A and B are temporarily set to the respective holes of the lever, so do not mix them up. (Fig.62)

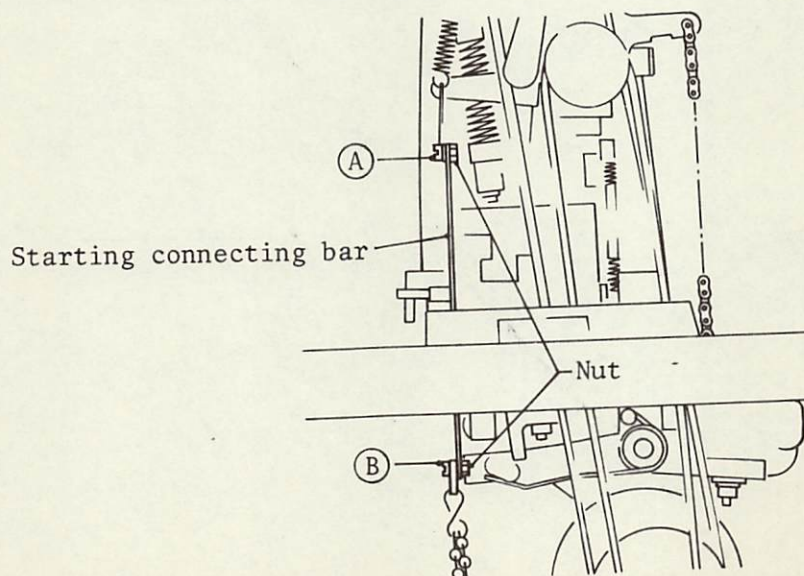
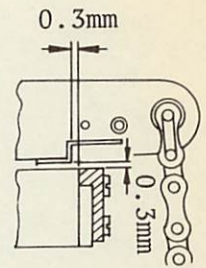


Fig.62



- 4) Be sure to carefully adjust the clearance of 0.3mm(1/64") of left and right and up and down position of the safety adjusting plate(Fig.61). If the clearance of 0.3mm of the horizontal direction becomes larger, the safety adjusting plate may be broken, so be careful.



- 5) Adjusting the spring switching cam

Adjust the spring switching cam either up and down or left and right so that the spring retainer roller base will move smoothly. Also, apply sufficient grease to the rim area of the roller base. (Fig.63)

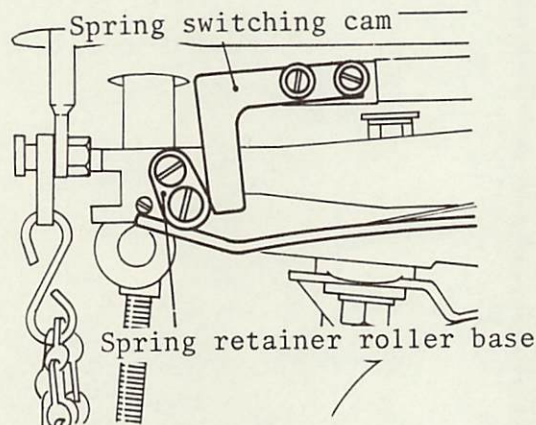


Fig.63

- 6) The roller base set hinge screw nut(NS-6110530-SP) is the place for lock tight is to be used, so be very careful when assembling or disassembling.
- 7) As shown in Fig.64, work clamp lifting returning spring is attached to the stud part of the stop-motion regulating lever of AO-10. So, when only the AO-10 is to be purchased, install the work clamp lifting returning spring to the LK-280 model and adjust so that the starting lever goes up toward the arrow direction.

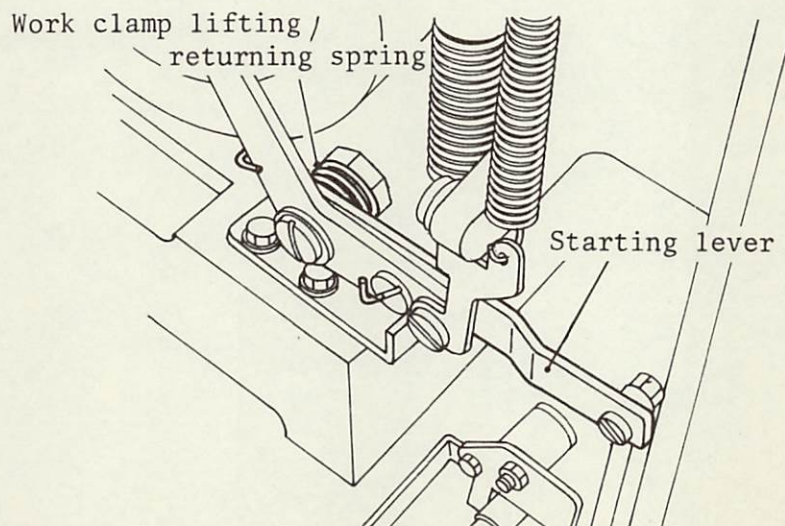


Fig.64

- 8) AO-10 uses a pedal plate for lockstitching but, as shown in Fig.65, set the pedal plate adjusting plate by sliding its hole, one by one. Also, the pedal



plate stopper screw is attached to the pedal plate and pedal plate support arm. So, adjust by the pedal plate support arm set screw so that at stop-motion position the clearance of the pedal plate stopper screw comes to 1.5--2mm (1/64--5/64"). (Fig.66)

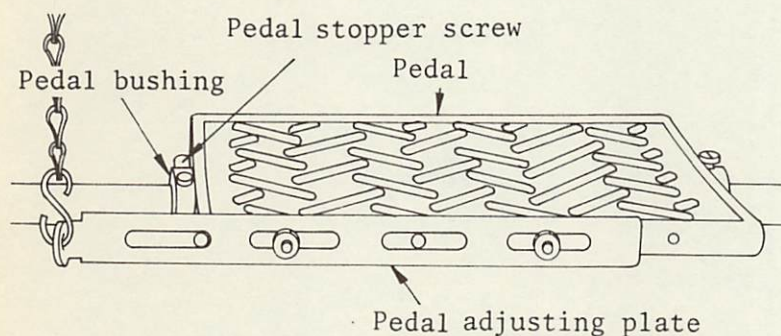


Fig.65

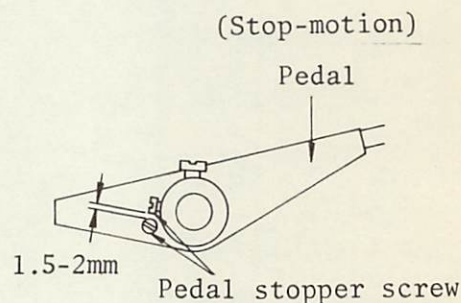


Fig.66

## (2) Order of operation of the machine

- 1) The order of operation of the machine and the pedal is same as the previous AO-8 unit and operates in the order as shown in Fig.67. The work clamp foot goes up at the same time with the stop-motion of the machine.

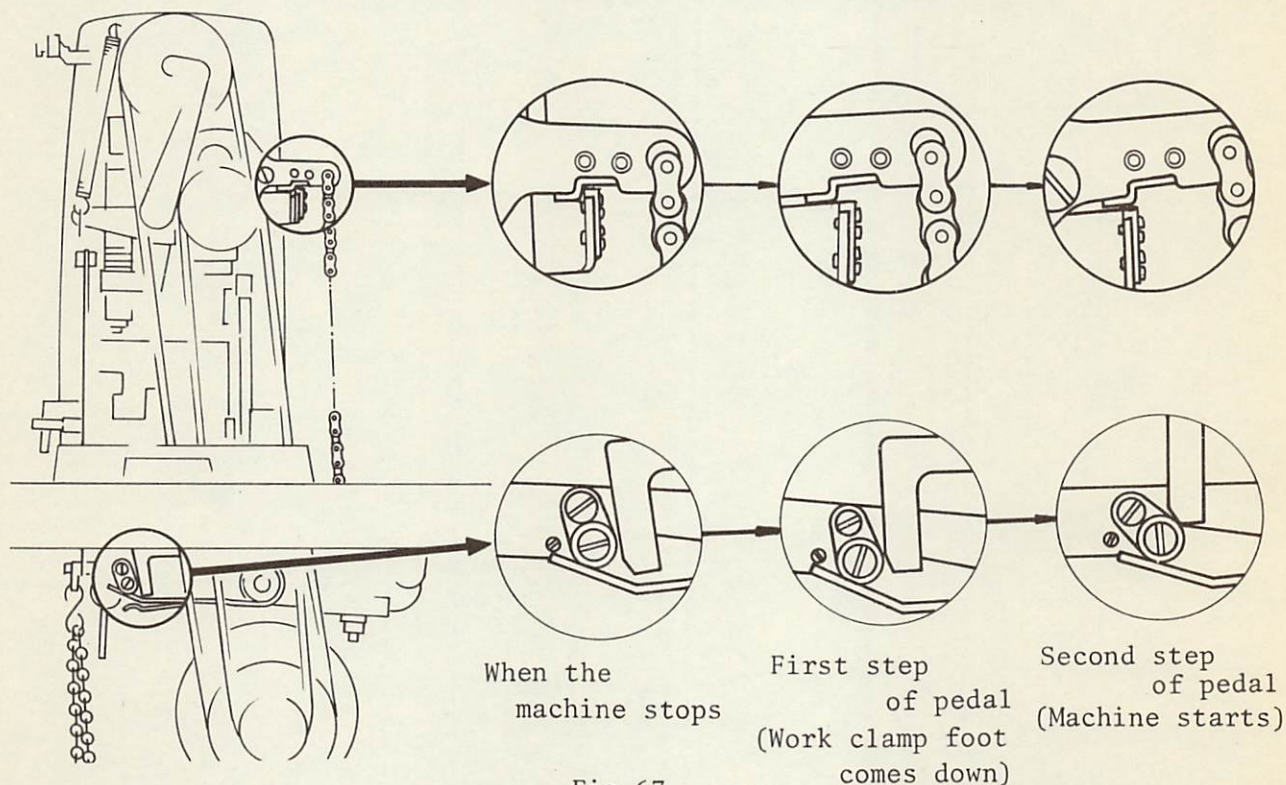


Fig.67

## (3) Adjustments

- 1) At the stop-motion time, the clearance between the stop-motion regulating lever's long hole part and the starting lever hinge screw should be matched to 1.5--2mm (1/16--5/64") as shown in Fig.68. Turn the chain adjusting nut (Fig.69) to adjust to this clearance. This nut locks up at each half turn.



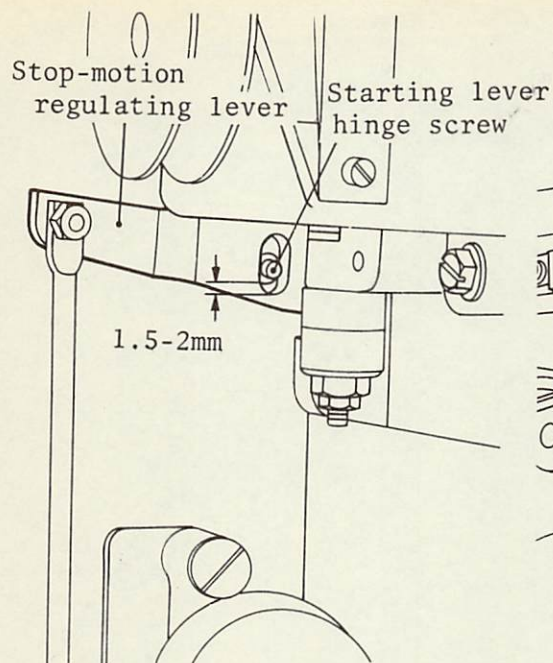


Fig.68

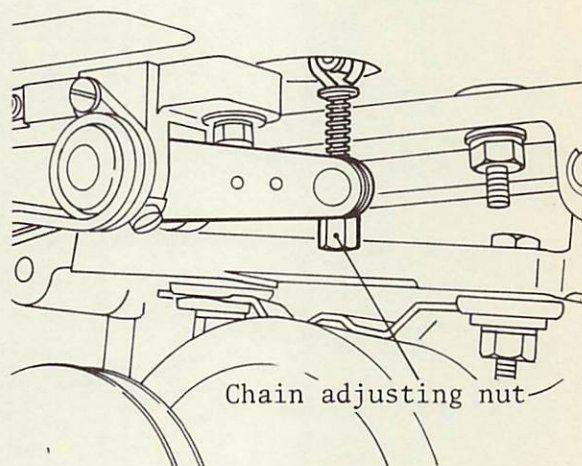


Fig.69

- 2) When the pedal is stepped on one step up and down and the work clamp foot does not go up, turn the chain adjusting nut(Fig.69) to right.  
Also, when the work clamp foot lifting lever's movement is bad, lessen the friction of work clamp foot lifting lever components so that the movement will be smooth.
- 3) When the work clamp foot does not go up at the stop-motion time, verify, besides the above causes, if the spring switching roller is moving the spring switching cam smoothly and if not, then adjust the spring switching cam(Fig.63) by moving it up and down.
- 4) When the machine is started and if the pedal is returned in the midst of pedal operation, the work clamp foot will stop going up. But if the pedal is stepped on strongly, the machine will start. When the work clamp foot is to be raised up without starting the machine, pull the safety plate strongly toward the arrow direction.(Fig.70)

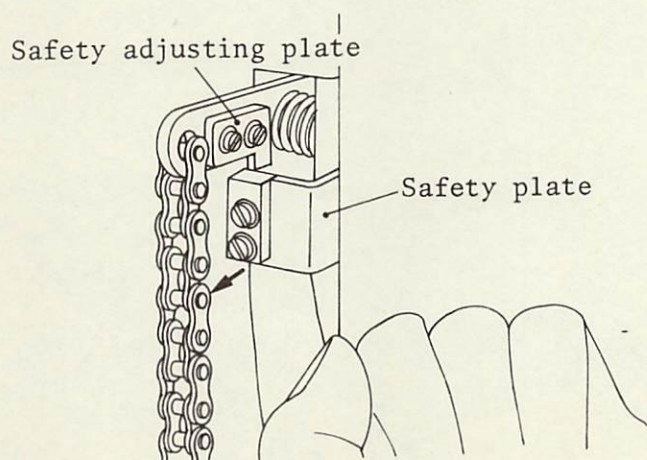


Fig.70



AO-11 is a unit composed of models LK-284-10, LK-282-20, LK-284-40 etc. which are set sideways on the table and to which AO-10 unit is installed. Please read and digest the INSTRUCTION BOOK on AO-10 thoroughly.

(1) Cautions on assembling and disassembling

As a basic step, install the AO-10 unit sideways on the table and by exchanging the pedal connecting bar in place of pedal lever stud, install the pedal connecting lever and the pedal connecting bar stud retainer. (Fig.71)

To install the pedal connecting bar stud set screw, install the pedal connecting bar stud retainer so that there will be no friction of pedal connecting bar components. (Fig.72)

(Note) This is a view from the backside of the table

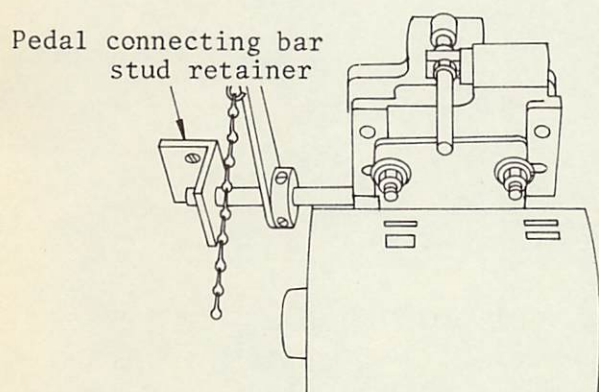


Fig.71

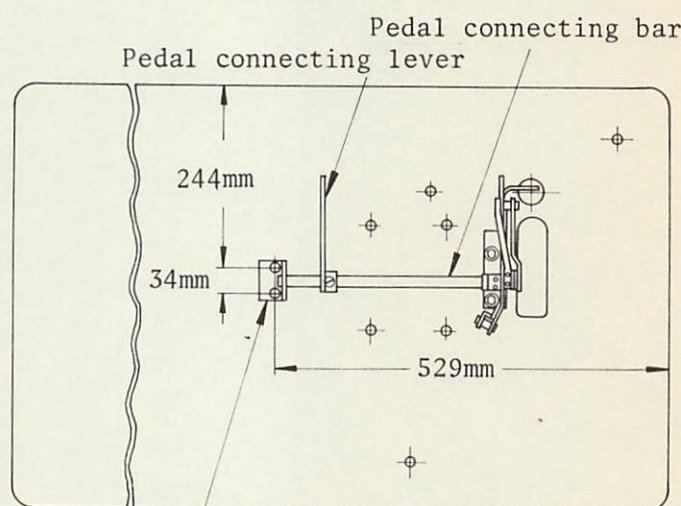


Fig.72

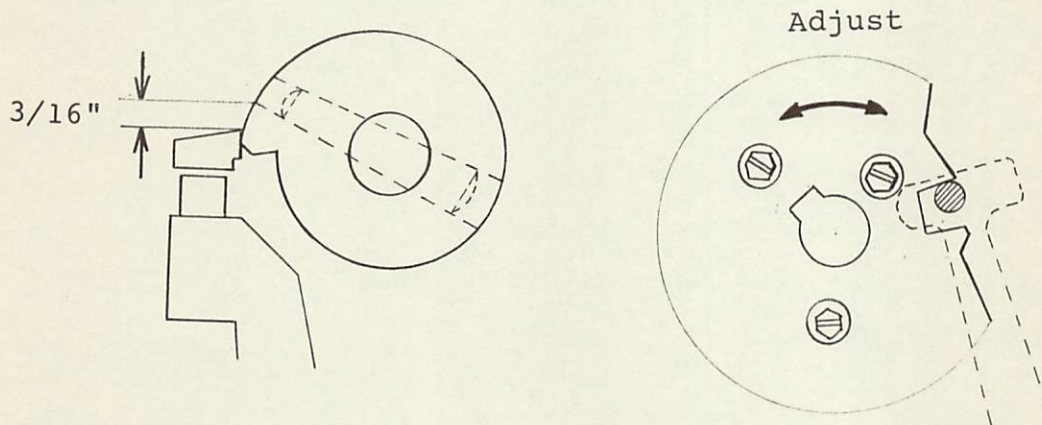


BASIC ADJUSTMENT ON THE CLUTCH AND STOP-MOTION

MECHANISM OF JUKI LK-280 SERIES

Note: The following adjustments must be done in the exactly same sequence.

- 1) On the last stitch before the machine comes to stop, the rod latch should sit on the cam about  $3/16"$  (5 mm.) below the hole.

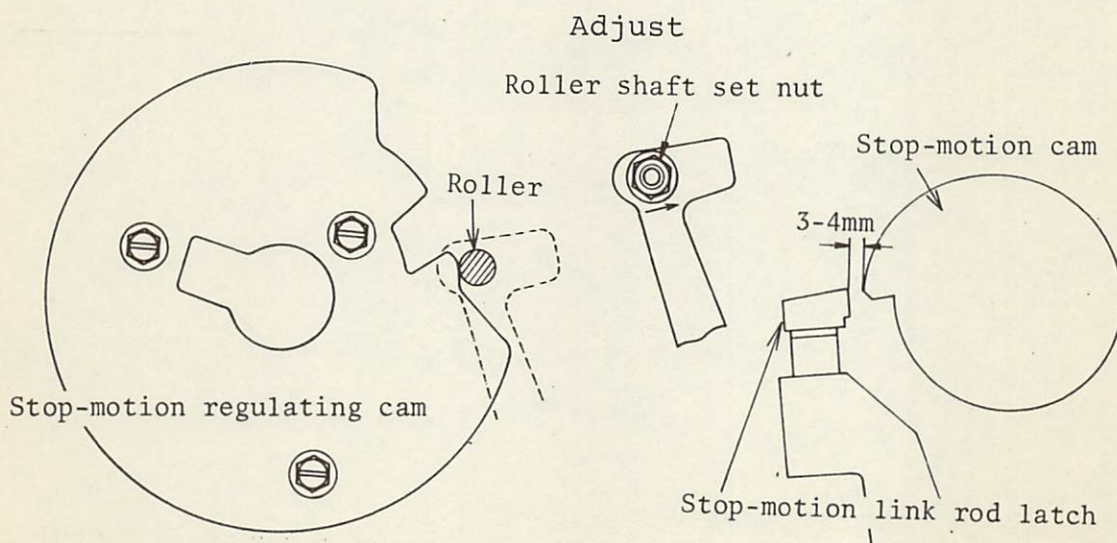


(Note)

At slow-speed rotation (1400 spm) or with subclass machine for heavy weight materials, the range 5mm ( $3/16"$ ) may be changed within the range of  $150^\circ$ .

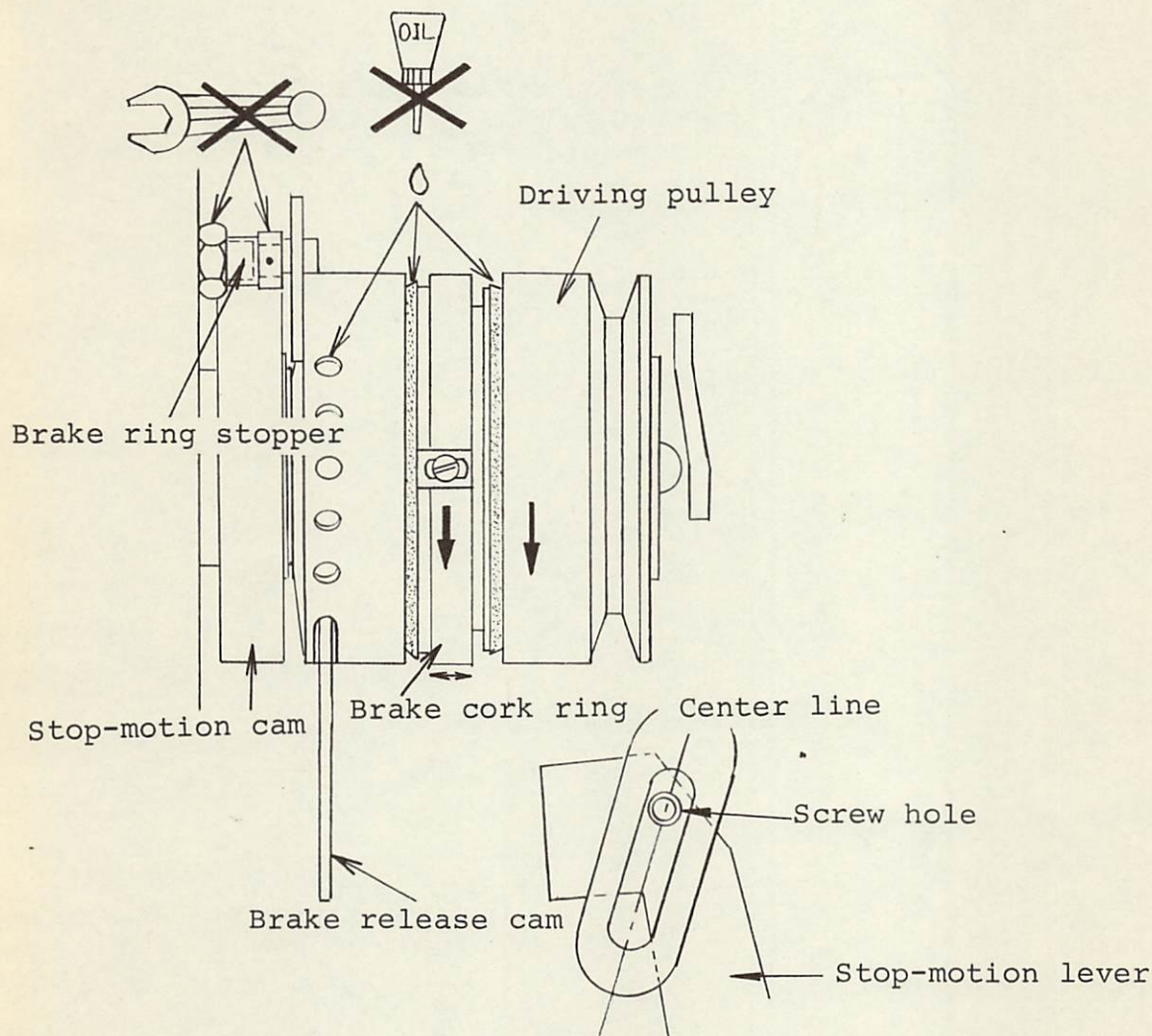
- 2) At a slow-speed position, the clearance between the rod latch and the cam should be  $1/8"$  to  $5/32"$  (3 to 4 mm).

Adjust by loosening the roller shaft set nut of the stop-motion regulating cam





- 3) Absolutely do not move the brake ring stopper where the white paint is applied.



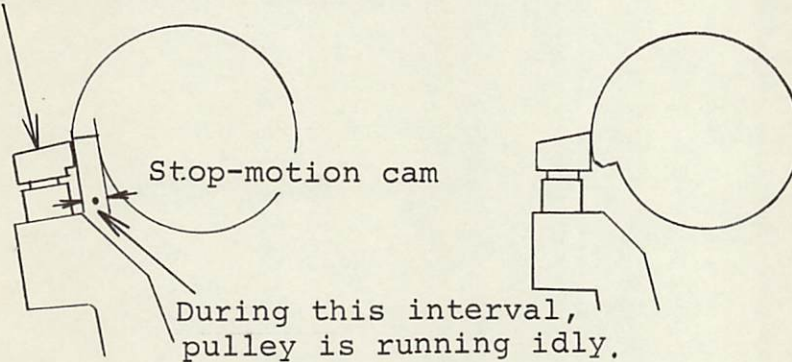
(Note)

However, in case the exchanged speed decreasing device (set) or adjusted the speed decreasing device which are not painted white at the low-speed rotation time, remove the hinge screw of the brake releasing cam and adjust the brake ring stopper so that the center line of the long hole of the brake releasing cam matches with the center of the brake releasing cam screw hole of the stop-motion frame.



- 4) The clutch should be engaged for the slow speed just after the rod latch comes off the cam. The brake cork ring (the middle ring) is stationary whenever the machine is at its slow speed.

Stop-motion link rod latch



Adjustment should be done as follows: When the stop-motion link rod latch is placed on the outer circumference part of the stop-motion cam, move the brake cork ring fore and aft and adjust so that the brake ring and the cork part barely touch each other.

- 5) Before the machine goes from the slow speed to the high speed, it runs idly (the brake cork ring rotates counter to the driving pulley). The proper length of idling is about one half rotation (180 to 200 degrees).



Adjustment should be done as follows:

Rotate the driving pulley pressing plate adjusting screw fully to right and with driving pulley and the brake cork ring in  $180^{\circ}$  idly rotated condition, adjust by rotating the driving pulley pressing plate adjusting screw to left so that the driving pulley and the driving clutch begin to touch each other.

In case the number of stitches become over 56, the range ( $180^{\circ}$ ) of idle rotation will be increased to  $270^{\circ}$  range.

