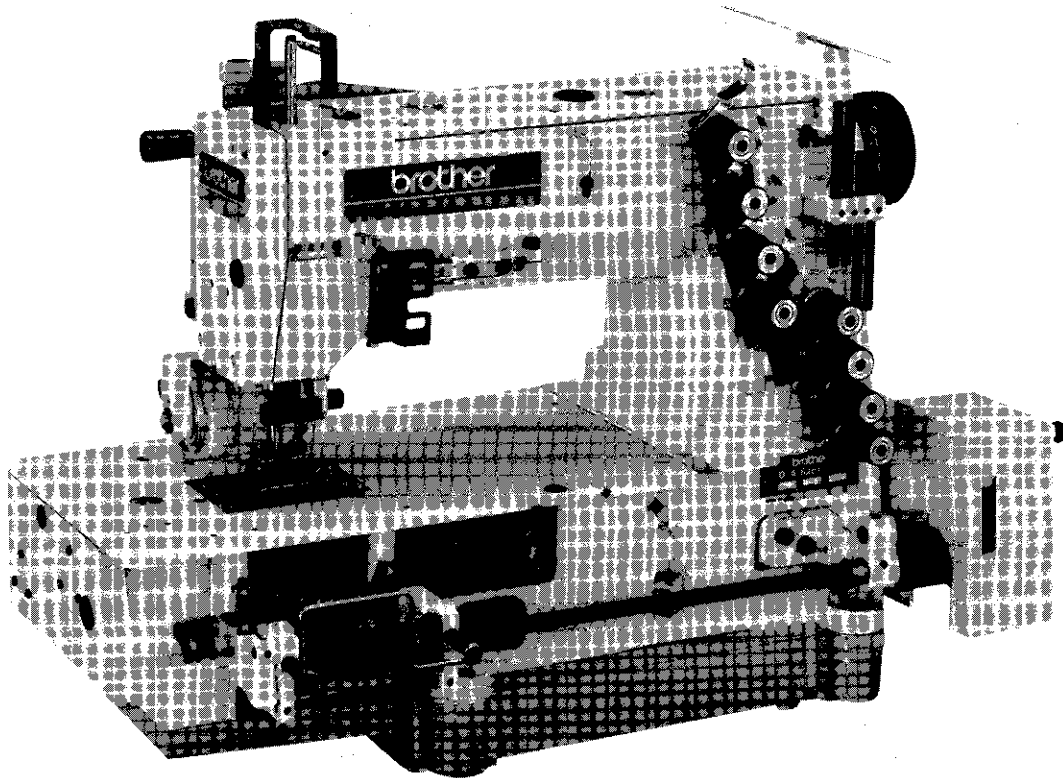


**4-NEEDLE DOUBLE CHAIN STITCHER WITH PULLER**

**DT4-B281**

**Service Manual**



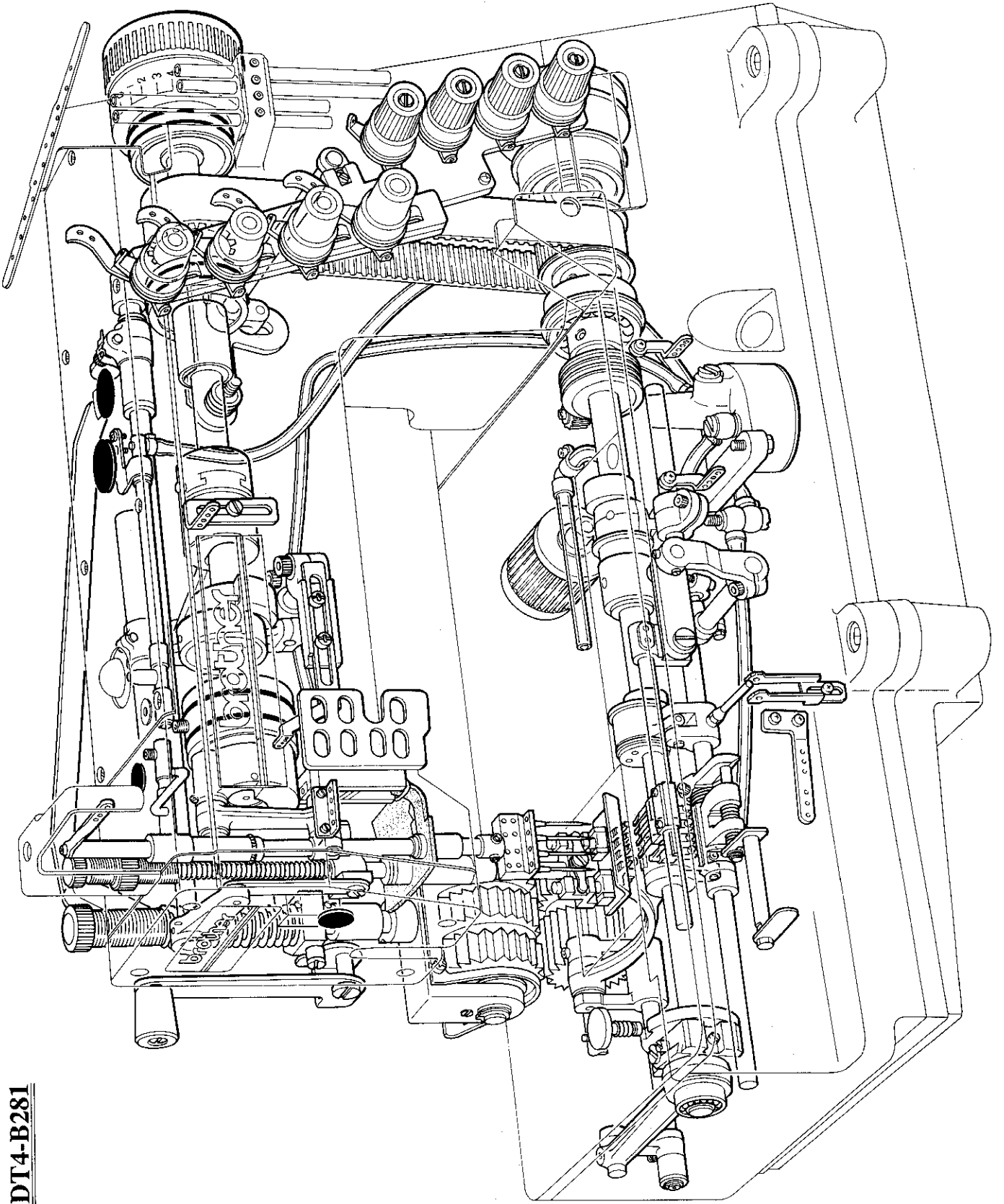
**BROTHER INDUSTRIES, LTD.**

**NAGOYA, JAPAN**

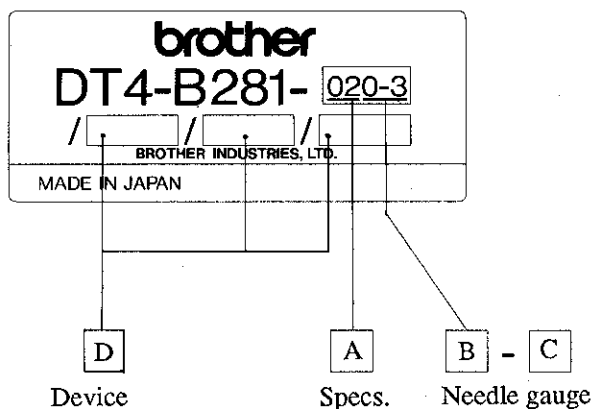
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DT4-B281



## [A] Model Plate Display



### [A] Specifications

A	Specifications
00	Without puller
02	For elastic gathered waistbands (with bottom metering device) (with puller)
04	For shirtfronts (with puller)
05	For waistbands (with puller)

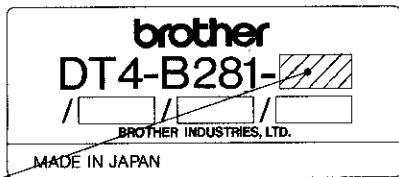
### [B] - [C] Needle gauge



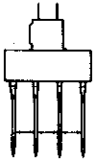
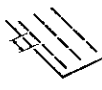
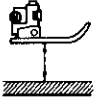
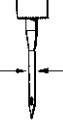

B	C	Needle gauge (inches)
0	1	Full width 3/4
0	2	Full width 1
0	3	Full width 1-1/8
0	4	Full width 1-1/4
0	5	Full width 1-1/2
0	6	1/4 - 1 - 1/4
0	7	3/16 - 7/8 - 3/16
0	8	1/4 - 3/4 - 1/4
0	9	1/4 - 1/2 - 1/4
1	0	3/16 - 1 - 3/16
1	1	3/16 - 3/4 - 3/16

### [D] Device

TC1	Air Type Tape Cutter
TC3	Solenoid Type Tape Cutter

# [B] Specifications

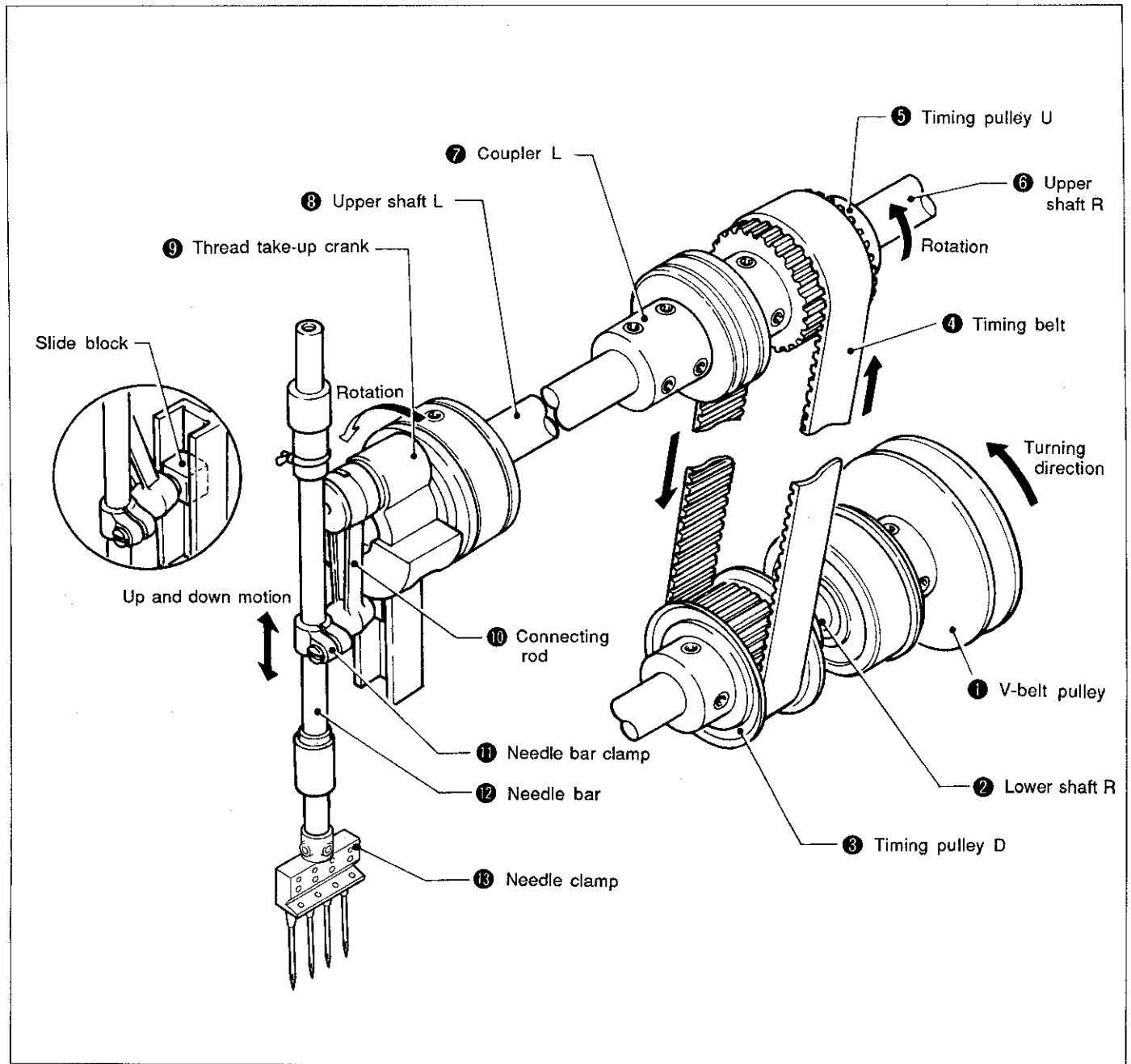


Sub-class	Application	 No. of needles	 No. of threads	 Needle gauge (inches)	 Max stitch length (mm)	 Presser foot lift height (mm)	 Needle size (UY113GS)	 Max. sewing speed (spm)
000-2	<b>For plain stitching</b> Jogging pants, white shirts, work clothes	4	8	Full width 1	3.6	7	# 75	5,000
0-3				Full width 1-1/8				
0-4				Full width 1-1/4				
0-5				Full width 1-1/2				
0-6				1/4 - 1 - 1/4				
0-7				3/16 - 7/8 - 3/16				
0-8				1/4 - 3/4 - 1/4				
0-9				1/4 - 1/2 - 1/4				
1-0				3/16 - 1 - 3/16				
1-1	3/16 - 3/4 - 3/16							
020-1	<b>For elastic gathered waistbands</b> Jumpers, work clothes, jogging pants	4	8	Full width 3/4	3.6	7	# 75	5,000
0-2				Full width 1				
0-3				Full width 1-1/8				
0-4				Full width 1-1/4				
0-5				Full width 1-1/2				
0-9	1/4 - 1/2 - 1/4							
040-6	<b>For shirtfronts</b> Dress shirts, white shirts, casual shirts	4	8	1/4 - 1 - 1/4	3.6	7	# 75	5,000
0-7				3/16 - 7/8 - 3/16				
0-8				1/4 - 3/4 - 1/4				
1-0				3/16 - 1 - 3/16				
1-1				3/16 - 3/4 - 3/16				
050-6	<b>For waistbands</b> Denims, work pants	4	8	1/4 - 1 - 1/4	3.6	7	# 100	3,500
0-7				3/16 - 7/8 - 3/16				
0-8				1/4 - 3/4 - 1/4				
1-0				3/16 - 1 - 3/16				
1-1				3/16 - 3/4 - 3/16				

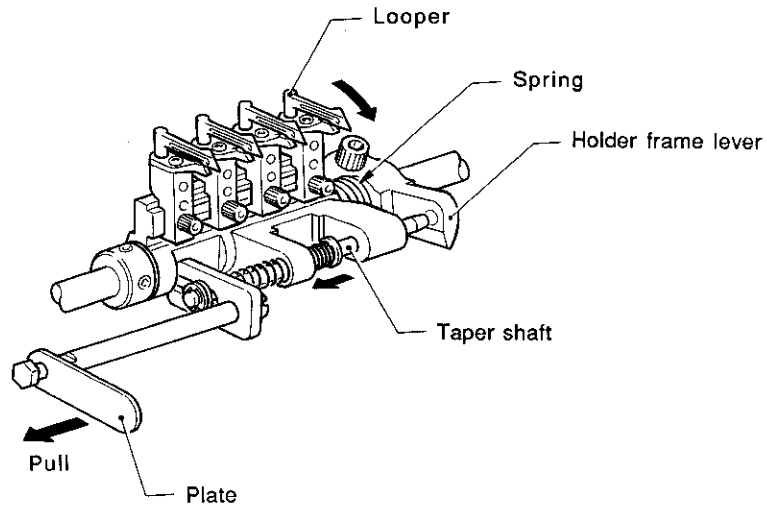
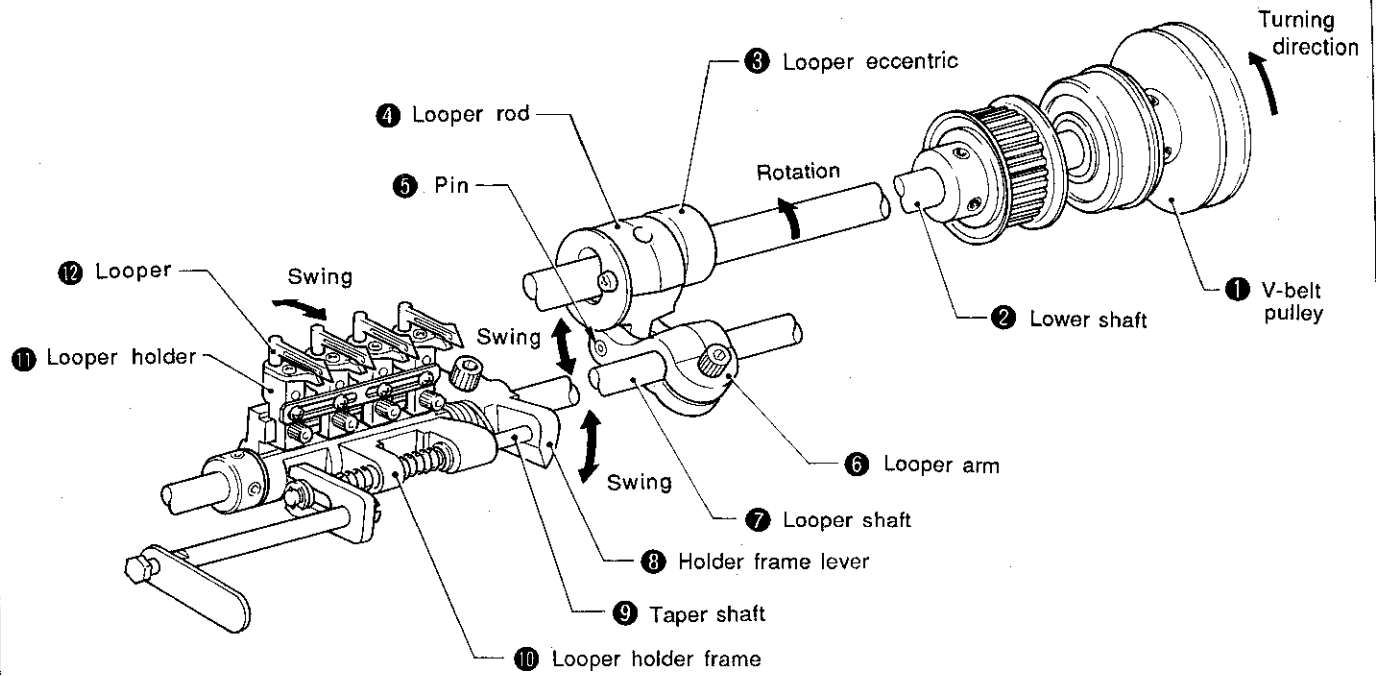
## [C] Description of Mechanism

◎ The power is transmitted in the order of the following numbers.

### 1 Needle bar mechanism

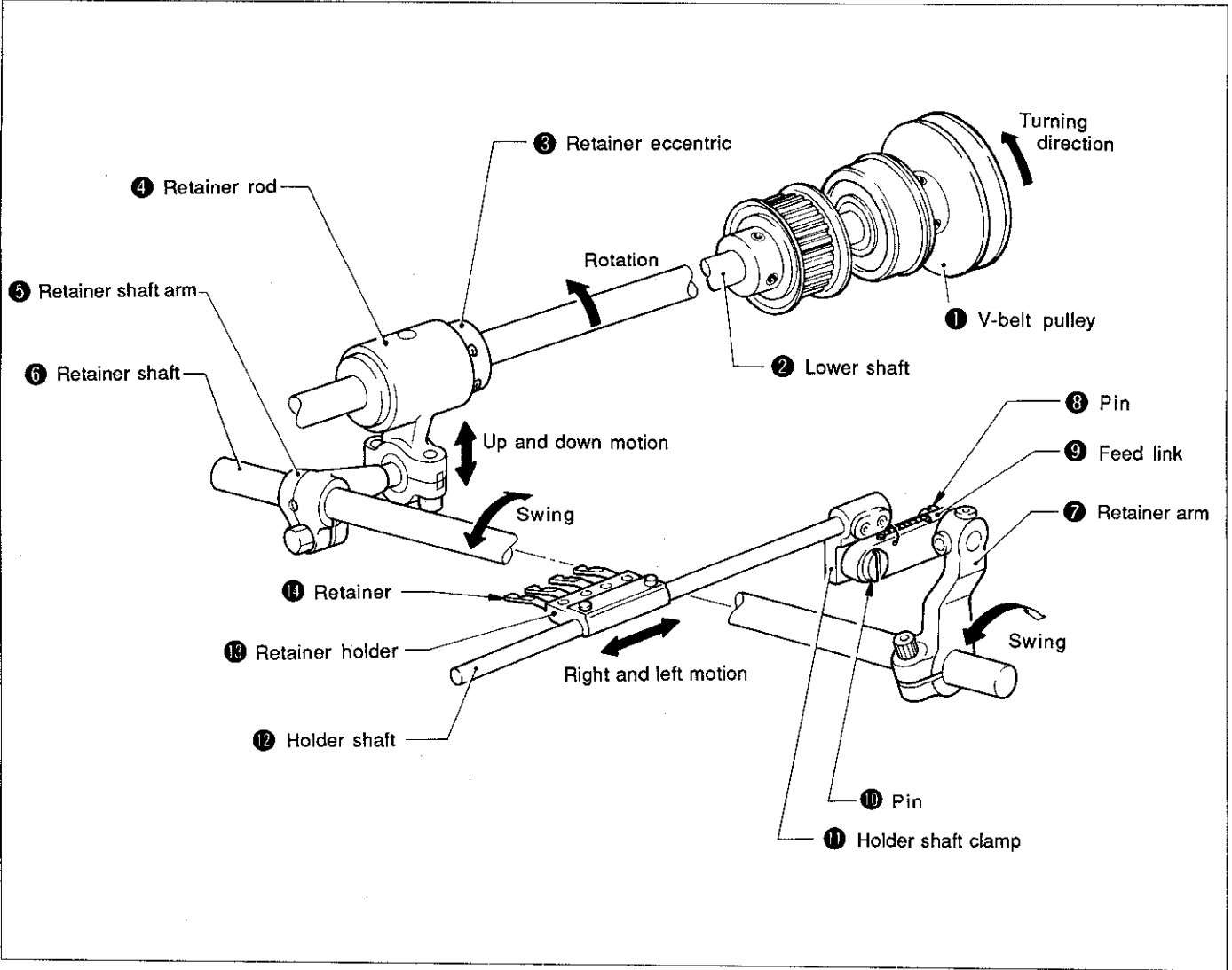


## 2 Loooper mechanism



- Pull the plate so that the taper shaft end comes off the holder frame lever. The spring works to let the looper down this side.

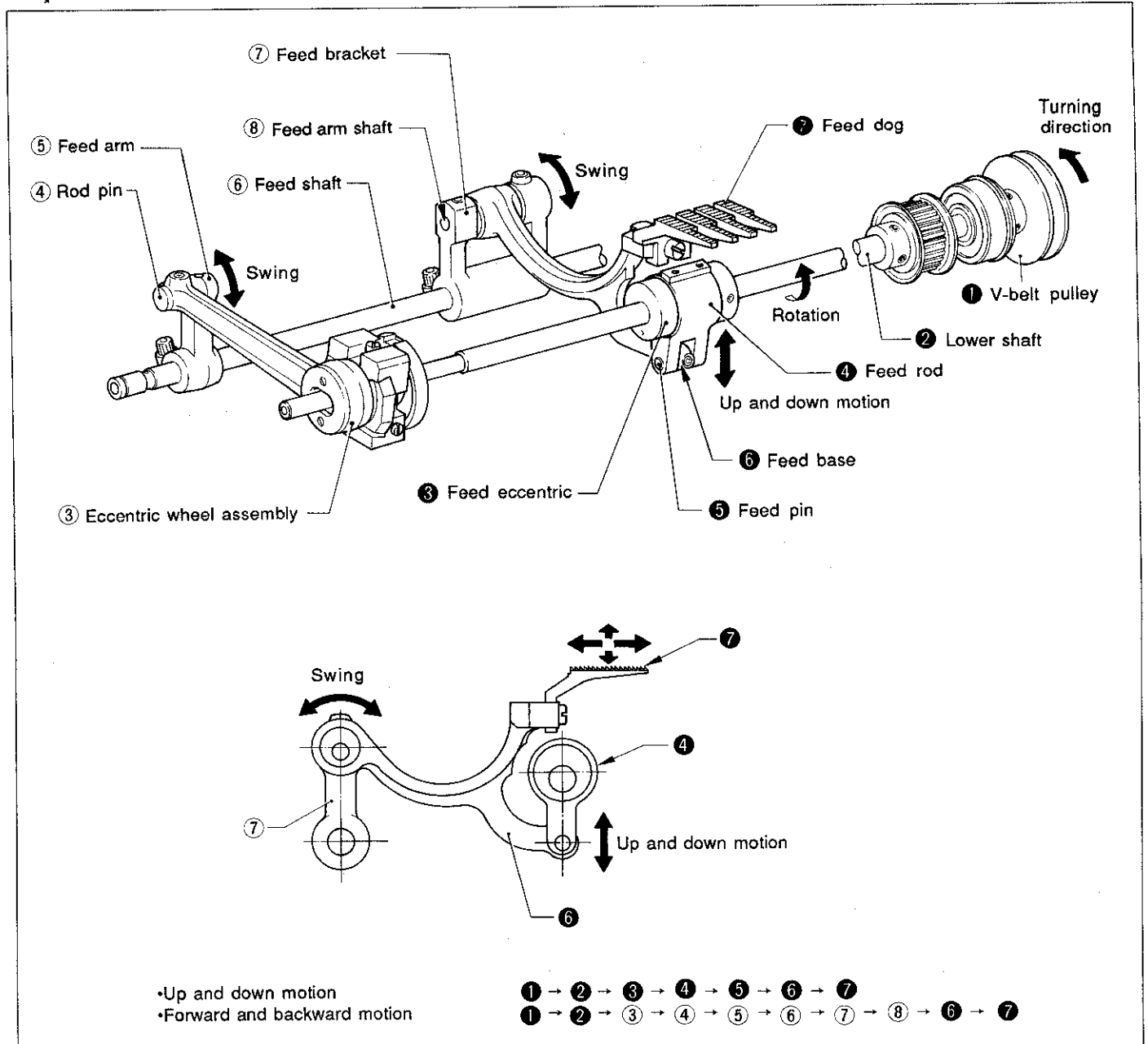
**3 Retainer mechanism**





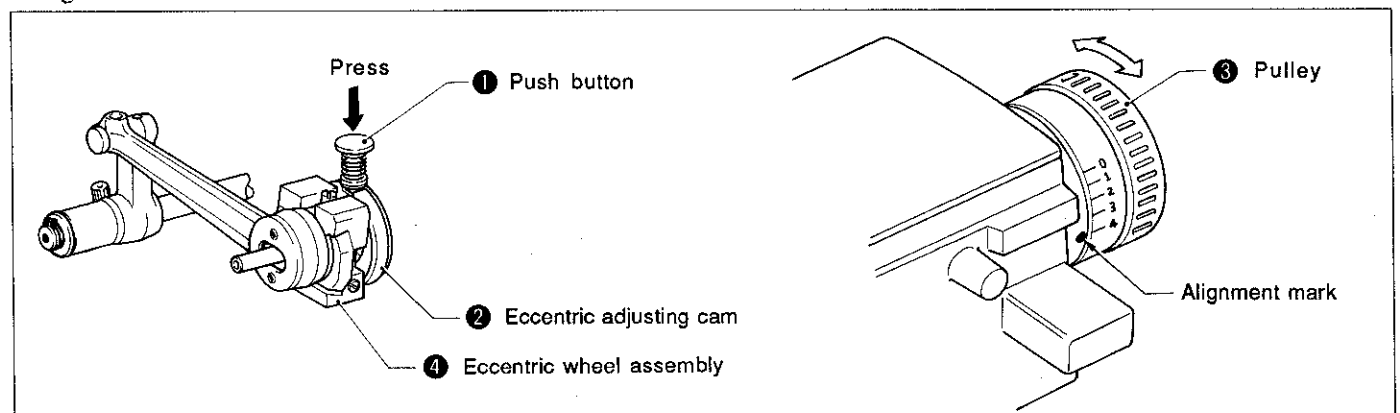
## 4 Feed mechanism

### 1. Up and down motion/Forward and backward motion

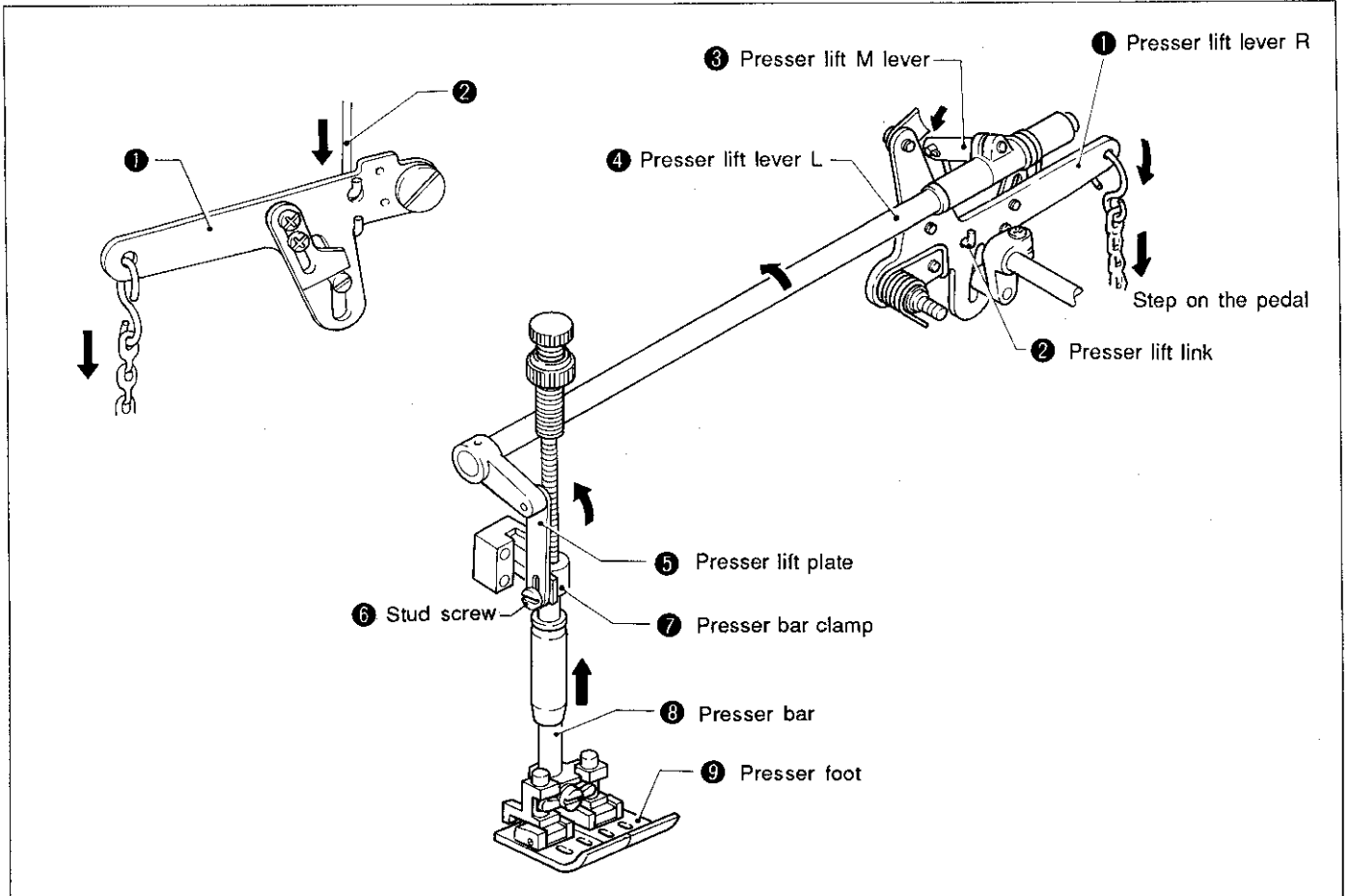


### 2. Stitch length changing mechanism

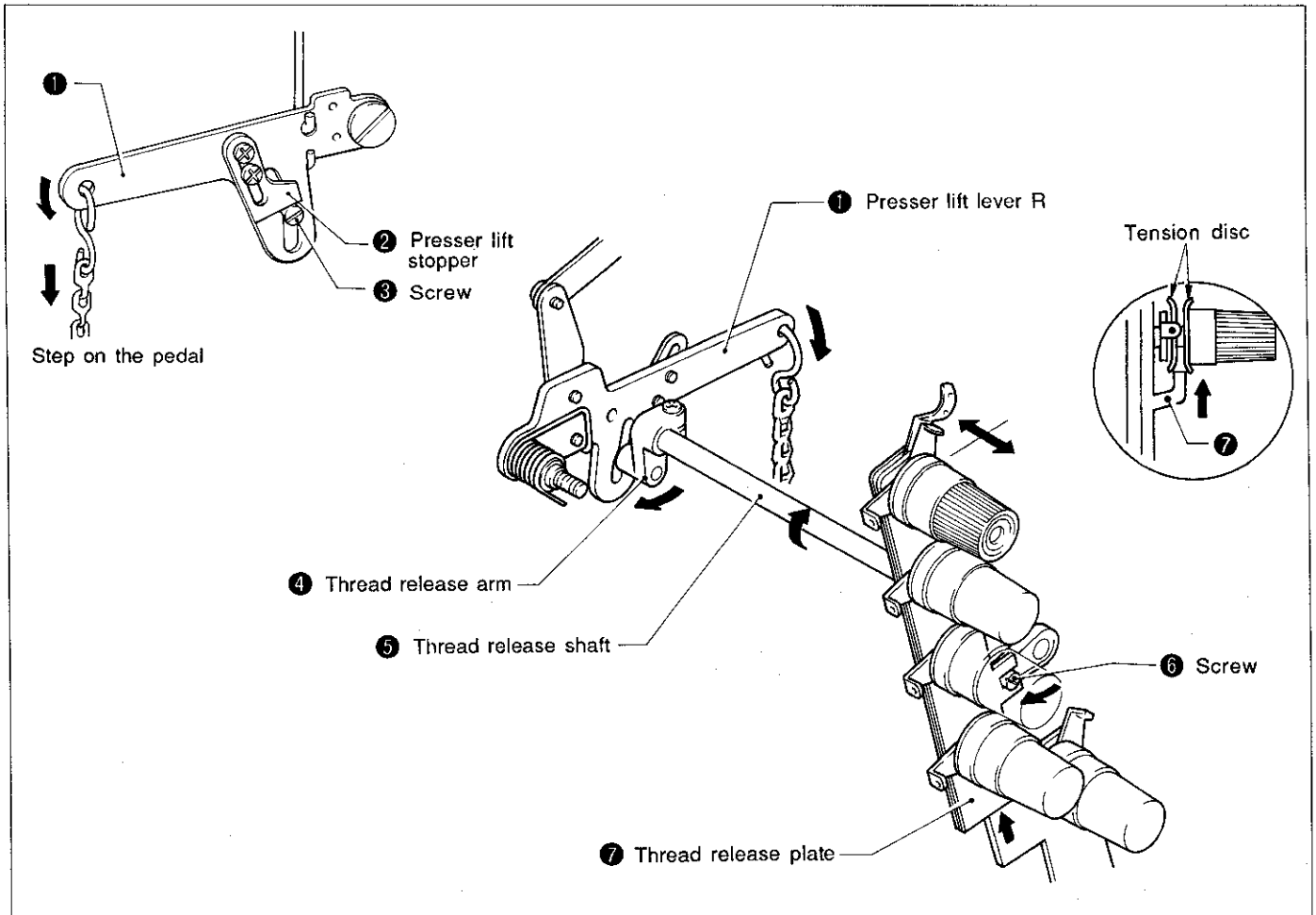
Press the push button ① and turn the pulley so that the tip engages with the eccentric adjusting cam ②. Then turn the pulley ③ forward and backward to change the eccentricity of the eccentric wheel assembly ④. As a result, the feed volume will be changed.



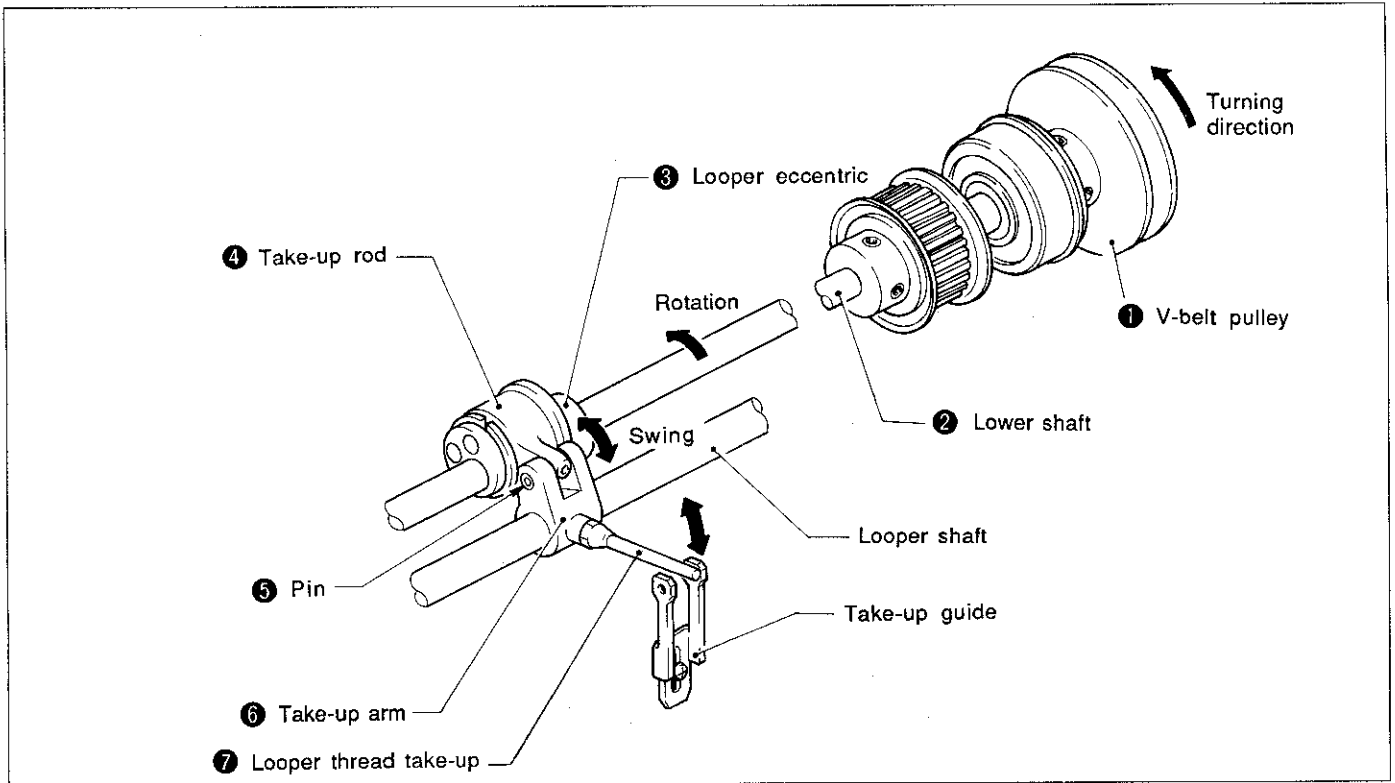
**5 Presser foot lift mechanism**



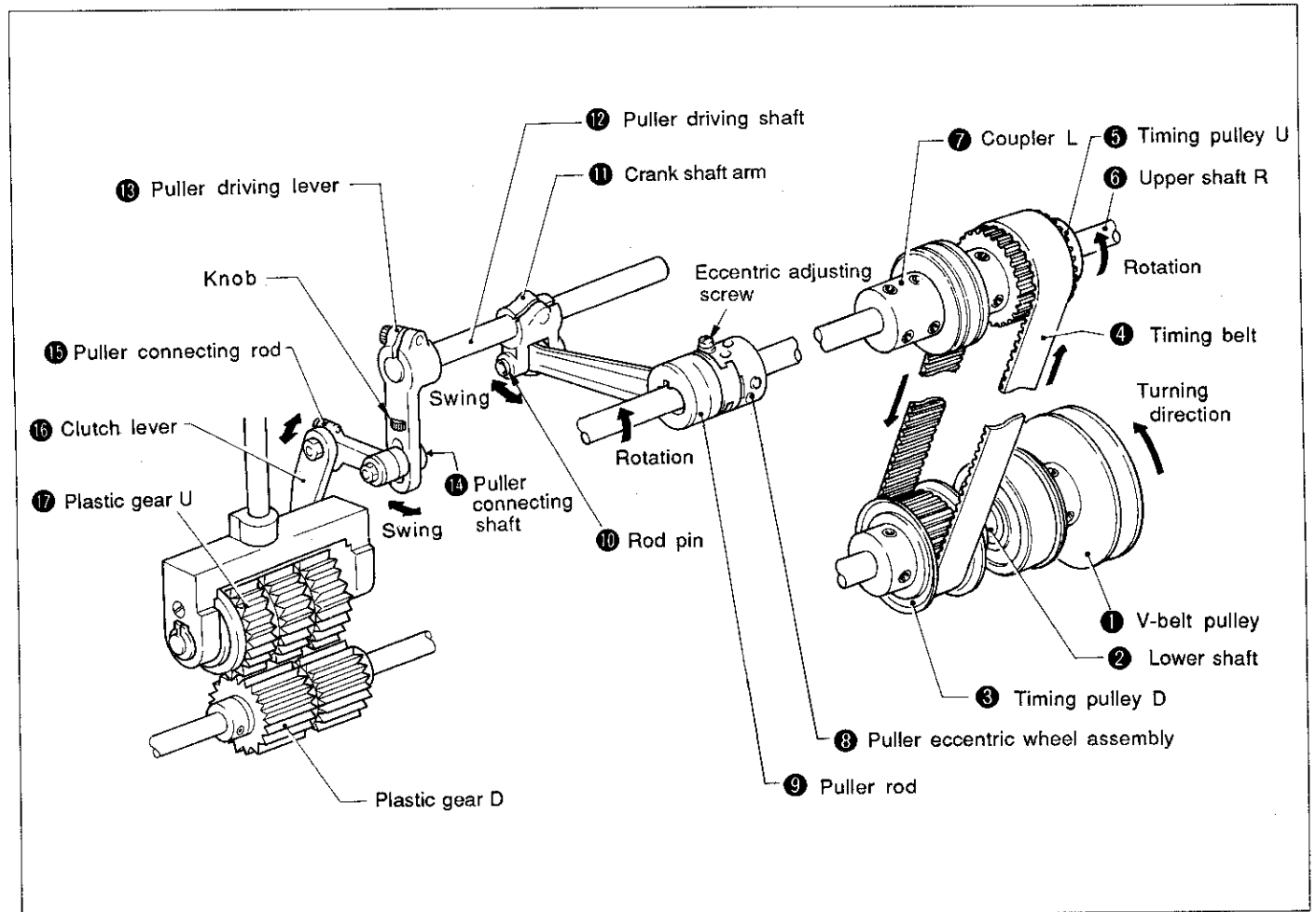
**6 Thread release mechanism**



## 7 Loooper thread take-up mechanism

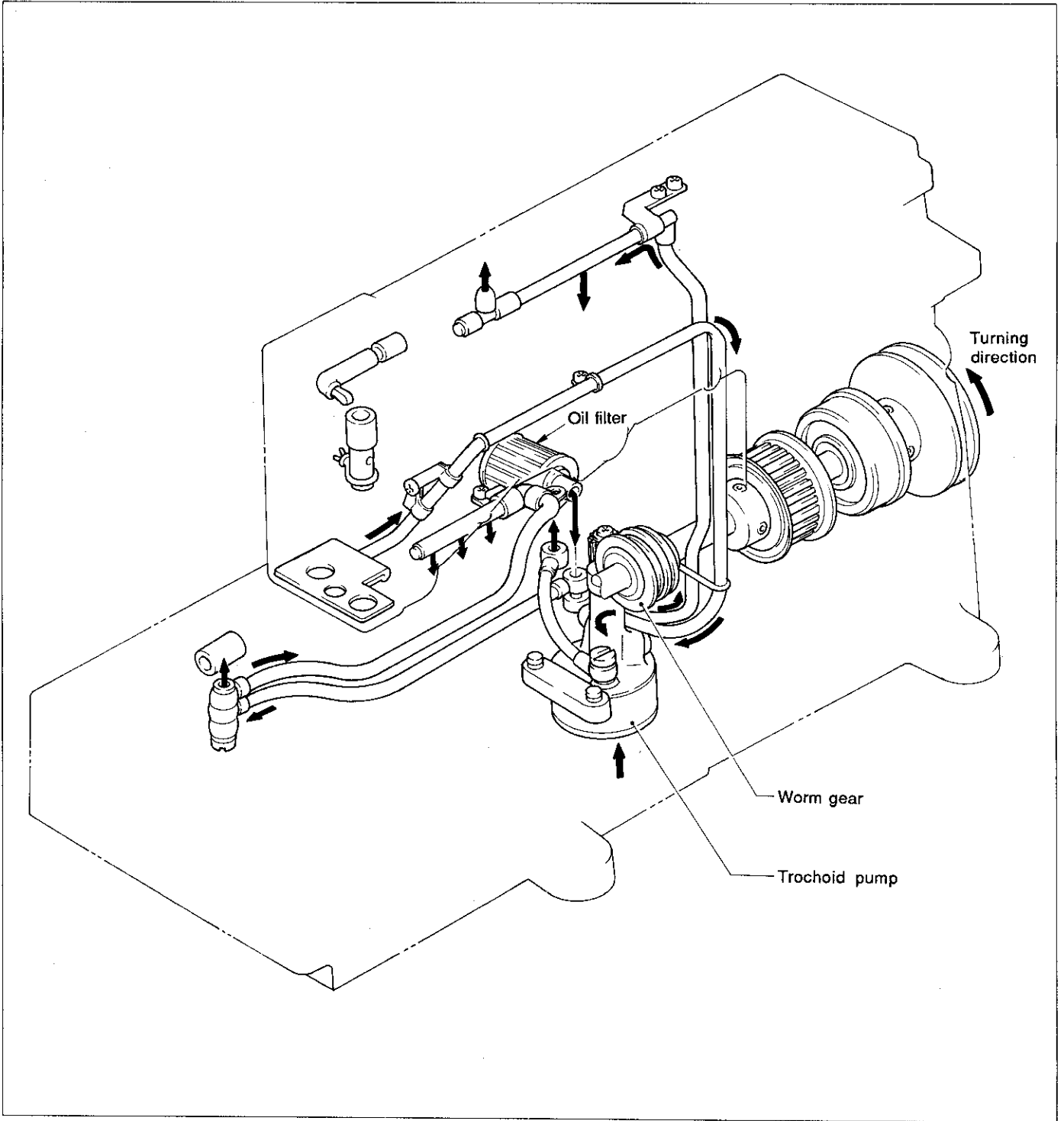


## 8 Puller mechanism



The feed volume of the puller (plastic gear) can be adjusted by changing the eccentricity of the puller eccentric wheel assembly 8. The fine adjustment can be made by changing the arm length of the puller driving lever 13 with the knob.

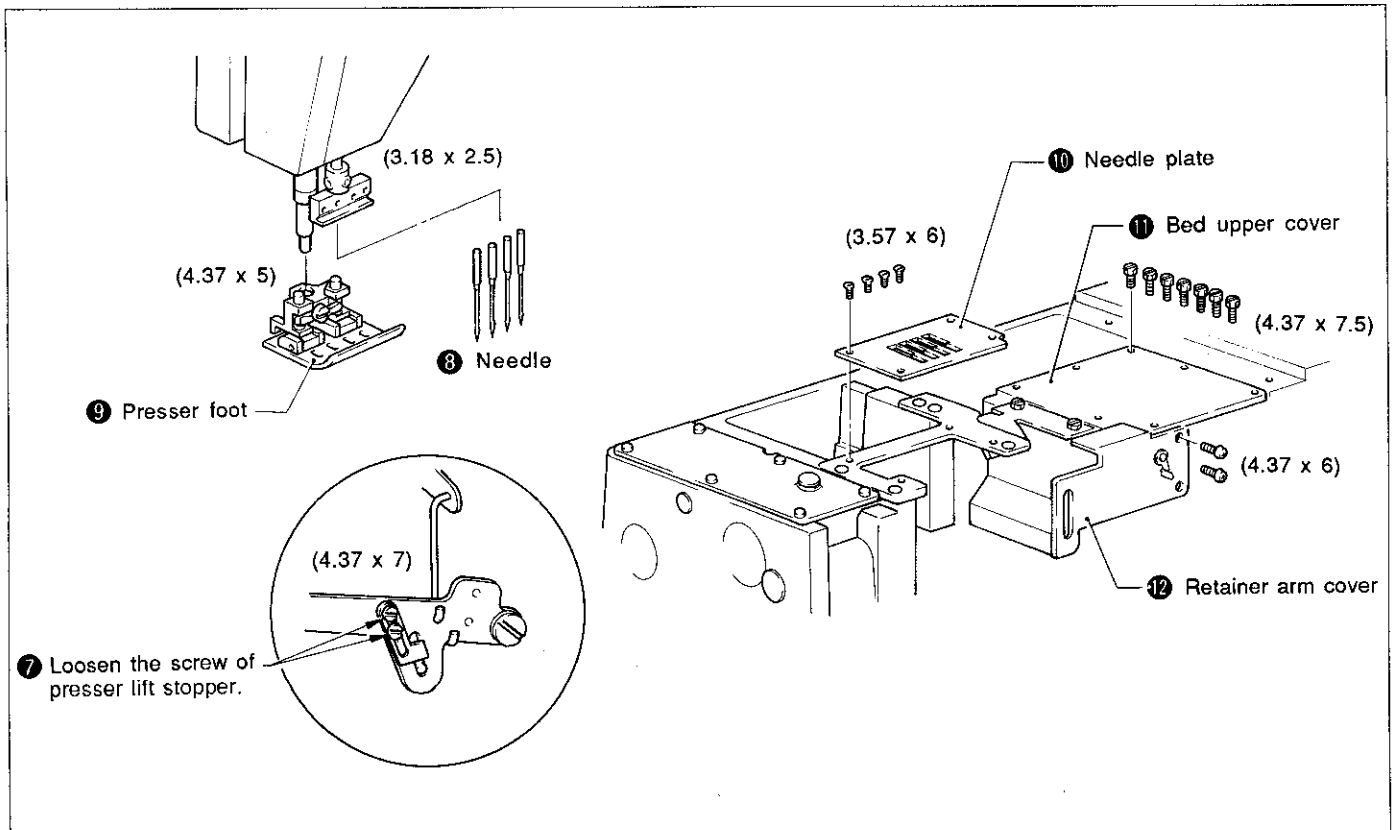
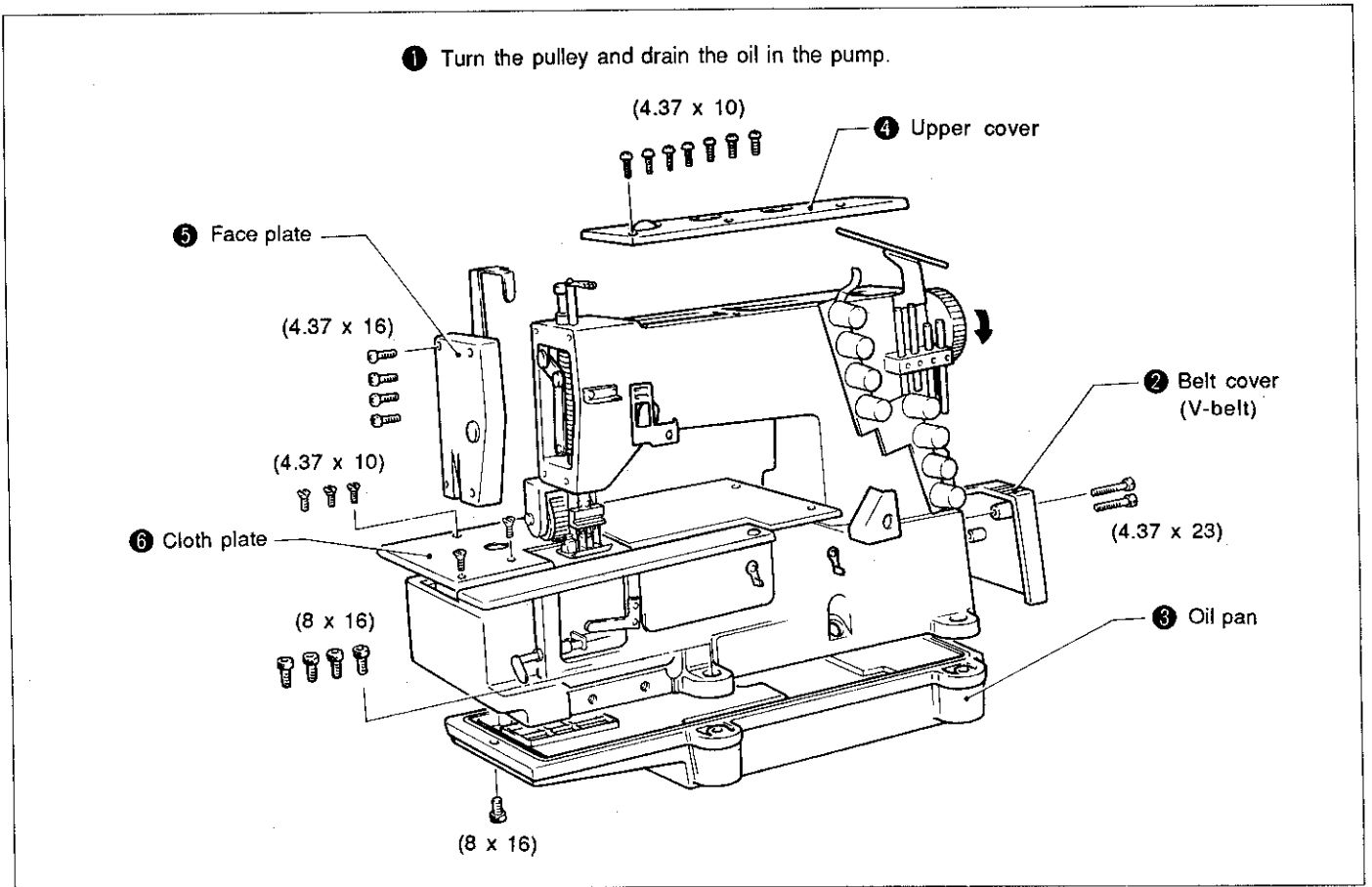
**9** Lubrication



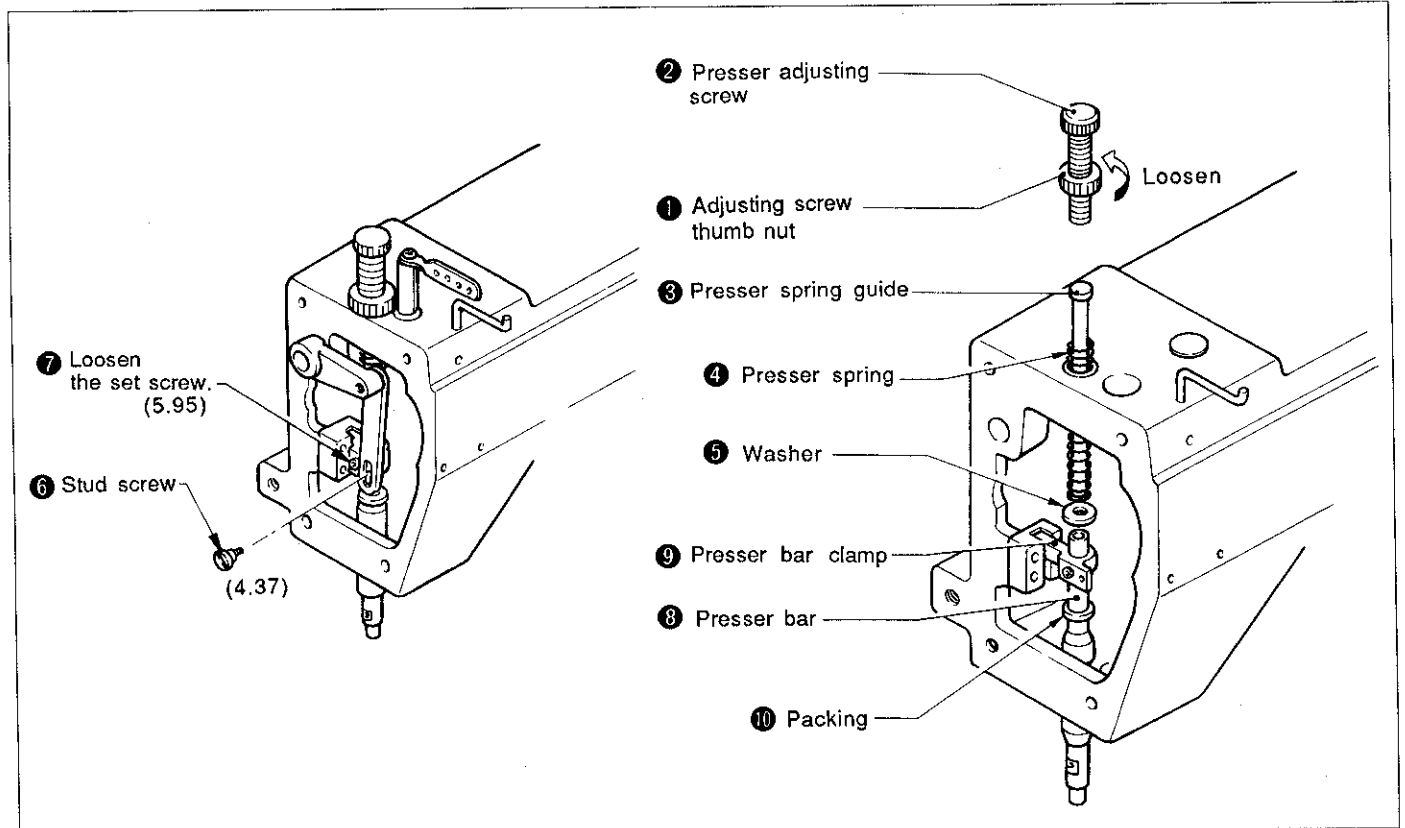
# [D] Disassembly Procedures

⊙ Disassemble the machine by removing the parts in the order of the following numbers.

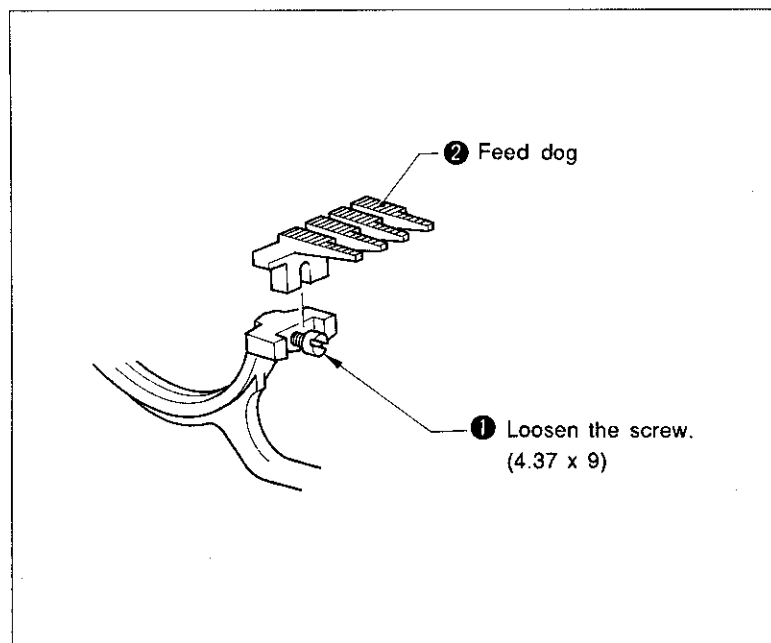
## 1 Cover



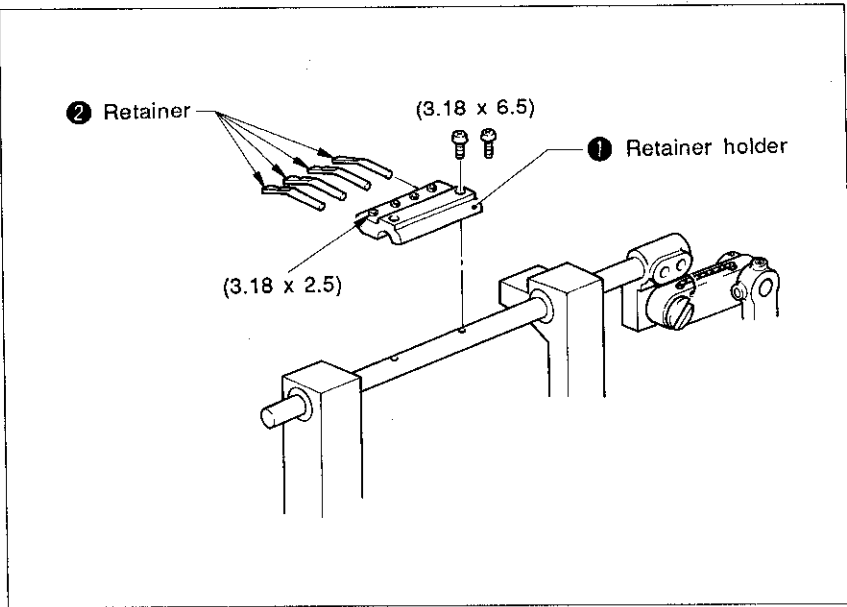
## 2 Presser



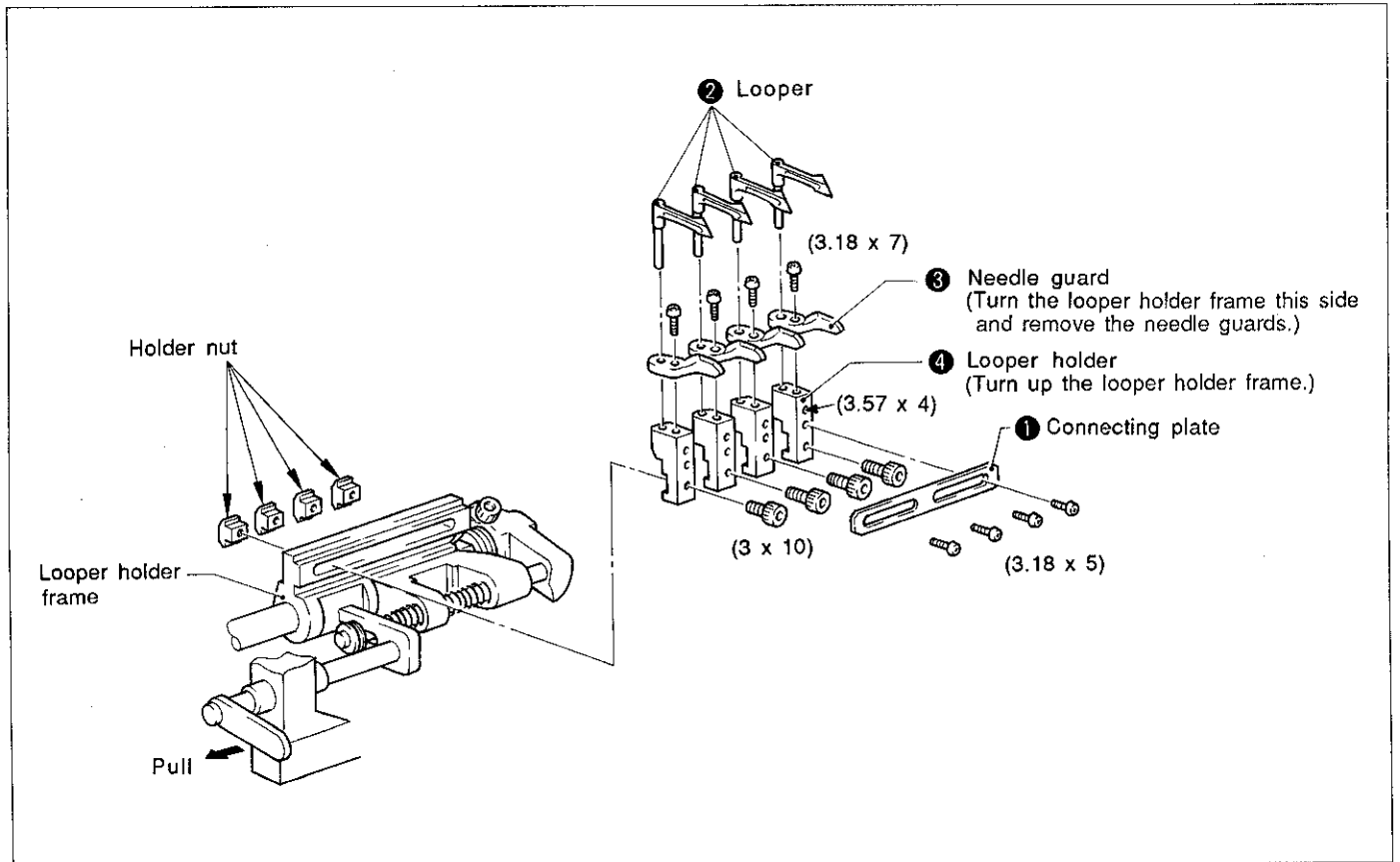
## 3 Feeding



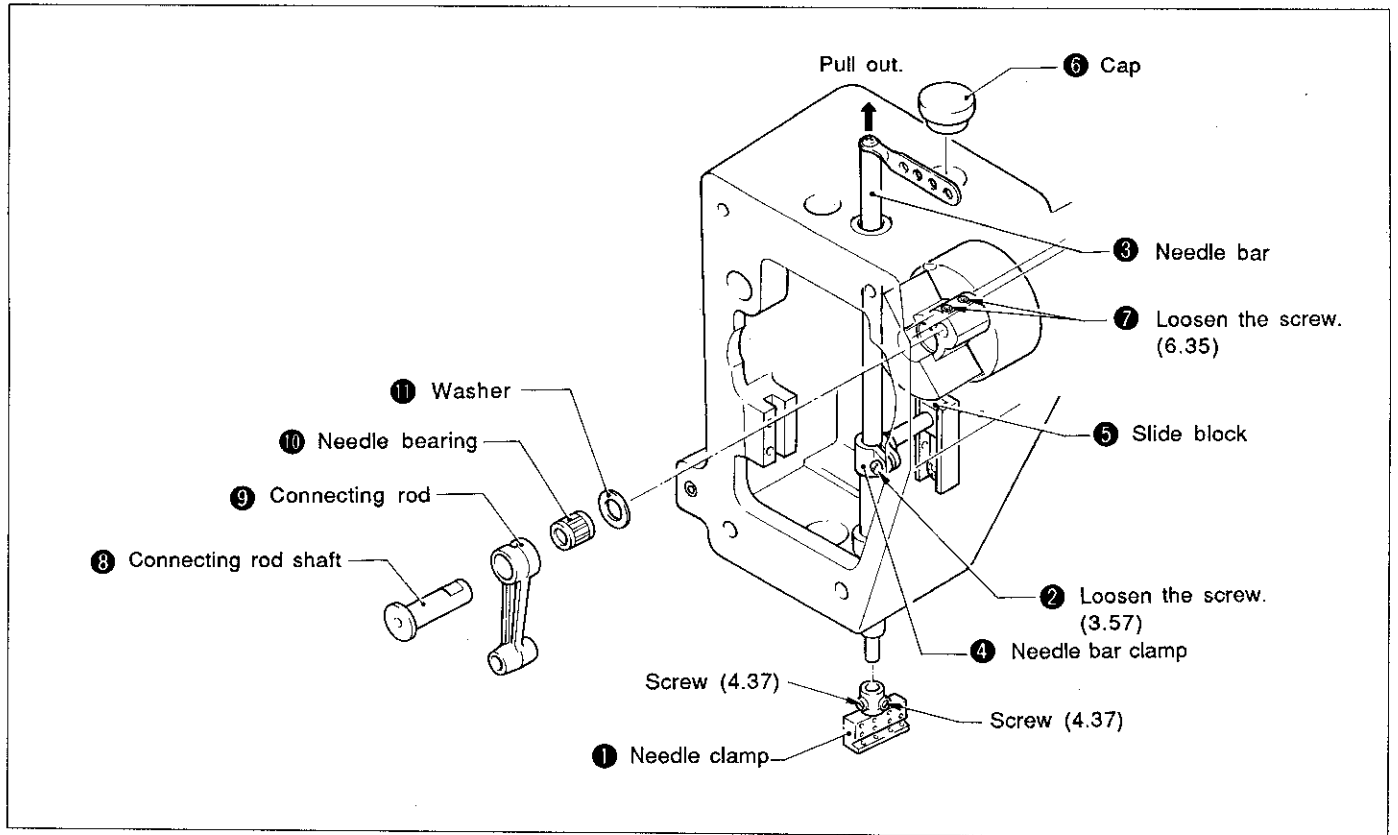
#### 4 Retainer



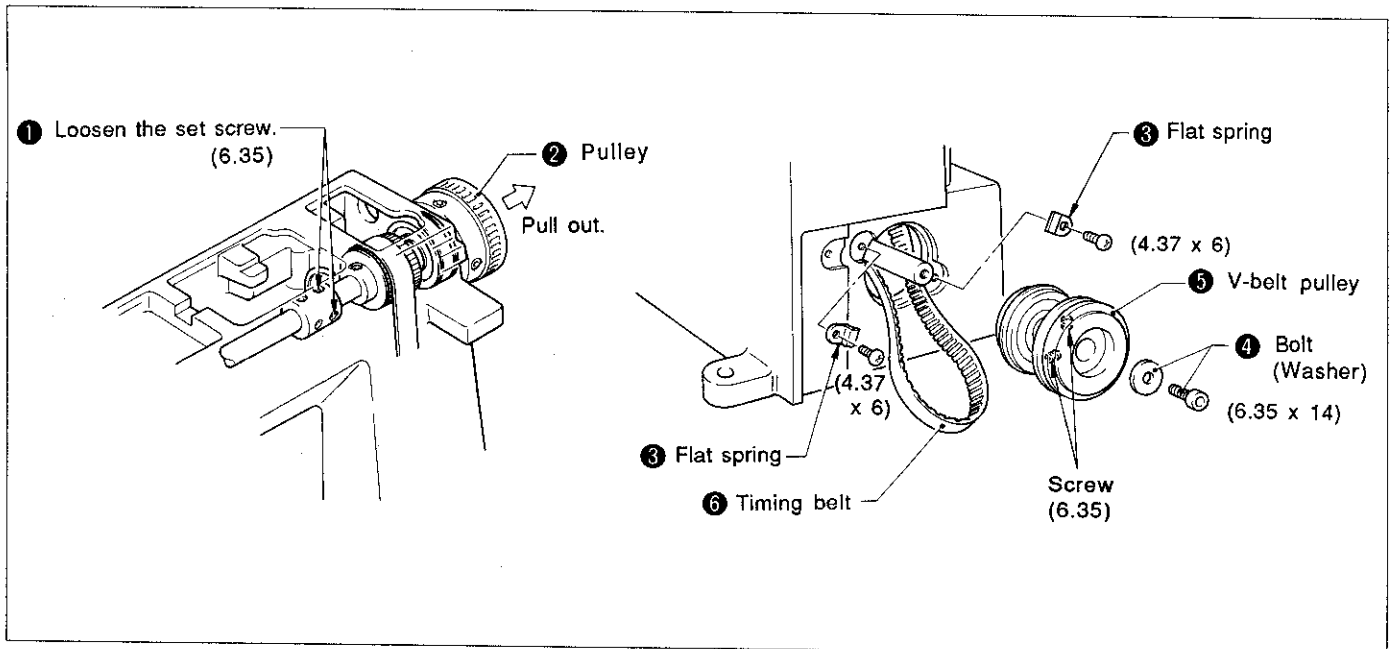
#### 5 Looper and needle guard



## 6 Needle bar



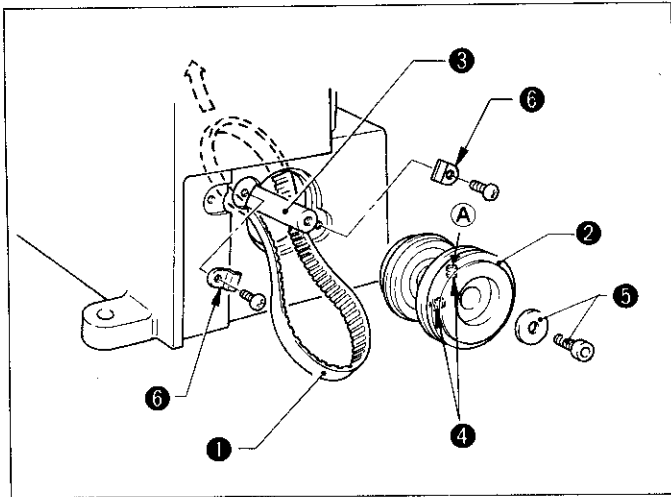
## 7 Upper and lower shafts



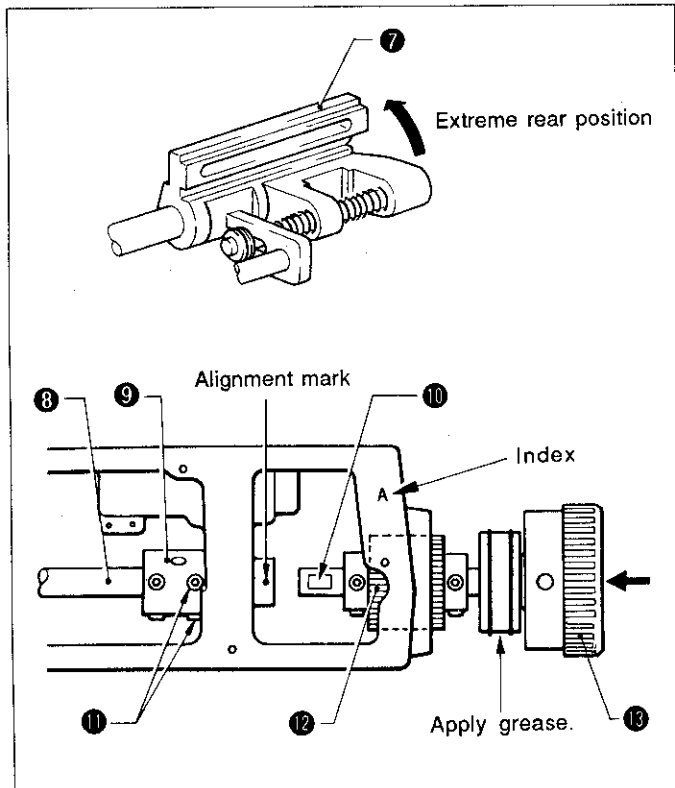


## [E] Assembly and Adjustment Procedures

### 1 Upper and lower shafts



- (1) Slide the timing belt ① into the arm.
- (2) Attach the V-belt pulley ② onto the lower shaft ③ and lightly tighten the set screws ④. Tighten the set screw (A) on the side of the rotation direction against the screw recess on the lower shaft ③.
- (3) Lightly tighten the bolt ⑤ (washer) until there is no play in the axial direction of the V-belt pulley ②.  
\* Check if the lower shaft rotates easily.
- (4) Securely tighten the set screws ④.
- (5) Attach the plate spring ⑥ pressing the outer ring of the bearing.
- (6) Tighten the bolt ⑤.



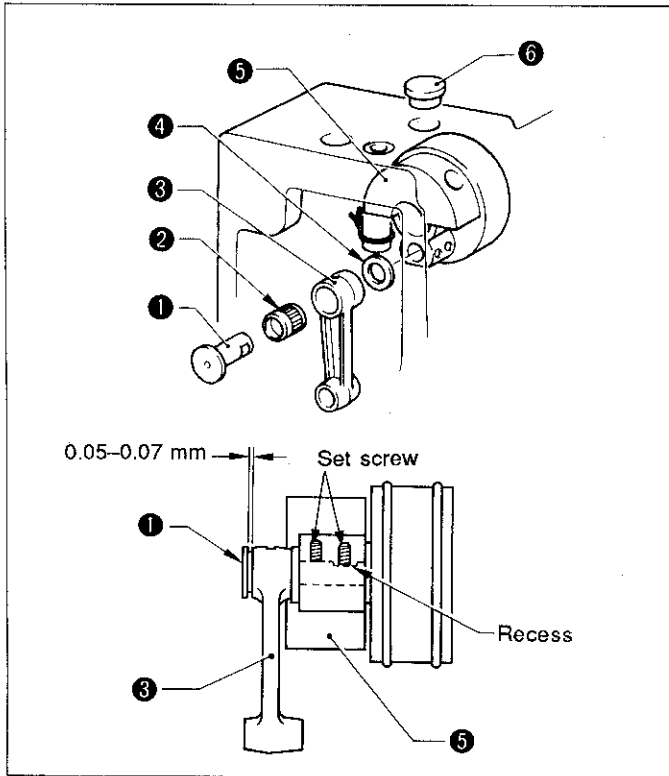
- (7) Turn the V-belt pulley ② so that the looper holder frame ⑦ comes to the extreme rear position.
- (8) Turn the upper shaft L ⑧ so that the alignment mark of the upper shaft coupling L ⑨ faces up.
- (9) Apply grease around the bearing.
- (10) When the looper holder frame is at the extreme rear position and the alignment mark of the upper shaft coupling L faces up as described at steps (7) and (8), face up the screw recess of the upper shaft R ⑩ and pass the upper shaft R ⑩ into the arm through the timing belt ①. Then push the upper shaft R ⑩ until it lightly touches the upper shaft L ⑧, and tighten the set screws ⑪.  
(Push the upper shaft R ⑩ while putting the timing belt ① lightly onto the timing gear ⑫ and turning the pulley ⑬. Check the screw recess of the upper shaft R ⑩ by removing the set screws ⑪.)

#### [Selecting a proper timing belt]

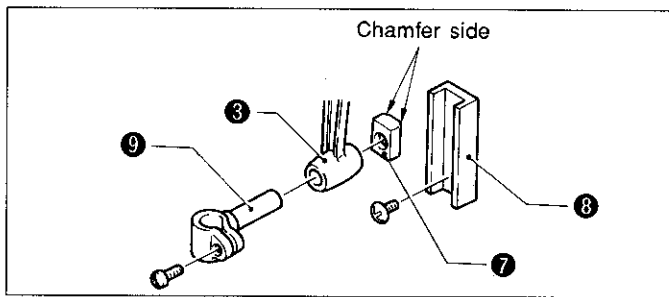
Use a timing belt of the same code as the index on the arm bed top. In cold areas where a single phase, 400-W motor is used, use the belt indicated in parentheses, e.g., (B) or (C).

Arm bed	Timing belt
A	A • (B)
B	B • (C)
C	C

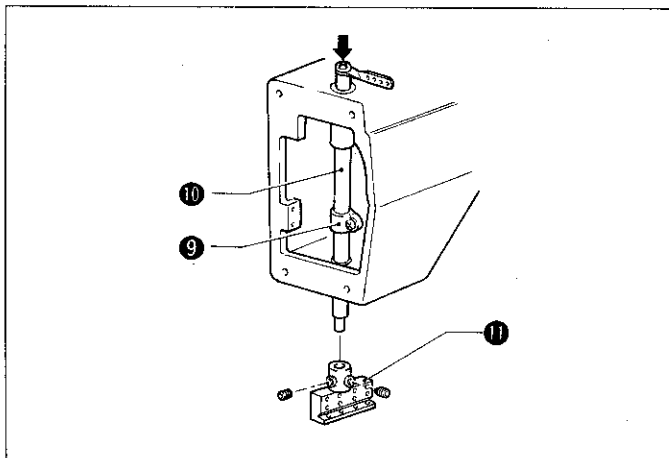
## 2 Needle bar



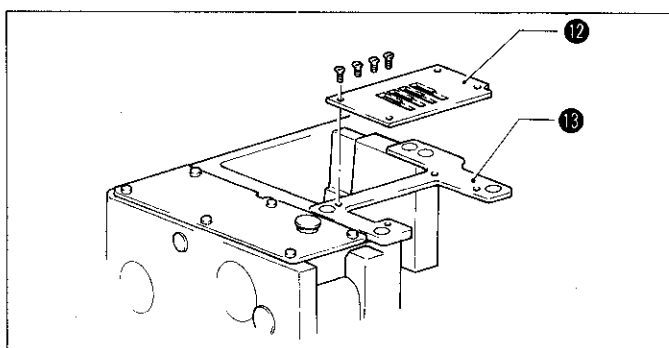
- (1) Attach the needle bearing ②, connecting rod ③ and washer ④ to the connecting rod shaft ①. Insert them as a set into the thread take-up crank ⑤. Make an adjustment so that 0.05 to 0.07 mm clearance is provided between the connecting rod shaft ① and the connecting rod ③. Securely tighten the set screws. (Tighten the set screw on the recess side first.)
- (2) Put the cap ⑥ on the arm.



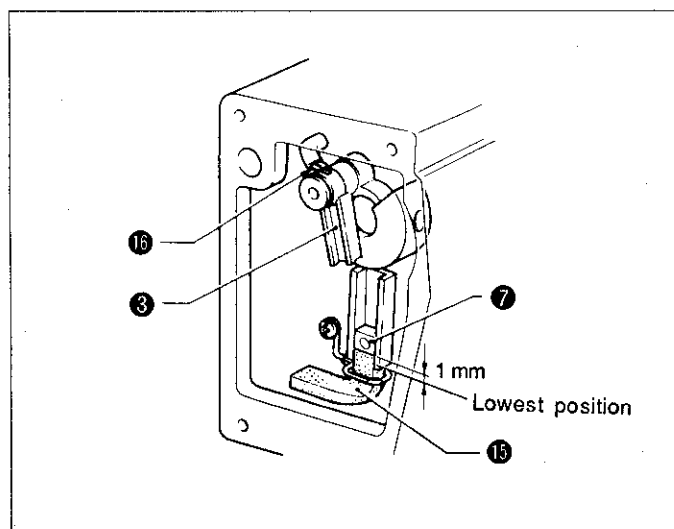
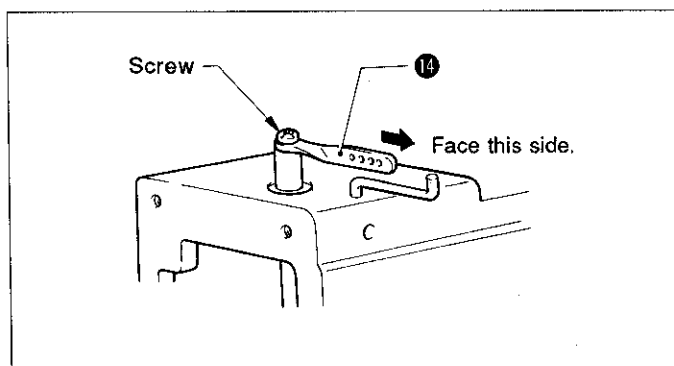
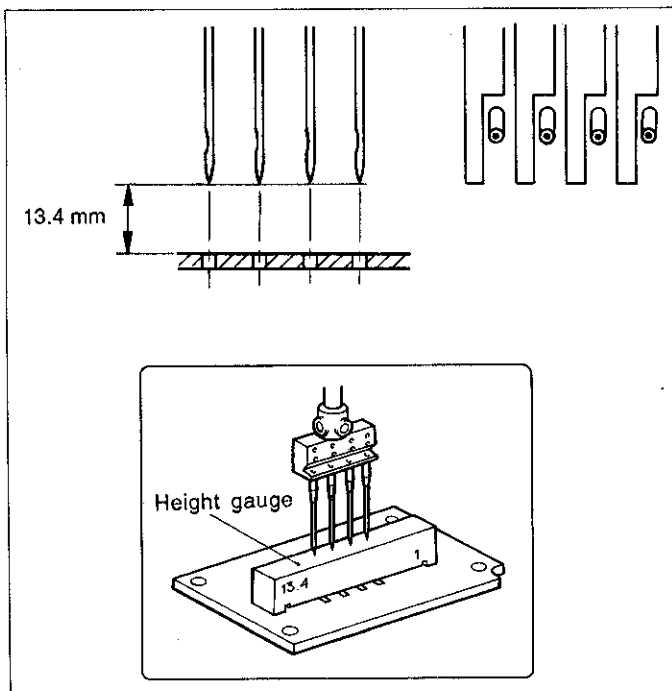
- (3) Attach the slide block ⑦ to the needle bar guide ⑧ with the slide block chamfer side positioned inside.
- (4) Attach the needle bar clamp ⑨ to the connecting rod ③ and the slide block ⑦.



- (5) Pass the needle bar ⑩ from the upper side of the arm through the needle bar clamp ⑨ and tighten it temporarily.
- (6) Attach the needle clamp ⑪ to the needle bar ⑩.



- (7) Attach the needle plate ⑫ onto the needle plate support ⑬.



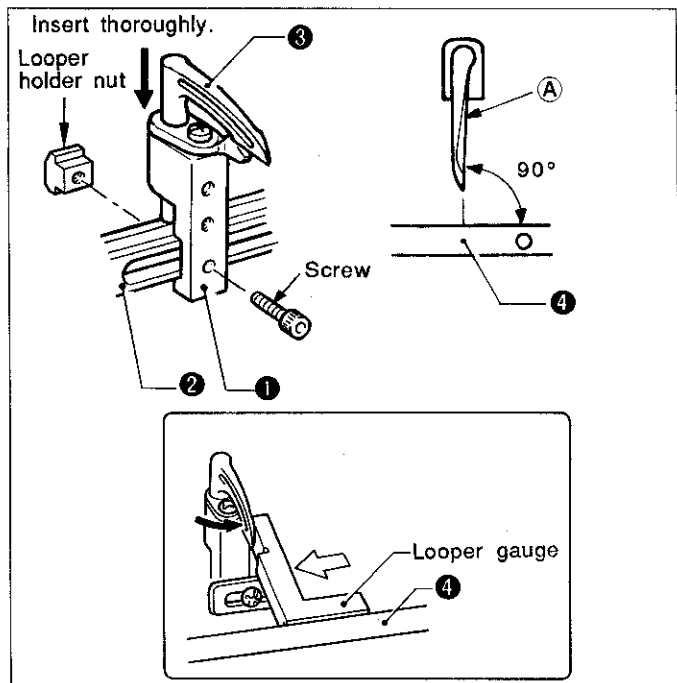
- (8) Set the needle bar ⑩ at the highest position by turning the pulley and attach the needles.
- (9) Loosen the set screw in the needle bar clamp ⑨.
- (10) Adjust the needle bar by turning it so that the needles can enter the center of the needle holes of the needle plate ⑫ .  
Adjust the distance between the needle tips and the top of needle plate to 13.4 mm when the needles are at the extreme upper position.
- (11) Securely tighten the set screw of the needle bar clamp ⑨ .

- (12) Face the needle bar take-up ⑭ toward this side.

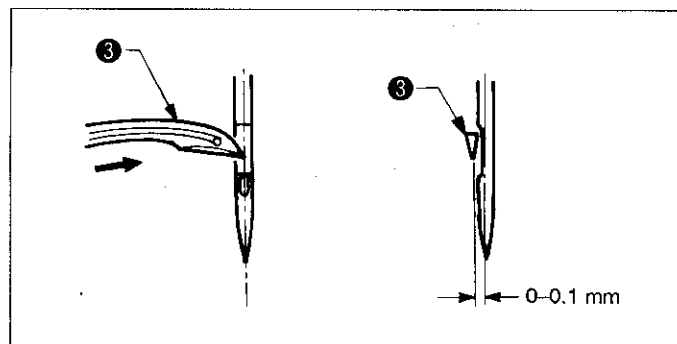
- (13) Turn the pulley and make sure if the slide block ⑦ for the needle bar guide touches the slide block felt ⑮ when the needle bar is 1 mm before its lowest position. Also check if the connecting rod ③ slightly touches the felt ⑯ ; or too heavy touch may cause oil leak and too light touch may cause seizure.

- (14) Remove the needles and needle plate.

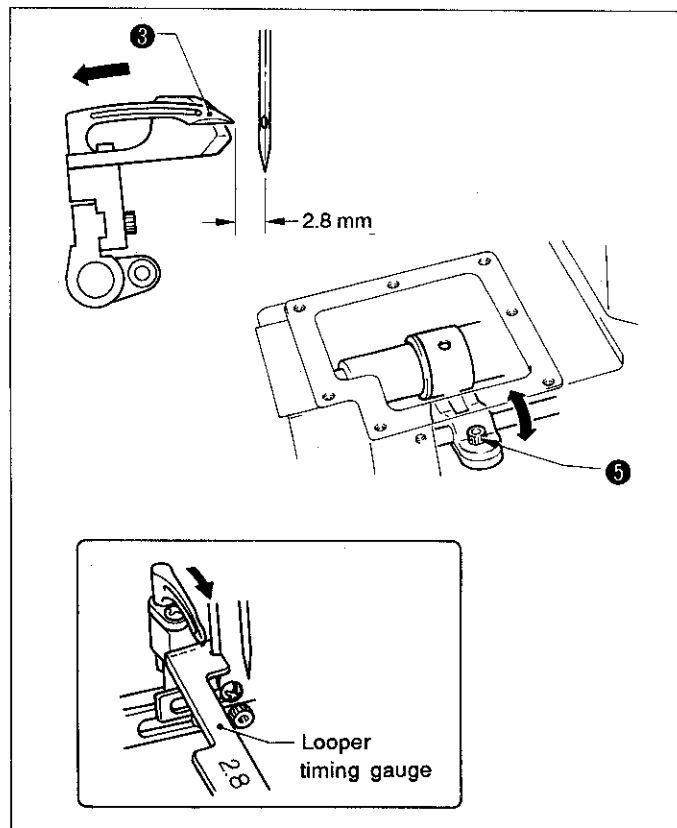
### 3 Looper and needle guard



- (1) Temporarily tighten the looper holder ① to the looper holder frame ②.
- (2) Insert the looper ③ into the looper holder ① until it comes to the stop. Locate the looper so that the side ④ is at the right angle (90°) to the retainer shaft ④. Temporarily tighten the screw.
- (3) Install the needles.

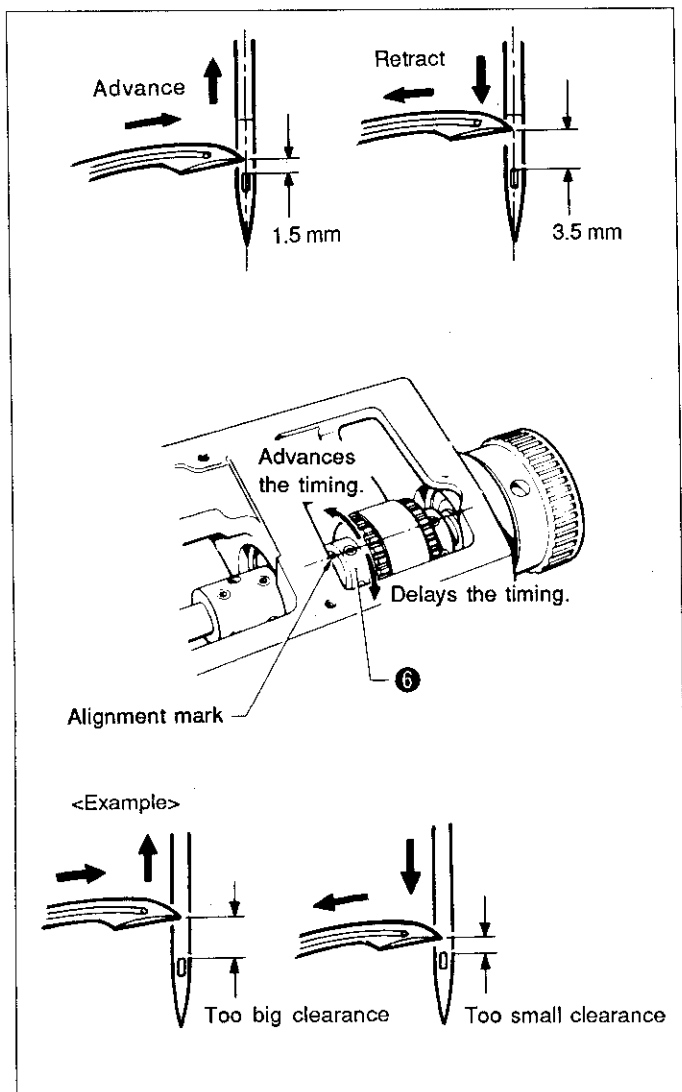


- (4) Make an adjustment by moving the looper holder ① right and left so that 0 to 0.1 mm clearance is provided between the looper and the needle when the tip of the looper ③ advances and aligns with center of the needle. After adjustment, secure the looper holder with the screw.



- (5) Turn the pulley to move the looper ③ and make sure that the 2.8 mm clearance is provided between the looper tip and the center of the needle when the looper ③ comes to the extreme rear position.

If necessary, loosen the bolt ⑤ and move the looper ③ back and forth for adjustment.

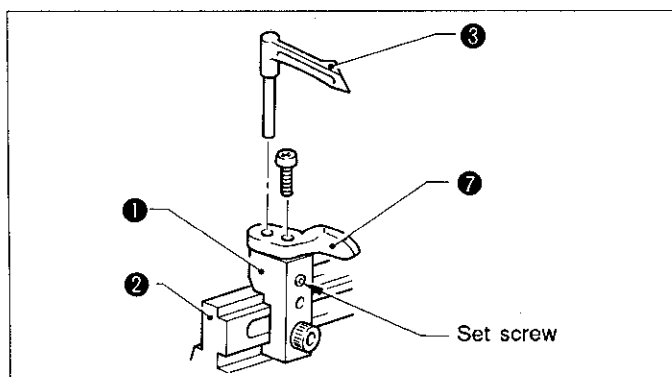


- (6) Turn the pulley to drive the looper. When the looper advances and the tip aligns with the center of the needle, 1.5 mm clearance should be provided between the looper tip and the upper edge of the needle thread hole. When the looper retracts and the tip aligns with the center of the needle, 3.5 mm clearance should be provided between the looper tip and the upper edge of the needle thread hole. If necessary, make an adjustment by loosening the four set screws of the timing pulley ⑥ and turning the timing pulley ⑥. After adjustment, tighten the set screws securely.

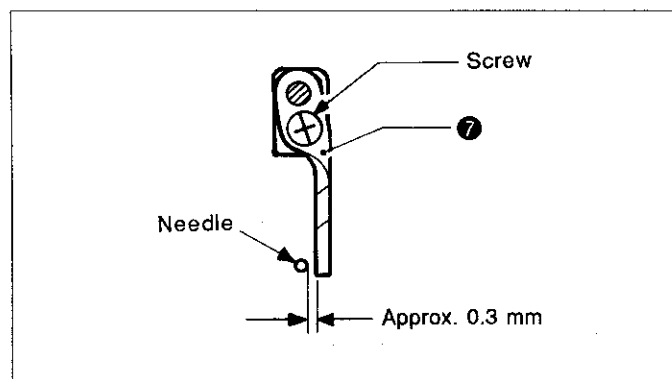
\* When the needle bar is at the lowest position and the extreme rear position of the looper is extremely out of timing, put the timing belt again.

<Example>

When the clearance is too big on looper's advancing stroke, that is the looper timing is too fast, turn the timing pulley ⑥ toward this side.

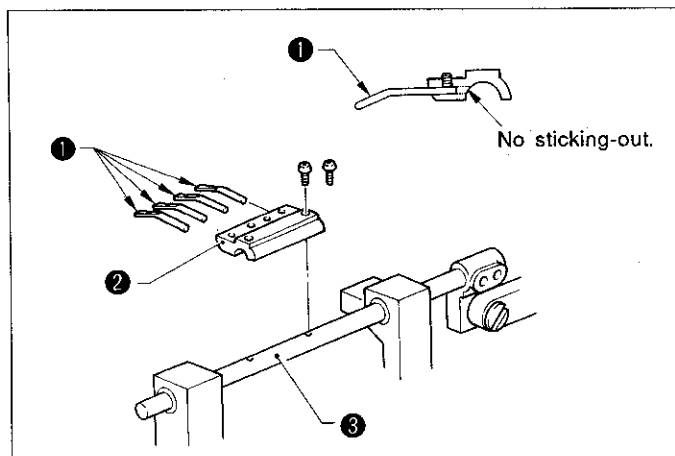


- (7) Loosen the set screw of the looper ③. Put the looper holder frame ② down this side and remove the looper ③.
- (8) Temporarily tighten the needle guard ⑦ to the looper holder ① with the screw.
- (9) Insert the looper ③ into the looper holder ①.
- (10) Raise the looper holder frame ②.

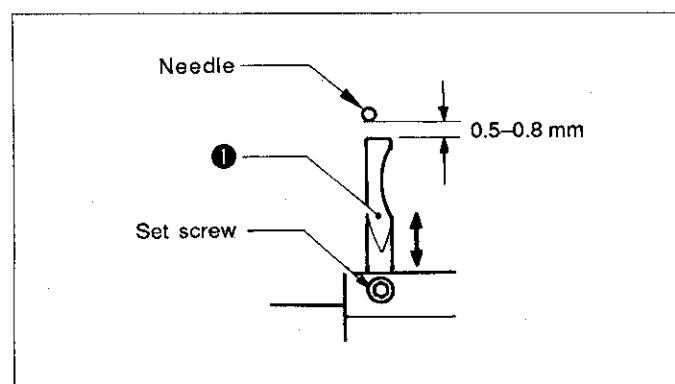


- (11) Adjust the needle guard ⑦ position so that approximately 0.3 mm clearance is provided between the needle and the needle guard when the needle bar goes up. After adjustment, secure the needle guard ⑦ with the screw.
- (12) Make an adjustment so that 0 to 0.1 mm clearance is provided between the looper tip and the needle when the looper advances.
- \*Refer to the step (4).

## 4 Retainer



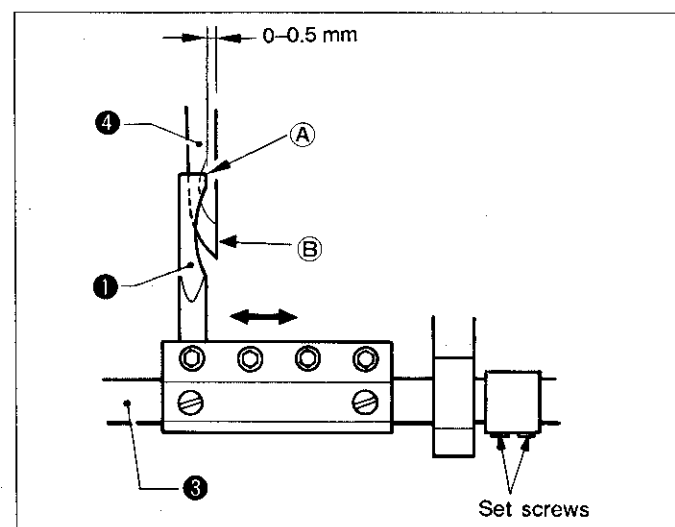
- (1) Face up the flat side of the retainers ① and temporarily tighten them to the retainer holder ②.  
\* When installing the retainers, make sure that they do not come out to the installing side of the holder shaft ③.
- (2) Install the retainer holder ② to the holder shaft ③.



- (3) Adjust the position of the retainers ① as follows:

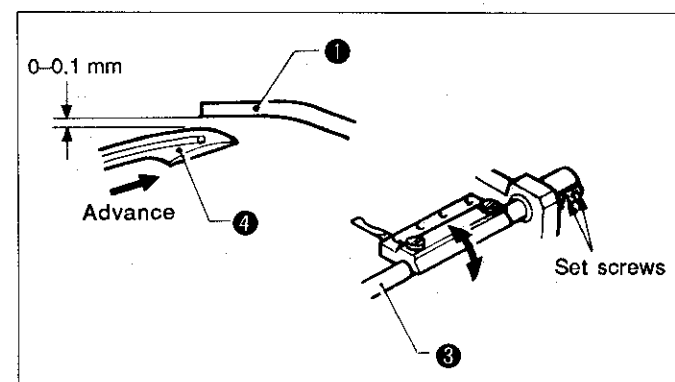
### 1. Back and forth positioning

Keep the tips of the retainers ① parallel while locating the needles at the lowest position. And pull or push the retainers ① so that 0.5 to 0.8 mm clearance is provided between the retainer tips and the needles.



### 2. Right and left positioning

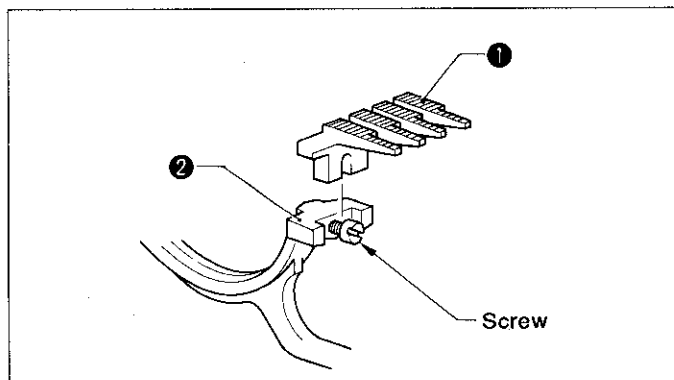
Turn the pulley to move the retainers ① to the leftmost position. Then move the holder shaft ③ right and left so that 0 to 0.5 mm distance is provided between the right side (A) of the retainer ① and the right side (B) of the loopers ④.



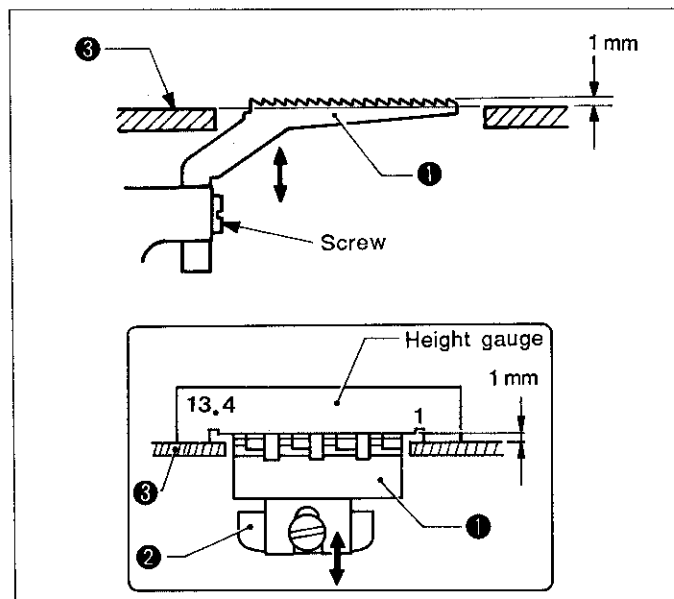
### 3. Up and down positioning

Turn the holder shaft ③ so that 0 to 0.1 mm clearance is provided between the upper side of the loopers ④ and the lower side of the retainers ① when the loopers come closest to the retainers on the looper's advancing stroke.

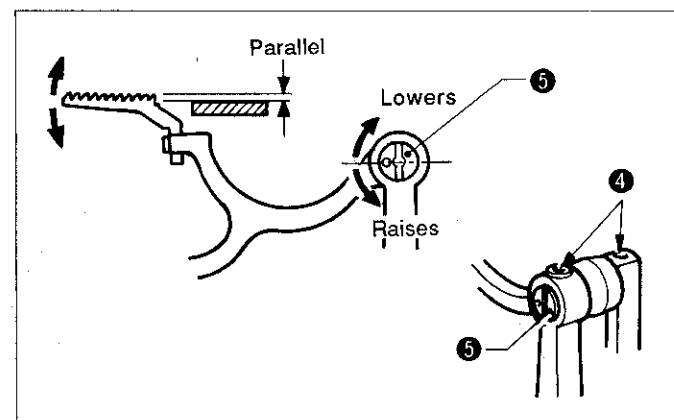
## 5 Feeding



- (1) Temporarily tighten the feed dog ① to the feed base ②.
- (2) Attach the needle plate ③.



- (3) Turn the pulley to raise the feed dog ① at the highest position. Then make an adjustment so that the feed dog ① comes out of the upper surface of the needle plate ③ by 1 mm. After adjustment, tighten the screw.

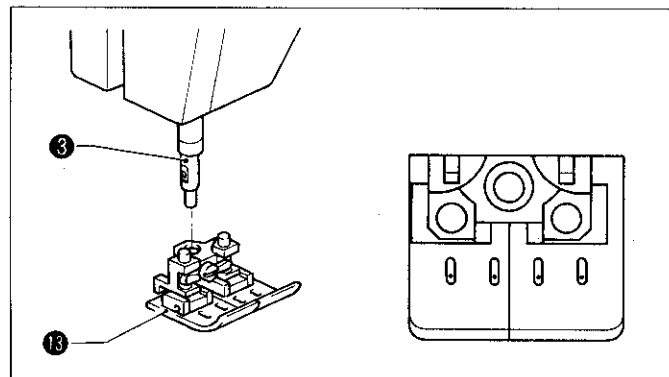
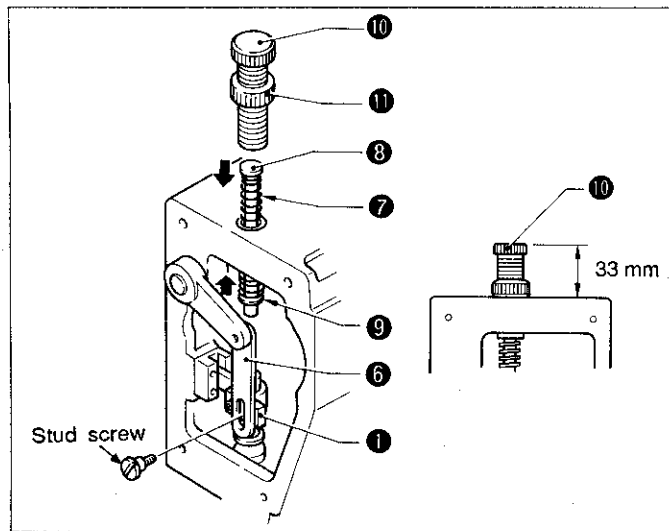
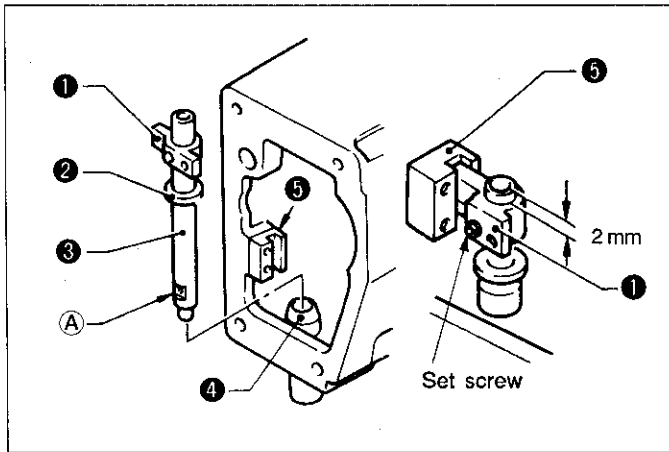


### <Feed dog gradient>

The feed dog should be parallel to the top of the needle plate. If necessary, adjust the feed dog gradient as follows:

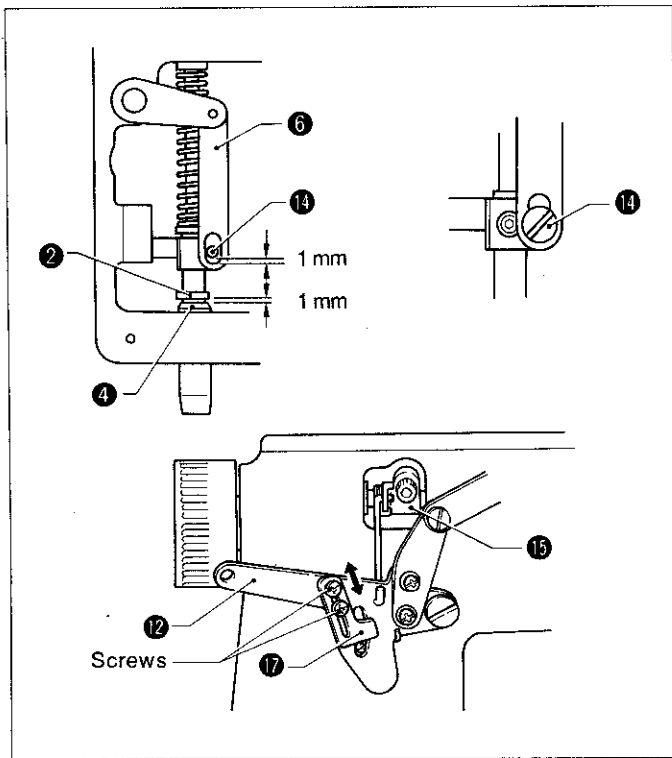
1. Loosen the screws ④.
2. Turn the feed arm shaft ⑤ clockwise to lower the front end of the feed dog. Turn it counterclockwise to raise it.
3. After adjustment, tighten the screws ④.

## 6 Presser

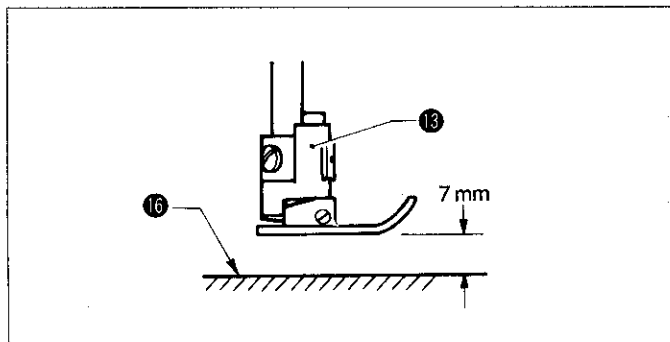


- (1) Attach the presser bar clamp ① and the packing ② to the presser bar ③. Insert them as a set into the presser bar bushing ④. Fit the presser bar clamp ① into the presser bar guide ⑤.
- (2) Face the finger guard attaching face ① of the presser bar ③ to the left. Make an adjustment until the distance between the upper surface of the presser bar and the presser bar clamp becomes 2 mm. Tighten the set screw.
- (3) Attach the presser lift plate ⑥ to the presser bar clamp ①.
- (4) Assemble the presser spring ⑦ and the presser spring guide ⑧, insert them as a set from the top of the arm, and attach the washer ⑨ to the top end of the presser spring guide ⑧. Then pass the guide into the presser bar ③.
- (5) Tighten the presser adjusting screw ⑩ until the distance between its top and the top surface of the arm becomes 33 mm. Fix it with the adjusting screw thumb nut ⑪.
- (6) Attach the presser foot ⑬ to the presser bar ③ while holding down the presser lift lever R ⑫. Make an adjustment so that the needles go through the center of the needle holes. Tighten the screw.



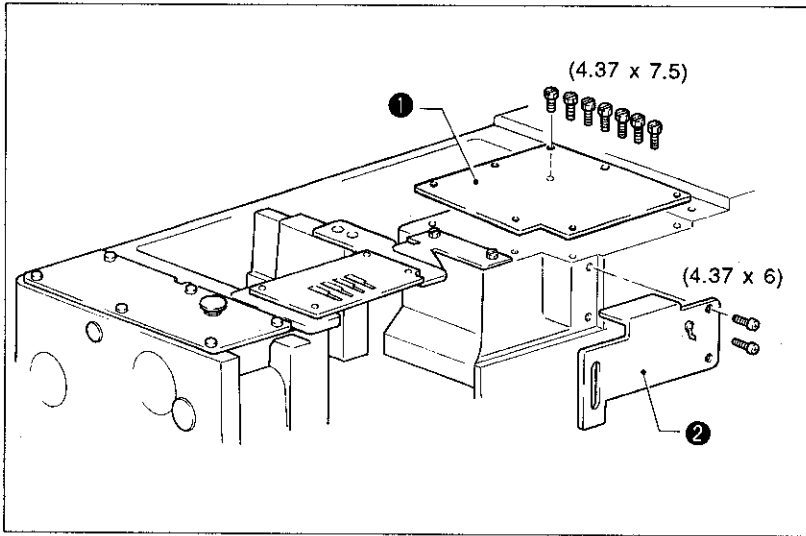


- (7) Check if 1 mm clearance is provided between the oval hole of the presser lift plate 6 and the stem part of the stud screw 14 .  
Adjust the clearance by loosening the presser lift M lever 15 .
- (8) Provide 1 mm clearance between the packing 2 and the top of the presser bar bushing 4 with the presser foot down on the needle plate.

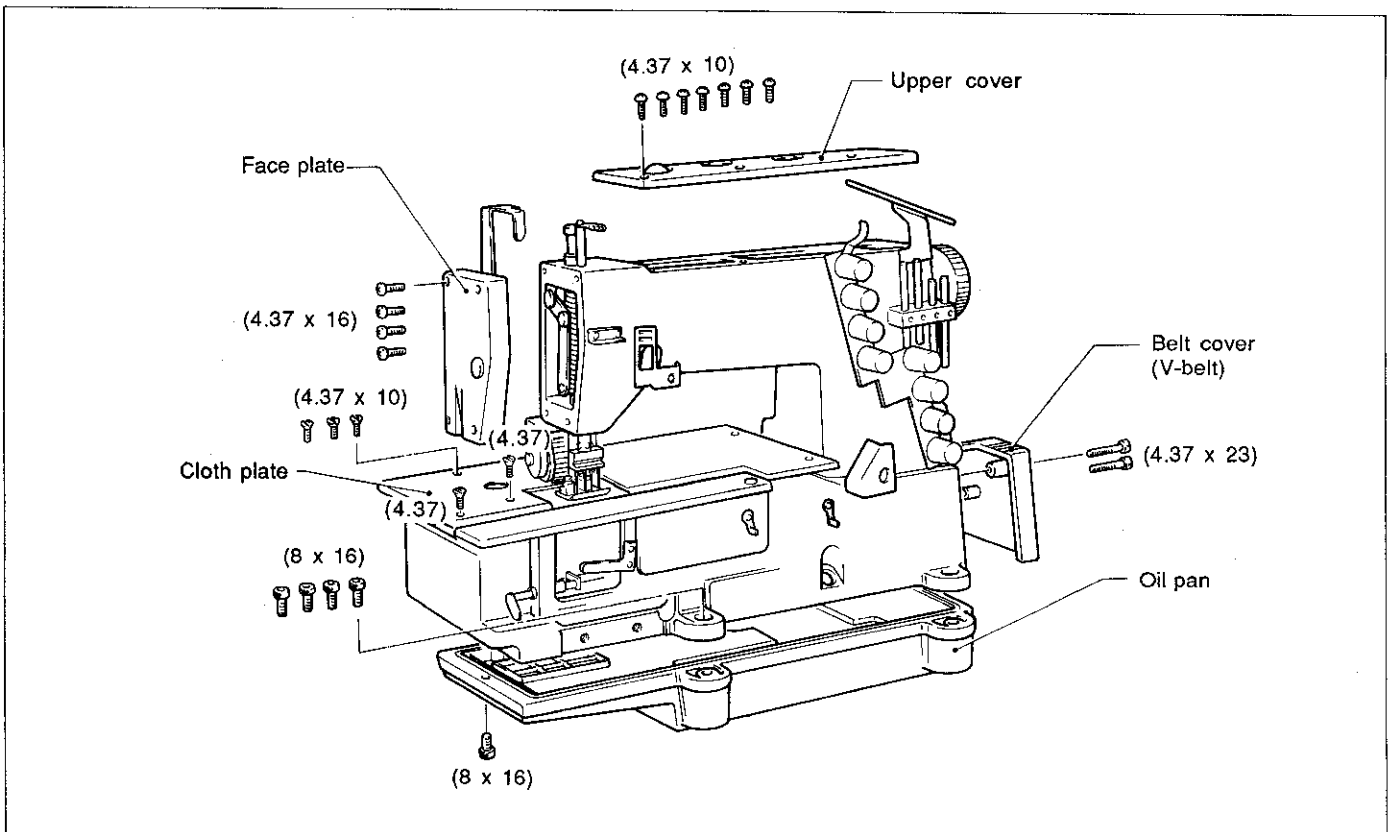


- (9) Push down the the presser lift lever R 12 and make sure that 7 mm clearance is provided between the bottom of the presser foot 15 and the top of the needle plate (16). If necessary, adjust the presser foot lift stroke with the presser foot stopper 17 and tighten the screws.

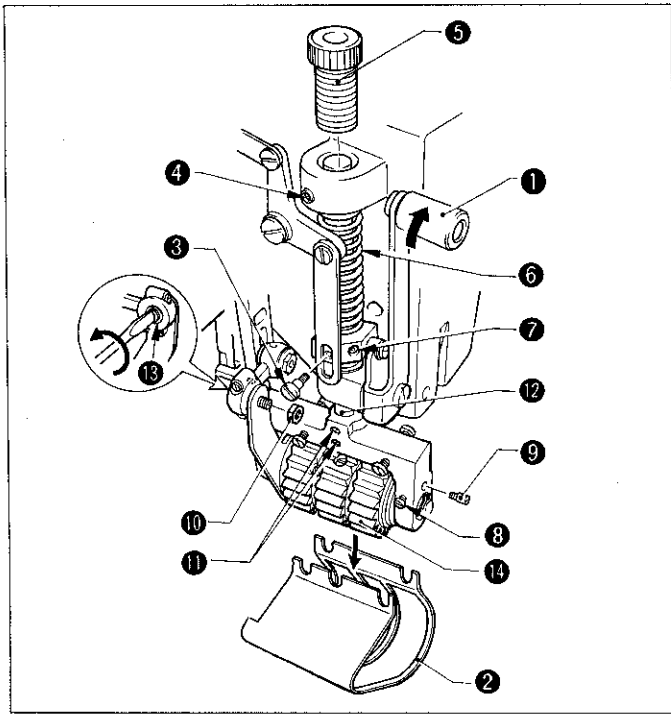
**7** Cover



- (1) Attach the upper bed cover ① and the retainer arm cover ②.
- (2) Install the parts shown below.

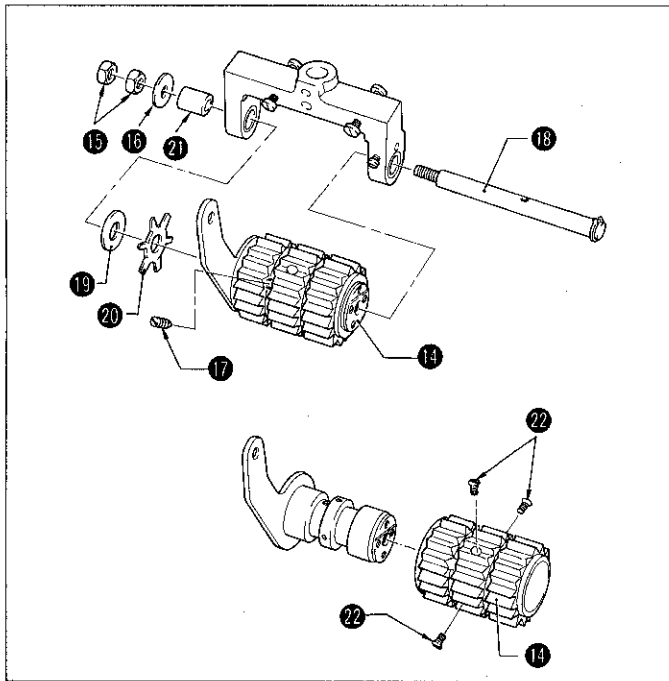


## [F] How to Change the Roller



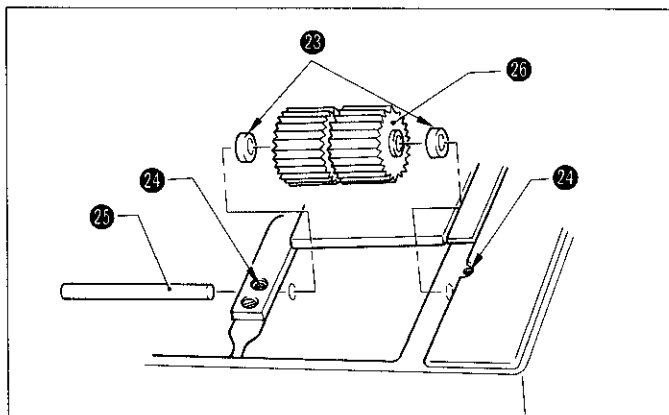
### 1. Disassembly

- (1) Raise the handle ① and remove the cloth plate.
- (2) Remove the puller guard ②.
- (3) Remove the stud screw ③.
- (4) Loosen the set screw ④ and remove the puller adjusting screw ⑤.
- (5) Remove the puller presser spring ⑥.
- (6) Loosen the set screw ⑦ of the puller presser bar clamp.
- (7) Loosen the set screw ⑧ and remove the stud screw ⑨.
- (8) Remove the nut ⑩.
- (9) Loosen the set screws ⑪ and pull out the puller presser bar ⑫. Then the puller presser bar clamp will come off.
- (10) Loosen the puller connecting rod coupling ⑬ and remove the roller ⑭.

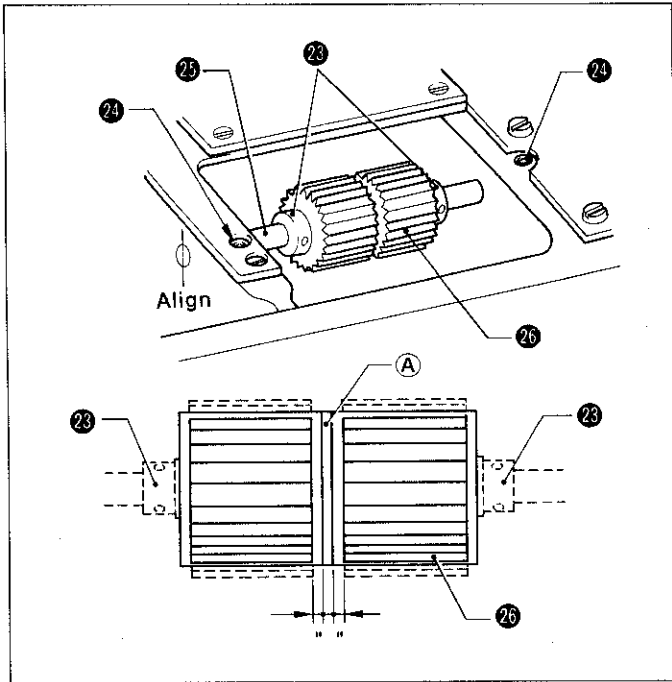


- (11) Remove the nuts ⑮ and the washer ⑯.
- (12) Remove the set screw ⑰ and pull out the puller shaft ⑱.  
The washer ⑲, star spring ⑳, roller bush ㉑, and roller ⑭ will come off.

- (13) Remove the flat head screw ㉒ and detach the roller ⑭.

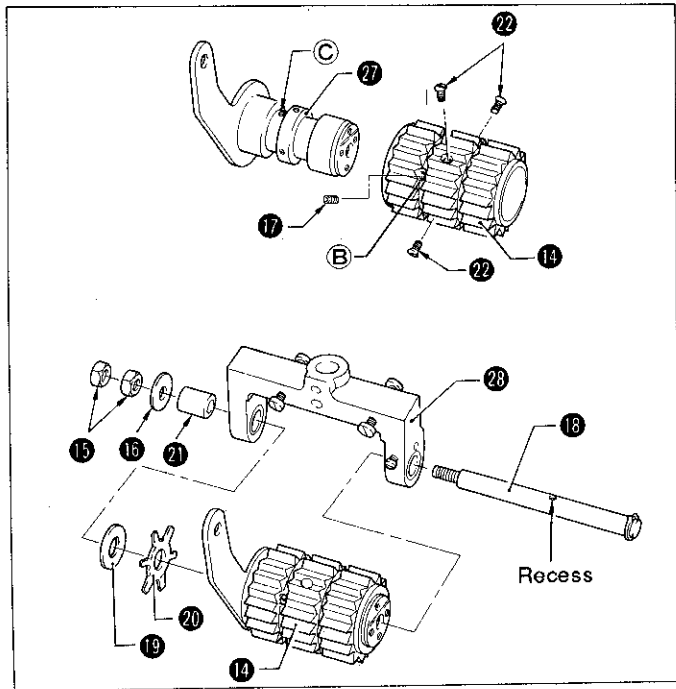


- (14) Loosen the set collars ㉓.
- (15) Loosen the set screws ㉔ and pull out the lower roller shaft ㉕.  
The set collars ㉓ and roller D ㉖ will come off.



## 2. Assembly

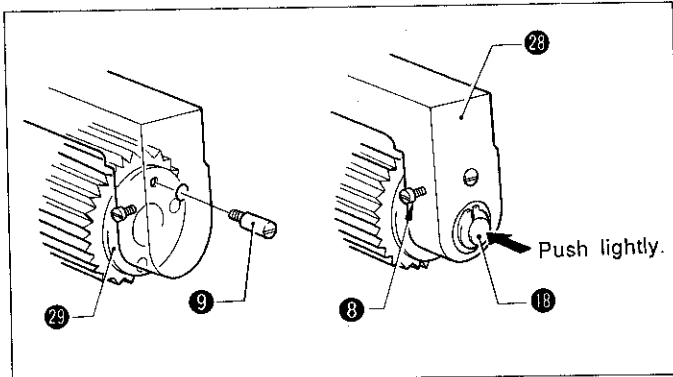
- (1) Insert the lower roller shaft 25 into the frame and let the shaft through the set collar 23, roller D 26, and set collar 23. After aligning the end of the lower roller shaft 25 with the frame, tighten with the set screws 24.
- (2) Temporarily tighten the cloth plate.
- (3) Move the roller D 26 so that the shaft part A of the cloth plate comes to the center of the groove of the roller D 26. Then remove the cloth plate.
- (4) Secure the set collars 23 so that the roller D 26 does not move along the shaft. Be careful not to move the roller D 26 while fixing it.



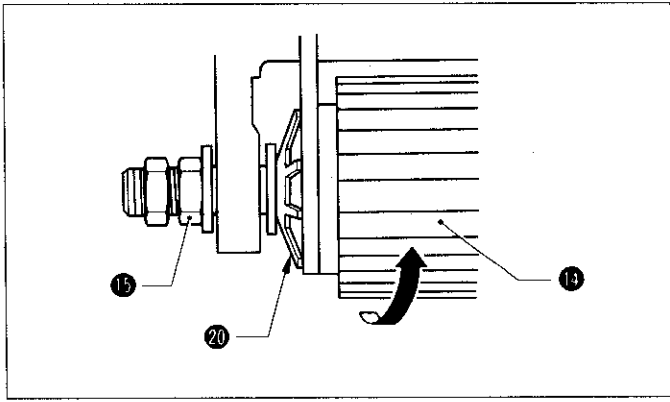
- (5) Install the roller 14 to the puller clutch 27 and align the hole B with the hole C. Then tighten the flat head screw 22.

- (6) Insert the puller shaft 18 into the puller frame 28 and let it through the roller 14, star spring 20, washer 19, roller bush 21, an washer 16 in this order. Attach the nuts 15 but do not tighten them at this step.

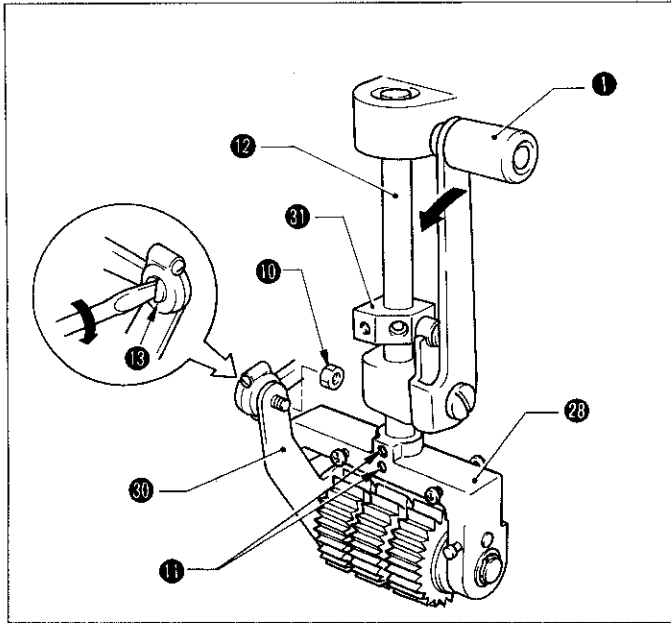
- (7) Align the recess of the puller shaft 18 with the hole C of the puller clutch 27 and tighten the set screw 17.



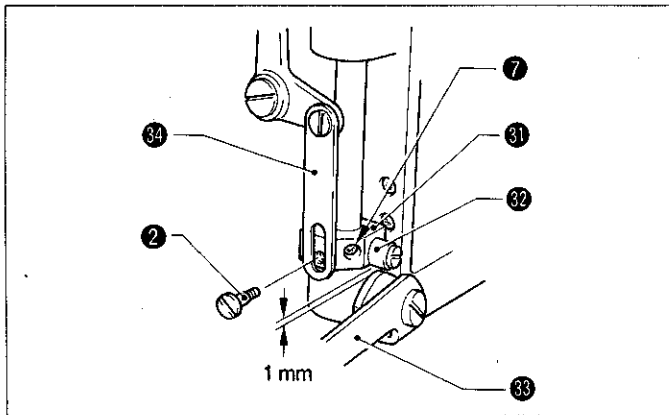
- (8) Tighten the stud screw 9 to the clutch plate 29.
- (9) Lightly push the puller shaft 18 to the puller frame 28 and lightly tighten the set screw 8.



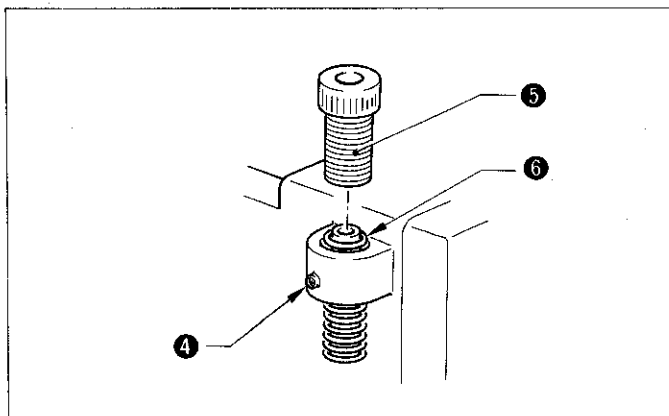
- (10) Adjust the roller ⑭ to 30 kg-cm. To make an adjustment, tighten the nut ⑮ little by little to apply pressure to the star spring ⑳, and turn the roller ⑭ in the cloth feed direction to check the roller weight.



- (11) Tighten the puller connecting rod coupling ⑬ to the clutch lever ⑳, and secure the nut ⑩ .  
 (12) Put the handle ① down.  
 (13) Insert the puller presser bar ⑫ into the frame and let it through puller presser bar clamp ③① into the puller frame ②⑧ . Tighten the set screw ⑪ at the screw recess.

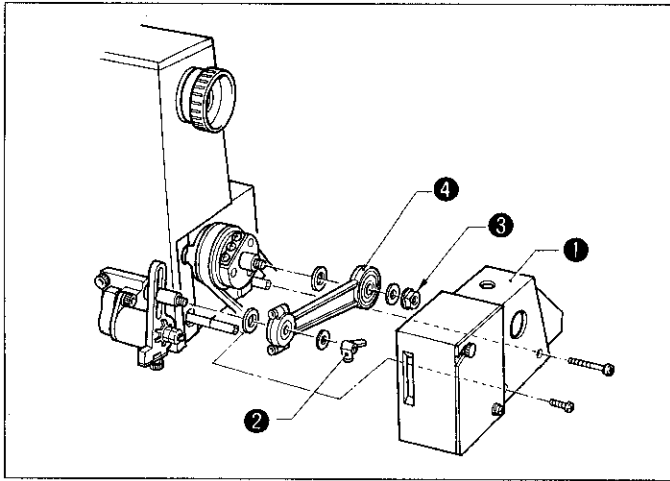


- (14) Adjust the position of the puller presser bar clamp ③① so that 1 mm clearance is provided between the roller ③② and the puller lift lever ③③ . After adjustment, tighten the set screw ⑦ .  
 (15) Install the puller lift plate ③④ to the puller presser bar clamp ③① with the stud screw ② .



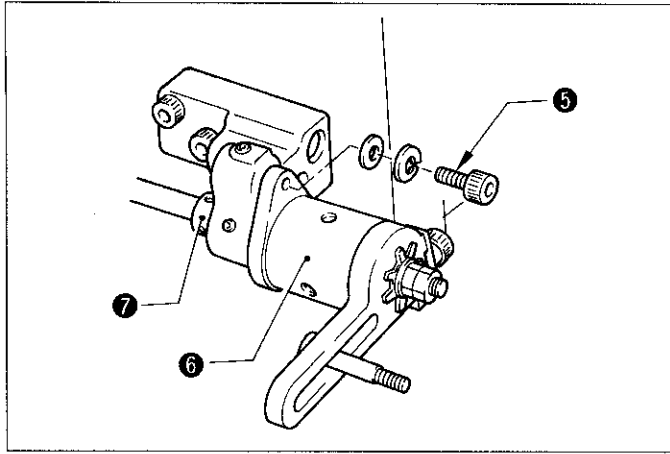
- (16) Install the puller presser spring ⑥ and the adjusting screw ⑤ to apply an appropriate pressure to the roller, and lightly tighten the set screw ④ .  
 (17) Turn up the handle, and install the puller guard and the cloth plate.

## [G] Disassembly and Assembly of the Bottom Metering Device

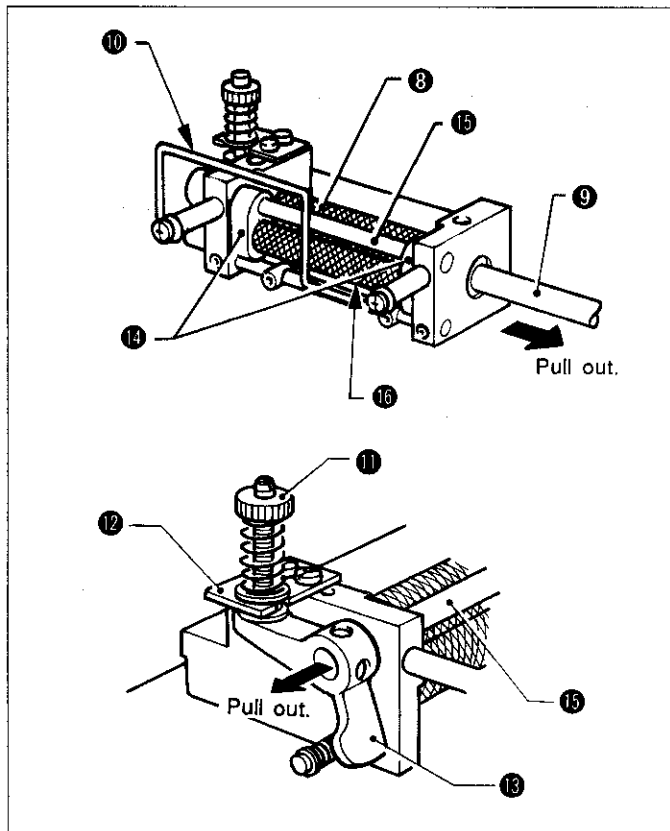


### 1. Disassembly

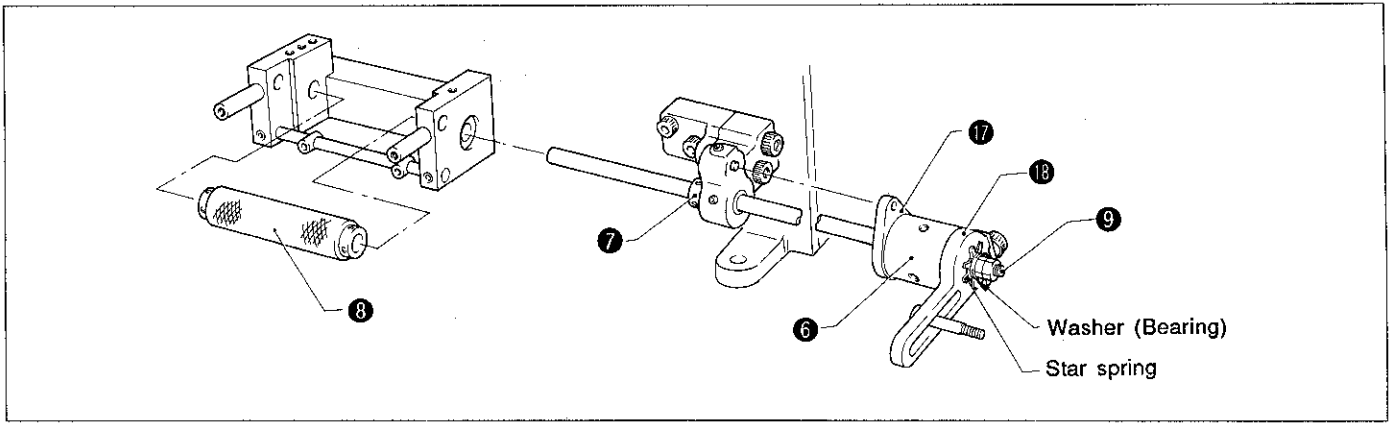
- (1) Remove the belt cover ①.
- (2) Remove the wing nut ② and the washer based nut ③, and detach the bottom metering rod ④.



- (3) Remove the bolt ⑤.
- (4) Loosen the two set screws of the clutch assembly ⑥.
- (5) Loosen the two set screws of the set collar ⑦.

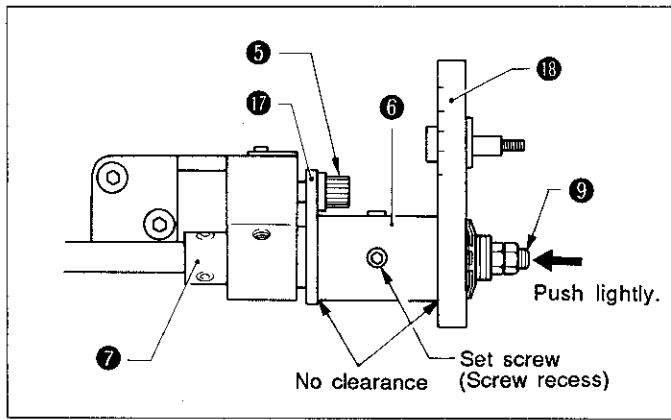


- (6) Loosen the four set screws of the rubber feed roller ⑧ and pull out the bottom metering shaft ⑨.
- (7) Remove the rubber guide U ⑩.
- (8) Loosen the tension nut ⑪ and remove the stop plate ⑫.
- (9) Remove the roller lift lever ⑬.
- (10) Loosen the set screws of the tension roller support ⑭.
- (11) Pull out the tension roller shaft ⑮ and remove the tension roller support ⑭ and tension roller ⑯.  
(Be careful not to take away the washers provided on both sides of the tension roller support ⑭.)

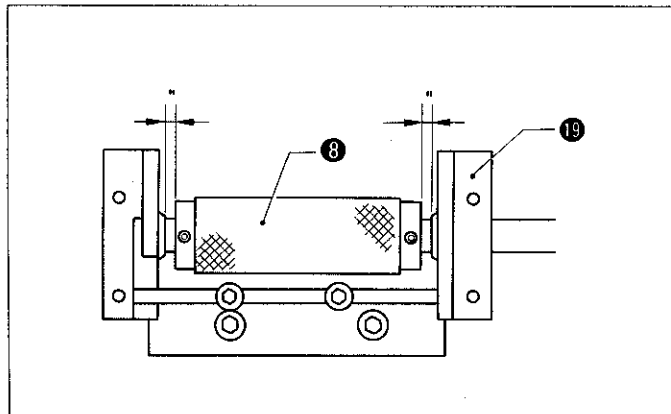


**2. Assembly**

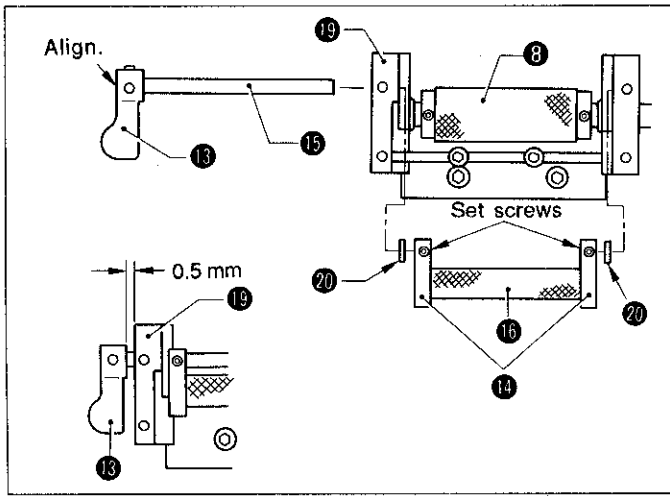
- (1) Attach the clutch assembly 6 (clutch cover 17 and rubber feed lever 18) to the bottom metering shaft 9.
- (2) Insert the bottom metering shaft 9 through the frame. Let it through the set collar 7 and rubber feed roller 8.



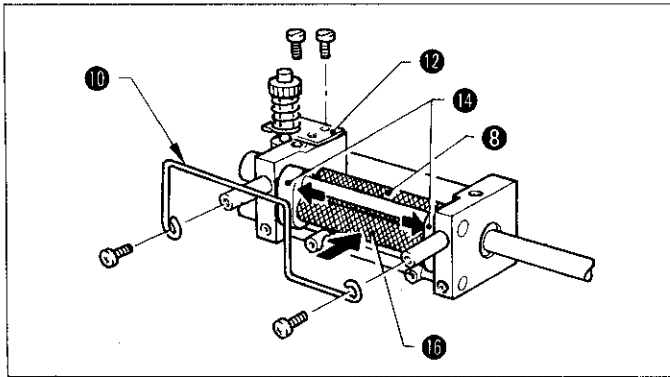
- (3) Lightly push the bottom metering shaft 9 and tighten the set screw of the clutch 6.  
(Be sure to tighten the set screw at the screw recess. Refer to the left figure.)  
Sandwich the clutch 6 between the clutch cover 17 and rubber feed lever 18, allowing no clearance.
- (4) Tighten the set collar 7 with the set screw, not allowing play along the shaft.
- (5) Tighten the bolt 5.



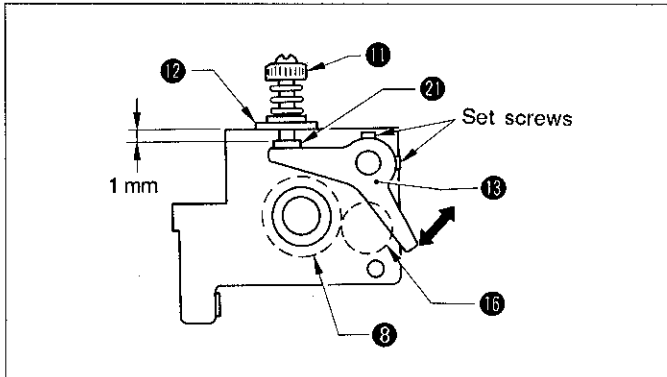
- (6) Provide equal clearances on both sides between the rubber feed roller 8 and the rubber feed base 19, and tighten the set screws.



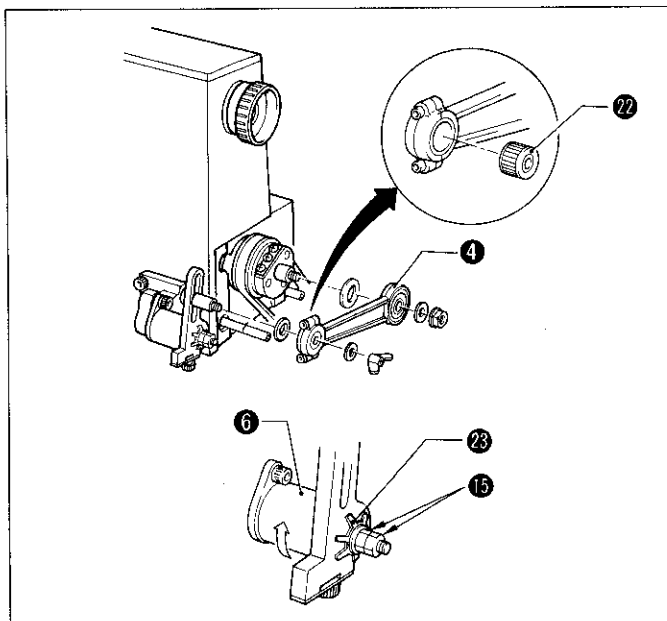
- (7) Align the end faces of the roller lift lever 13 and tension roller shaft 15. Tighten the set screw temporarily.
- (8) Insert the tension roller shaft 15 through rubber feed base 19, washer 20, tension roller support 14 and again washer 20. (Assemble the tension roller support 14 and the tension roller 16 beforehand.) Provide 0.5 mm clearance between the roller lift lever 13 and the rubber feed base 19.



- (9) Lightly push the tension roller 16 against the rubber feed roller 8 and check that no clearance is provided between the two rollers. And check no play while moving the tension roller support 14 right and left along the shaft. Then tighten the set screws. (Make sure that the tension roller 16 turns smoothly when it is lifted apart from the rubber feed roller 8.)
- (10) Install the stop plate 12 and rubber guide U 10.



- (11) Keep pushing the tension roller 16 against the rubber feed roller 8, and adjust the roller lift lever 13 loosening the set screws so that 1 mm clearance is provided between the collar of the tension rod 21 and the stop plate 12. Tighten the set screws after adjustment. (Make an adjustment with the tension nut 11 if uneven sewing takes place at high speed and low speed.)

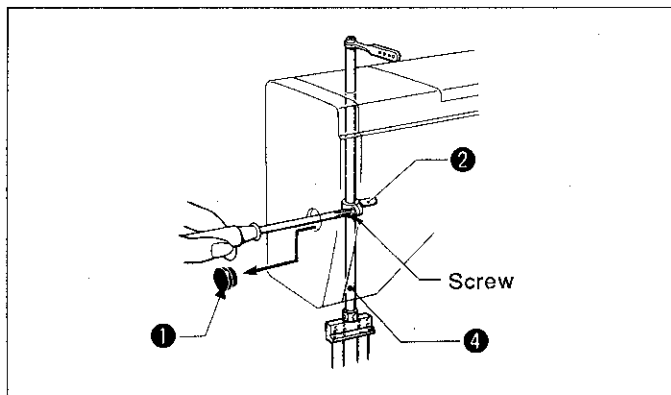


- (12) Install the bottom metering rod 4.  
\* Apply a little grease to the needle bearing 22.
- (13) Loosen the outer nut 15.
- (14) Turn the clutch assembly 6 by hand and make it heavy (8 – 10 kg·cm) by tightening the inner nut 15 and applying pressure to the star spring 23. After adjustment, tighten the outer nut 15. (In case of overrun, it can be corrected by applying pressure to the star spring 23. But be careful not to apply much load to the bottom metering rod 4.)
- (15) Install the belt cover.

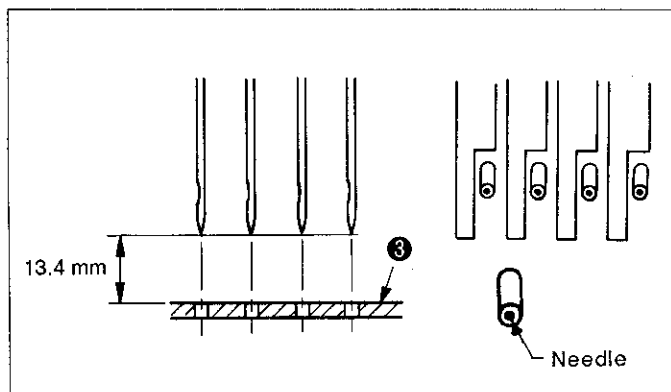


## [H] Standard Adjustment

### [1] Needle bar height

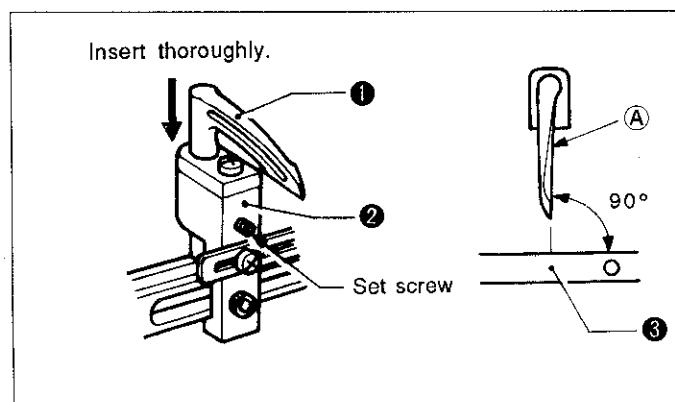


- (1) Remove the plug ① from the face plate and loosen the needle bar clamp ② for adjustment described at the next step.

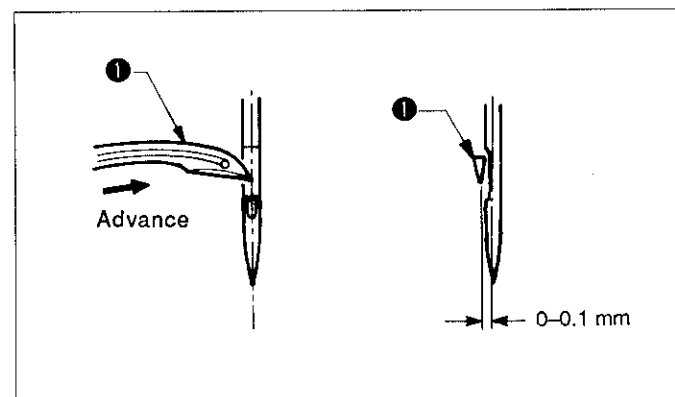


- (2) Turn the pulley to raise the needles to the highest position. And move the needle bar ④ up and down so that 13.4 mm clearance is provided between the needle tips and the top of the needle plate ③ with the needles located at the highest position. At the same time, turn the needle bar so that the needles come to the center of the needle holes of the needle plate.

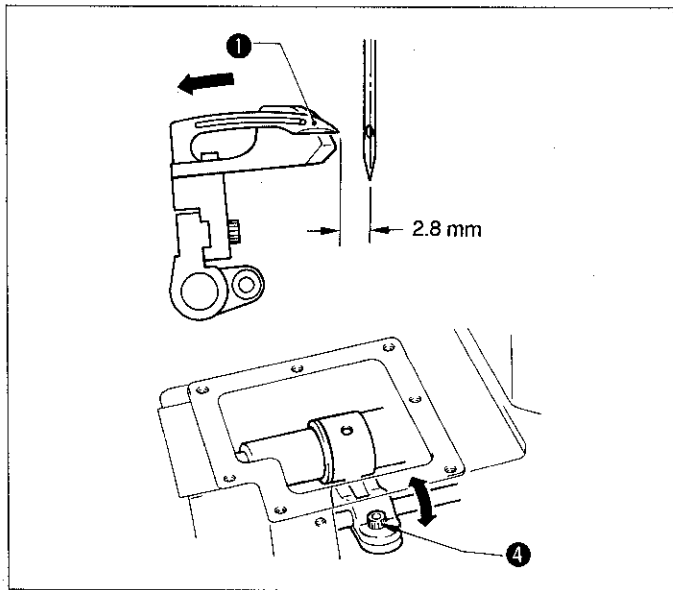
### [2] Installation position of looper



1. **Looper gradient**  
Insert the looper ① into the looper holder ② until it comes to the stop. Locate the looper so that the side ① (A) is at the right angle (90°) to the retainer holder shaft ③ and tighten the screw.



2. **Clearance between needle and looper**  
Make an adjustment by moving the looper holder ② right and left so that 0 to 0.1 mm clearance is provided between the looper and the needle when the tip of the looper ① advances and aligns with center of the needle.

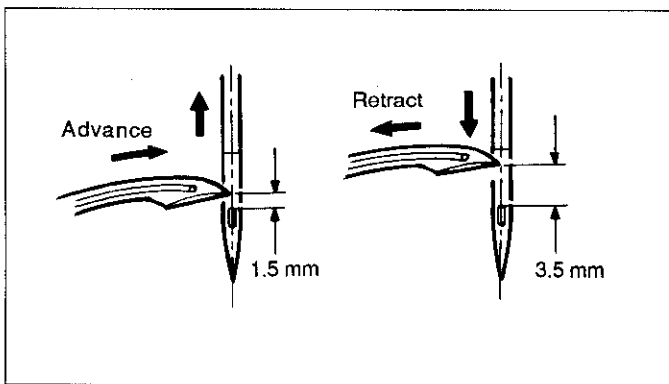


### 3. Looper stroke

Turn the pulley to move the looper ① to the extreme rear position. While keeping the looper at the extreme rear position, loosen the bolt ④ and move the looper back and forth so that the 2.8 mm clearance is provided between the looper tip and the center of the needle.

\* Remove the cloth plate and bed upper cover when adjusting the looper stroke.

### 3 Needle and looper timing

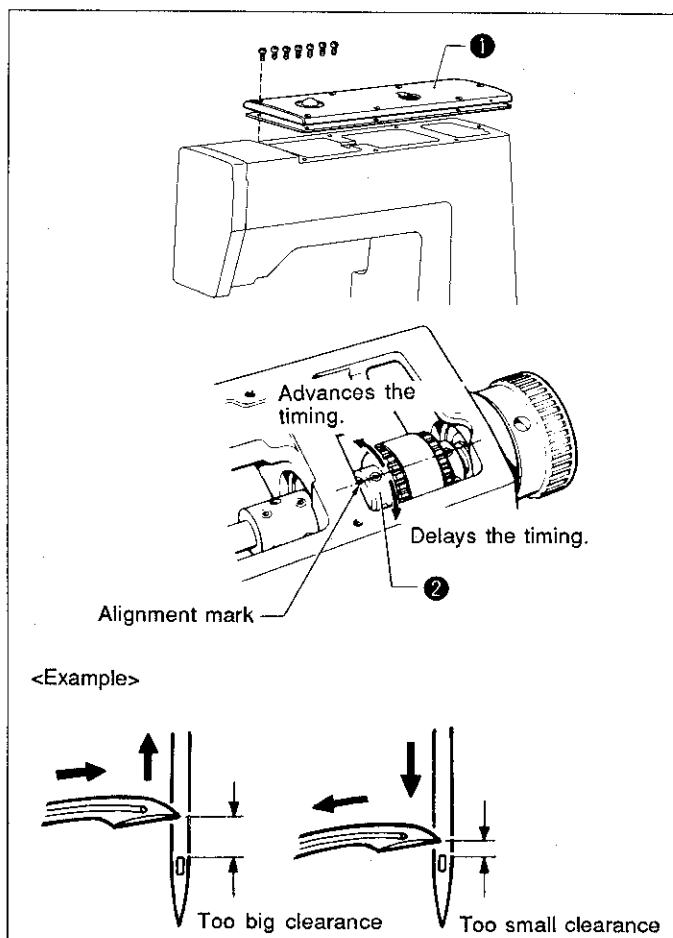


- (1) When the looper advances and the tip aligns with the center of the needle, 1.5 mm clearance should be provided between the looper tip and the upper edge of the needle thread hole. When the looper retracts and the tip aligns with the center of the needle, 3.5 mm clearance should be provided between the looper tip and the upper edge of the needle thread hole.

- (2) If the timing of the needle and looper is bad, make an adjustment as follows:

<Adjustment procedure>

1. Remove the upper cover ①.
2. Loosen the four set screws of the timing pulley ② and make an adjustment by turning it.



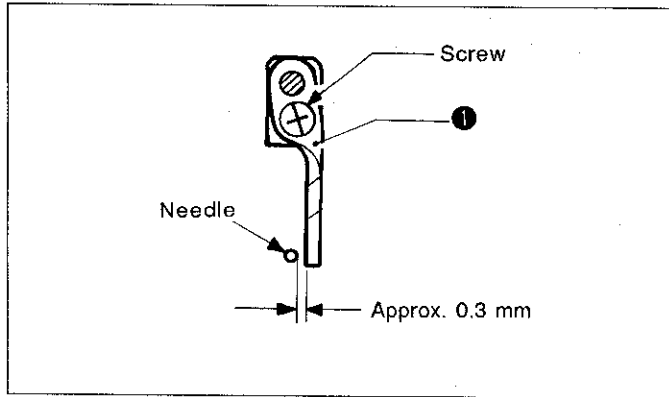
<Adjustment procedure>

1. Remove the upper cover ①.
2. Loosen the four set screws of the timing pulley ② and make an adjustment by turning it.

<Example>

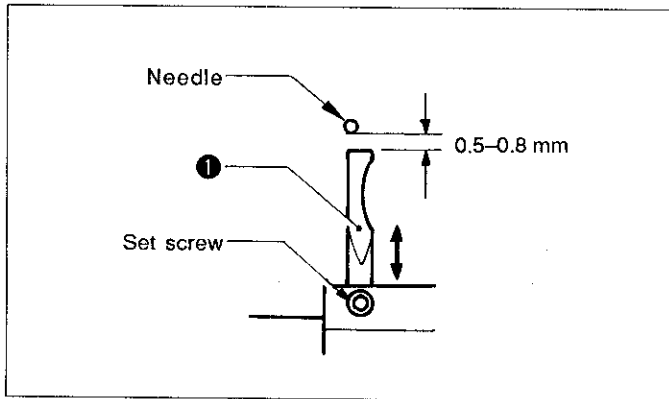
When the clearance is bigger than specified on looper's advancing stroke, that is the looper timing is fast, turn the timing pulley ② toward this side.

#### 4 Clearance between needle and needle guard



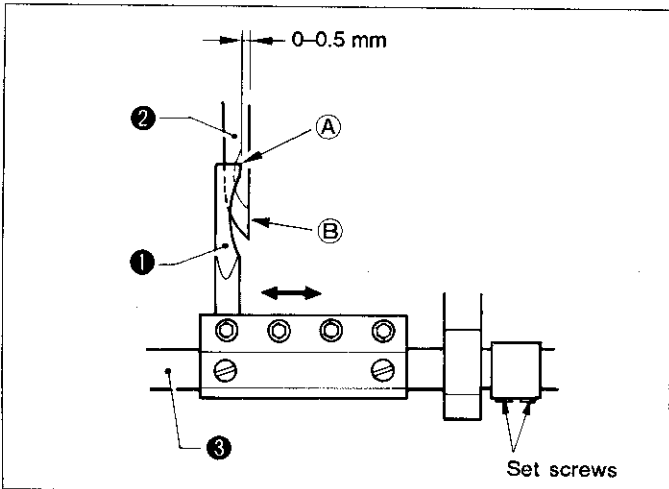
Adjust the needle guard ① position so that approximately 0.3 mm clearance is provided between the needle and the needle guard when the needle bar goes up.

#### 5 Installation position of retainer



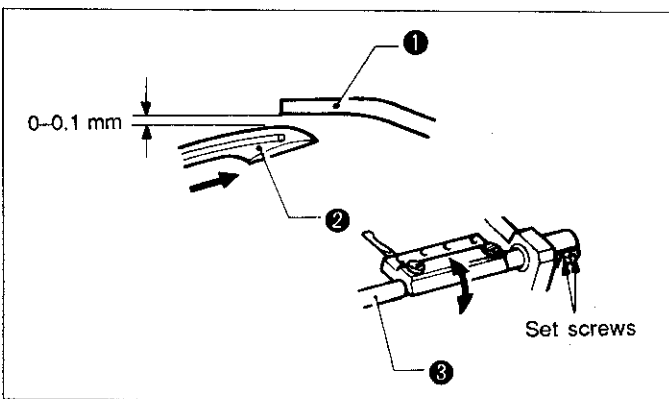
##### 1. Back and forth positioning

Keep the tips of the retainers ① parallel while locating the needles at the lowest position. And pull or push the retainers ① so that 0.5 to 0.8 mm clearance is provided between the retainer tips and the needles.



##### 2. Right and left positioning

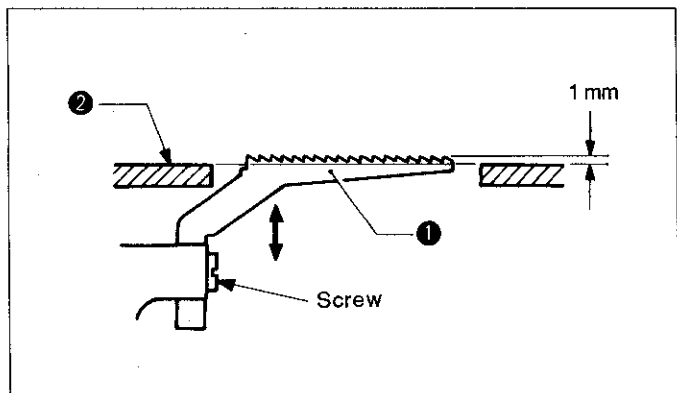
Turn the pulley to move the retainers ① to the leftmost position. Then move the retainer holder shaft ③ right and left so that 0 to 0.5 mm distance is provided between the right side A of the retainer and the right side B of the loopers ②.



##### 3. Up and down positioning

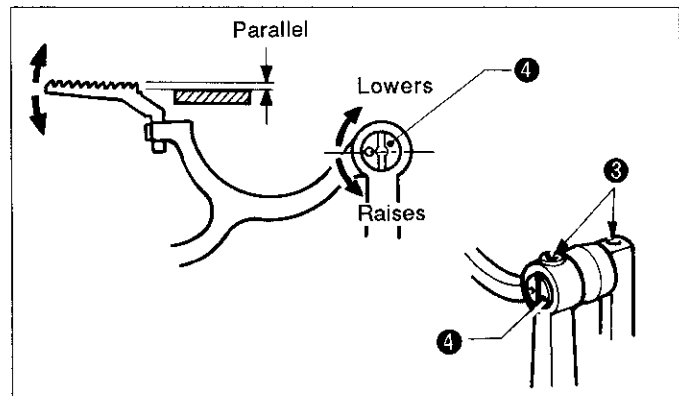
Turn the retainer holder shaft ③ so that 0 to 0.1 mm clearance is provided between the upper side of the loopers ② and the lower side of the retainers ① when the loopers come closest to the retainers on the looper's advancing stroke.

## 6 Installation position of feed dog



### 1. Feed dog height

Make an adjustment so that the feed dog ① comes out of the upper surface of the needle plate ② by 1 mm when the feed dog is raised to the highest position by turning the pulley.

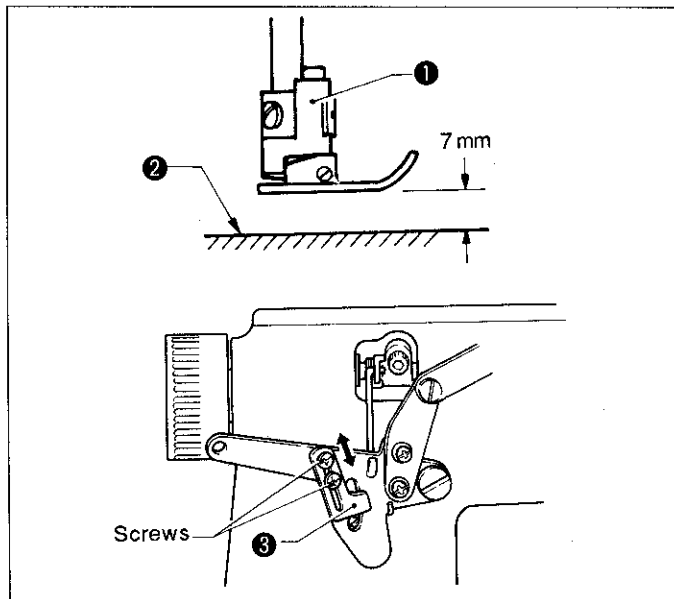


### 2. Feed dog gradient

The feed dog should be parallel to the top of the needle plate. If necessary, adjust the feed dog gradient as follows:

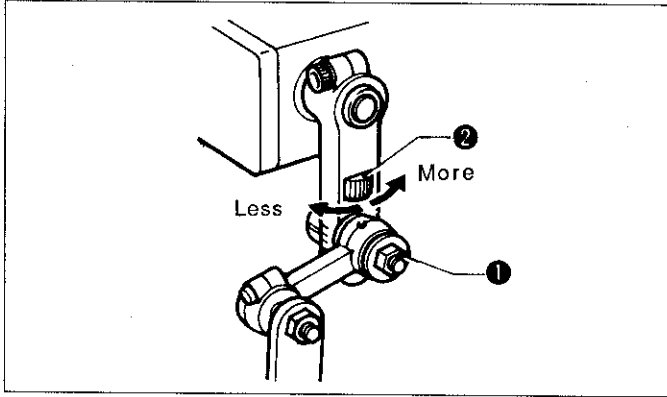
1. Loosen the screws ③.
2. Turn the feed arm shaft ④ clockwise to lower the front end of the feed dog. Turn it counterclockwise to raise it.
3. After adjustment, tighten the screws ③.  
\* Remove the cloth plate when adjusting the feed dog gradient.

## 7 Presser foot lift stroke

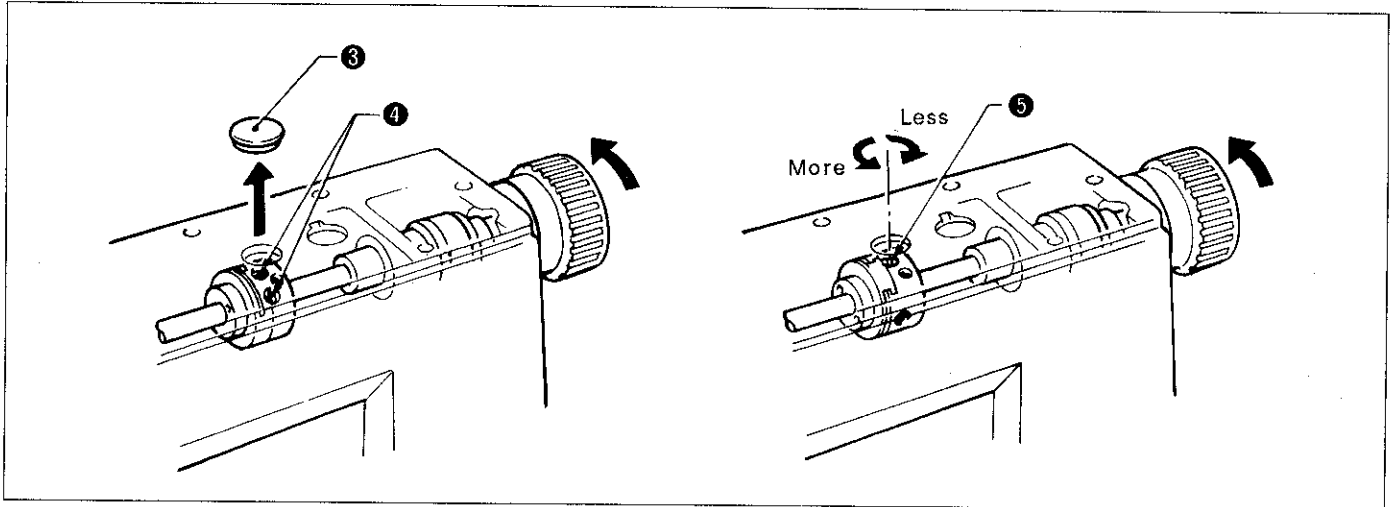


Adjust the clearance between the bottom of the presser foot ① and the top of the needle plate ② with the presser foot stopper ③. The clearance should be 7 mm when the pedal is stepped down and the presser foot ① is raised up.

## 8 Roller feed amount



Adjust the roller feed finely by loosening the nut ① and turning the knob ②.



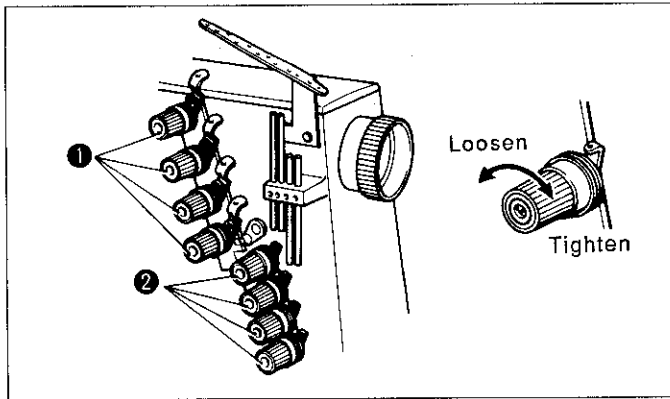
◎ Follow the next steps to adjust the roller feed to more extent:

- (1) Remove the cap ③.
- (2) Turn the pulley to locate the two screws ④ upward and loosen them.
- (3) Turn the pulley to locate the adjusting screw ⑤ upward and turning it counterclockwise.
- (4) Tighten the screws ④ after adjustment.
- (5) Loosen the adjusting screw ⑤ a little to provide a little play.

## 9 Thread tension

An appropriate thread tension varies according to the kind of cloth and thread, needle gauge, and stitch length. Adjust as follows to match the sewing conditions.

### 1. Adjustment of thread tension nuts



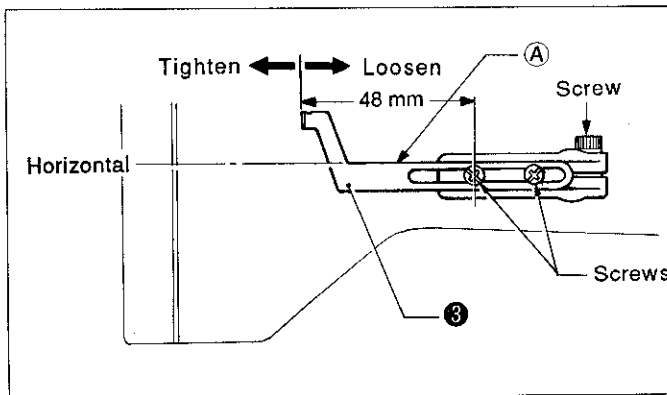
Adjust the tightness of stitches with the thread tension nuts ① and ②.

Turning the nuts clockwise increases the tightness of stitches. Turning the nuts counterclockwise decreases the tightness of stitches.

Nuts ① ... For needle thread

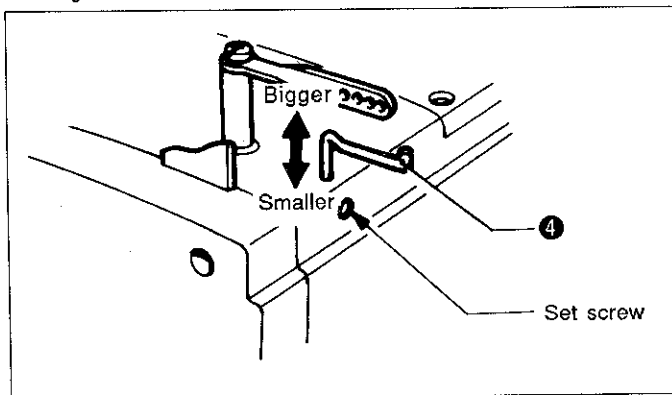
Nuts ② ... For looper thread

### 2. Adjustment of needle thread take-up



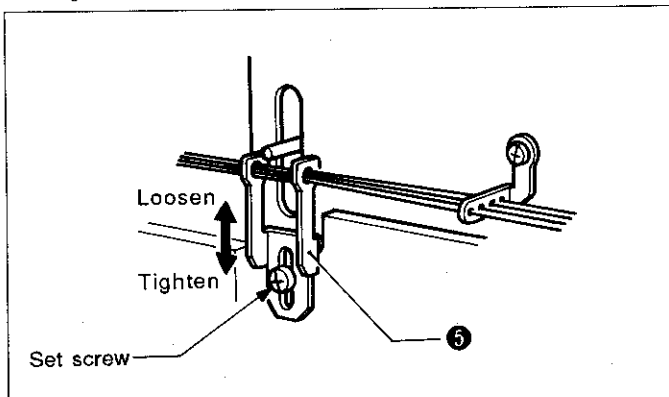
Adjust the distance between the tip of the needle thread take-up ③ and the center of the left screw to 48 mm. Move the needle thread take-up ③ to the left to tighten the needle thread. Move it to the right for loosening. Turn the pulley to raise the needle thread take-up to the highest position and keep the surface ④ of the needle thread take-up horizontal.

### 3. Adjustment of needle thread guard



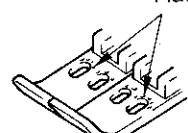
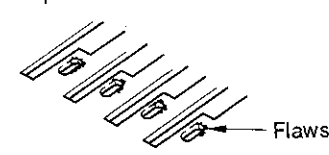
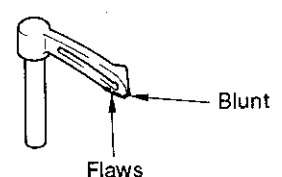
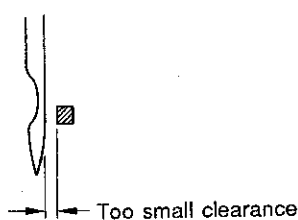
Pull up the needle thread guard ④ to make the loop of the needle thread bigger. Push down the guard to make it smaller.

### 4. Adjustment of take-up thread guide

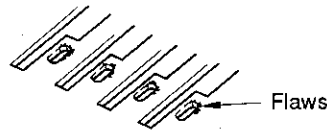


Lower the take-up thread guide ⑤ to tighten the looper thread. Raise the guide to loosen it.

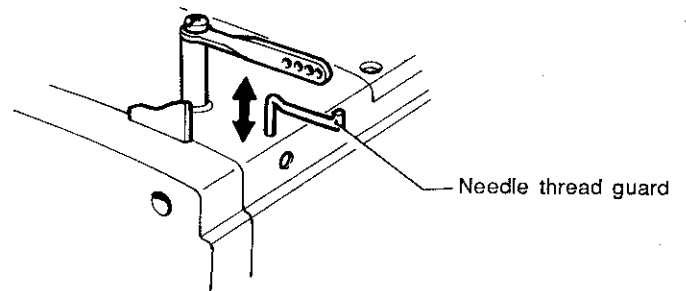
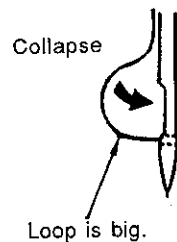
# [ I ] Troubleshooting

Trouble	Cause	Remedy	Page
Thread breaks.	<ol style="list-style-type: none"> <li>1. Improper threading.</li> <li>2. Excessive tension disc pressure.</li> <li>3. Poor quality of thread.</li> <li>4. Thread is too thick for needle eyelet.</li> <li>5. Improper needle installation.</li> <li>6. Blunt or bend needle tip.</li> <li>7. Needle groove or eyelet is improperly finished.</li> <li>8. Needle thread guides (needle thread take-up, needle thread guard) are improperly attached.</li> <li>9. Flaws in needle thread passage.</li> <li>10. Flaws in needle plate and needle holes of presser foot.</li> </ol>	<p>Thread properly. Adjust to proper pressure. Replace with a good one. Replace with a proper one.</p> <p>Adjust needle for proper direction and height. Replace with a new needle. Replace with a good needle.</p> <p>Adjust needle thread guides to their proper positions.</p> <p>Replace with a new one. Remedy flaws with oil, grinding stone, sandpaper or buffer. Or replace with new ones.</p>	35
<div style="display: flex; justify-content: space-around;"> <div> <p>Presser foot</p>  </div> <div> <p>Needle plate</p>  </div> </div>			
	11. Flaws in looper.	Remedy flaws with oil, grinding stone, or buffer.	
<div style="display: flex; justify-content: center;">  </div>			
	12. Too small clearance between needle and needle guard.	Refer to "Clearance between needle and needle guard."	32
<div style="display: flex; justify-content: center;">  </div>			
	13. Needles don't go through needle holes smoothly.	Refer to "Needle bar height" or "Looper stroke."	30, 31

Trouble	Cause	Remedy	Page
Looper thread breaks.	1. Improper threading.	Thread properly.	35
	2. Excessive tension disc pressure.	Adjust to proper pressure.	
	3. Poor quality of thread.	Replace with a good one.	
	4. Take-up thread guide is improperly attached.	Refer to "Adjustment of take-up thread guide."	
	5. Flaws in looper thread passage.	Replace with a new one.	
	6. Flaws in looper thread holes.	Replace with a new one.	
	7. Flaws in needle holes of needle plate. (Top, side, & bottom)	Remedy with oil, grinding stone, or buffer. Or replace with a new one.	



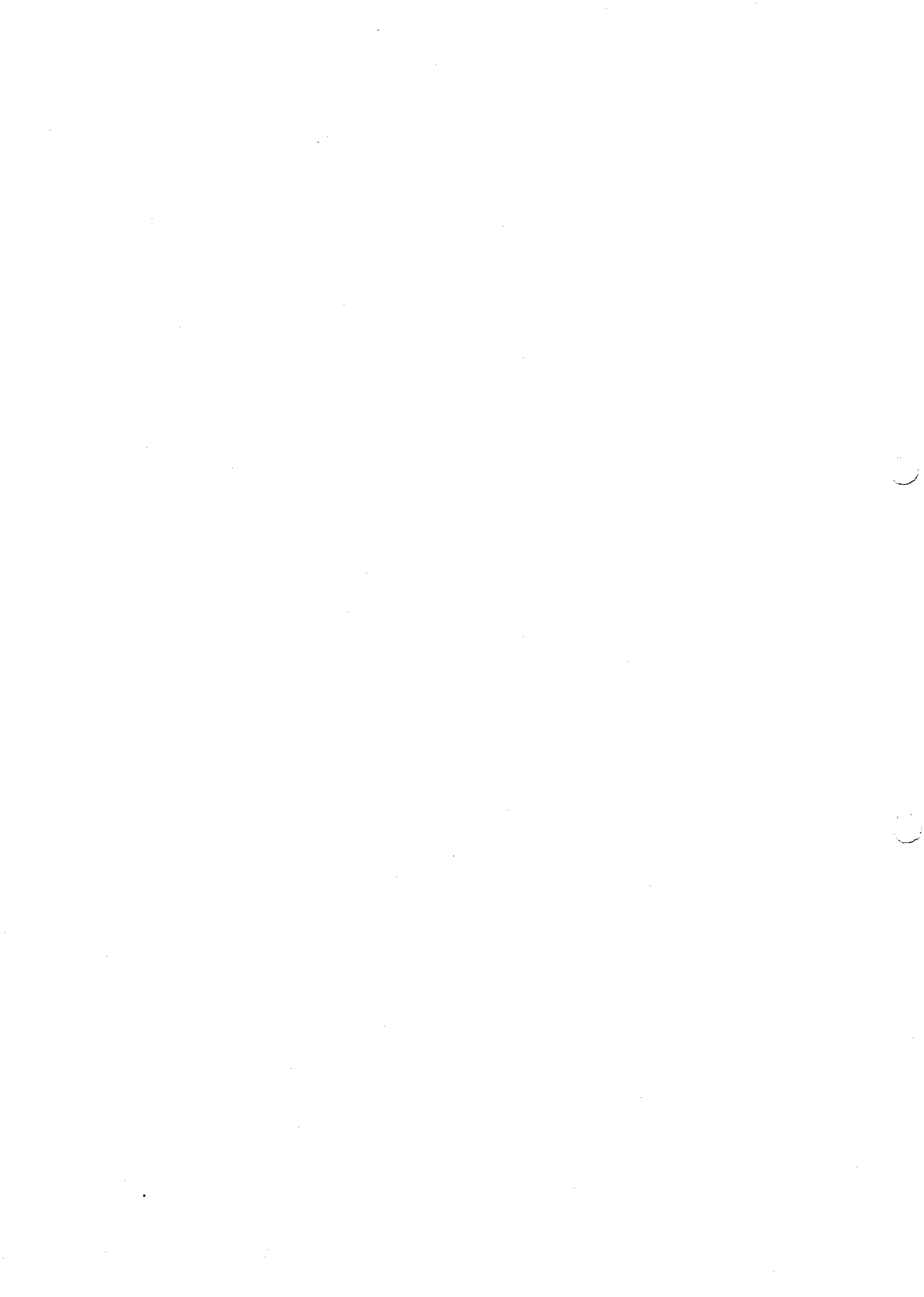
Stitches skip. (Needle, looper)	1. Improper threading.	Thread properly.	35
	2. Improper needle installation.	Adjust needle for proper direction and height.	
	3. Blunt or bend needle pint.	Replace with a new needle.	
	4. Too strong or too weak tension of needle thread and looper thread	Adjust to proper tension.	
	5. Improper installation of take-up thread guide	Refer to "Adjustment of take-up thread guide."	
	6. Too big clearance between needle and looper tip	Refer to "Clearance between needle and looper."	
	7. Improper contact dimension of looper and needle.	Refer to "Needle bar height" and "Looper stroke."	
	8. Improper timing of needle and looper	Refer to "Needle and looper timing."	
	9. Improper clearance between needle and needle guard.	Refer to "Clearance between needle and needle guard."	
	10. Needle thread loop is so big that it collapses.	Lower the needle thread guard.	

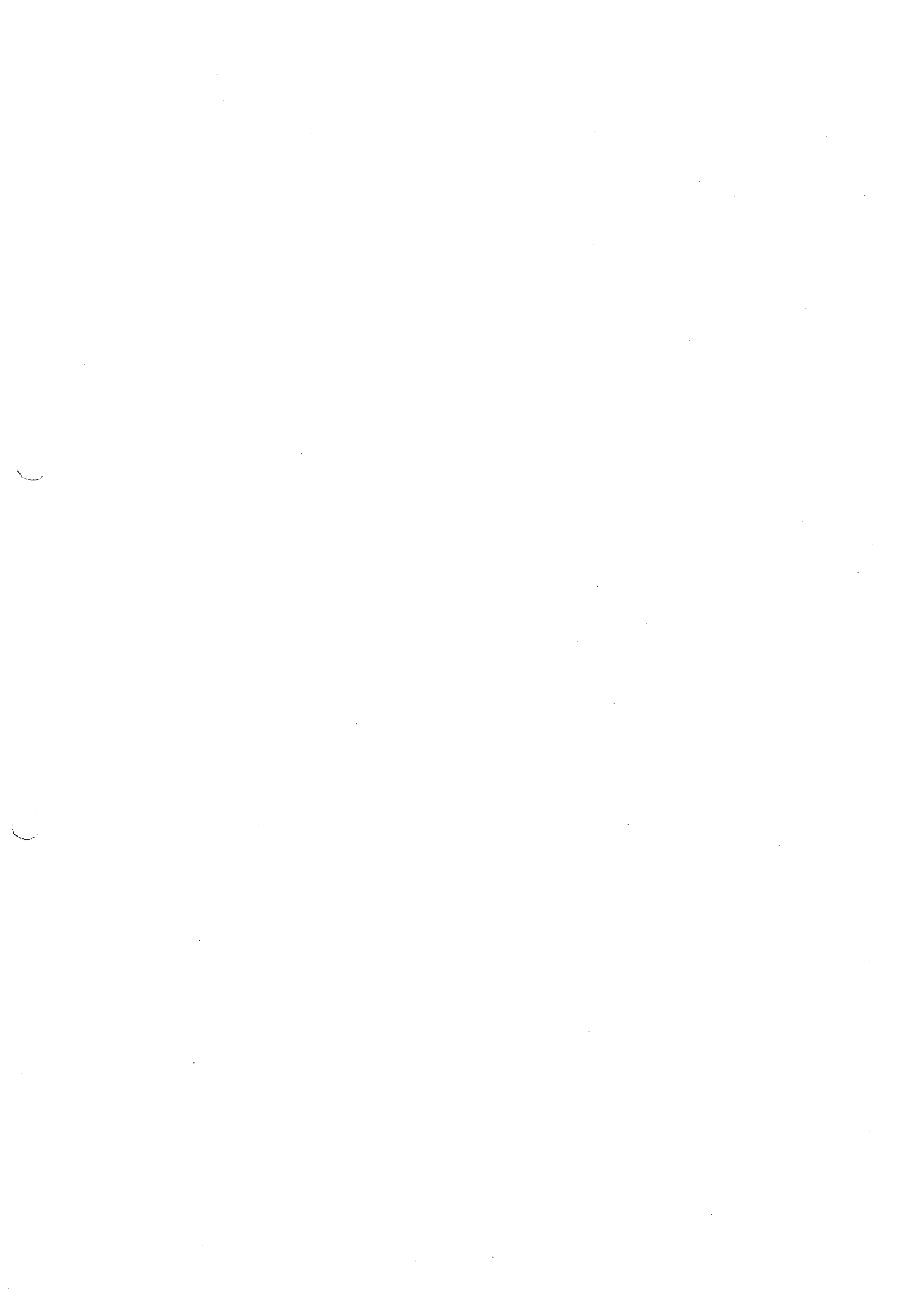


11. Needle thread loop is too small.	Raise the needle thread guard.	35
12. Improper installation of retainer	Refer to "Installation position of retainer."	32



<b>Trouble</b>	<b>Cause</b>	<b>Remedy</b>	<b>Page</b>
Needle breaks.	1. Improper presser foot installation.	Refer to "Presser foot lift stroke."	33
	2. Improper needle installation.	Adjust needle for proper direction and height.	
	3. Needle bent.	Replace with a new needle.	
	4. Needles doesn't go through needle holes of needle plate smoothly.	Make an adjustment.	30
	5. Looper tip touches needle.	Refer to "Looper stroke" and "Clearance between needle and needle guard."	31, 32
	6. Thread guard touches needle.	Refer to "Clearance between needle and needle guard."	32
Thread tightening is poor.	1. Improper threading.	Thread properly.	
	2. Thread is too thick for needle eyelet.	Replace with a proper one.	
	3. Weak thread tension.	Adjust to proper tension.	
	4. Improper operation of tension disc.	Clean dust in tension disc to smoothen operation.	
	5. Thread guide is improperly positioned.	Refer to "Thread tension."	35
	6. Needle, looper and thread take-up are improperly positioned.	Refer to "Needle bar height," "Looper stroke" and "Thread tension."	30, 31 35
Needle holes in cloth are excessively large.	1. Blunt needle tip.	Replace with a new needle.	
	2. Needle is too thick for cloth.	Replace with a thinner needle.	
Excessive wrinkles are produced when sewing.	1. Blunt needle tip.	Replace with an appropriate needle for material and thread.	
	2. Improper presser foot pressure.	Adjust presser foot for proper pressure.	
	3. Thread tension is too strong.	Adjust to proper tension.	
	4. Feed dogs are improperly attached.	Refer to "Feed dog height and "Feed dog gradient."	33
Tape feed amount changes in proportion to increase in rotation while sewing.	1. Spring pressure of tension roller is too weak.	Increase spring pressure.	
	2. Tension roller doesn't rotate smoothly.	Refer to "Tension roller installation."	29 (8), (9)
	3. Clutch sometimes overruns.	Increase star spring pressure.	
	4. Clutch slips.	Replace with a new one.	
	5. Faces of knurling tools of metering roller and tension roller are blunt.	Replace with a new one.	





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