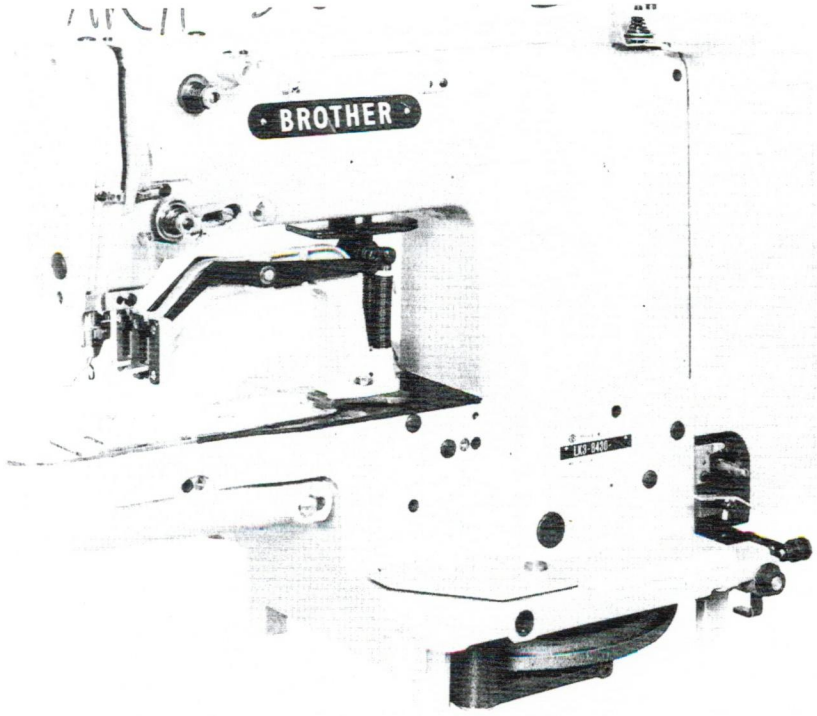
SERVICE MANUAL

FOR

BROTHER MODEL LK3-B430



BROTHER INDUSTRIES, LTD.

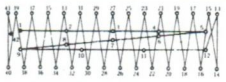
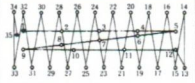
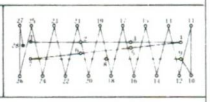
NAGOYA, JAPAN

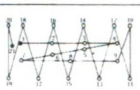
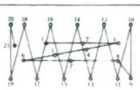
CONTENTS

SPECIFICATIONS

The table below shows the sub-classes of the LK3-B430 type high speed bar tacking machine.

BROTHER INDUSTRIES, LTD.
LK3-B430 — □
MADE IN JAPAN

Sub-class	−1	−2	−3	−4	−5
Main uses	Ordinary clothes	Denim		Ordinary clothes	
Decorative stitching					
Number of stitches	42		35	28	
Tack length	7 ~ 16	7 ~ 20		6.5 ~ 16	4 ~ 10
Tack width	1 ~ 2 (3)	1 ~ 3		1 ~ 2 (3)	
Needle	DP × 5 #16	DP × 17 #19		DP × 5 #16	
Presser foot stroke	17 mm				
Sewing speed	2,000 rpm				

Sub-class	−6	−7	−8	−9
Main uses	Denim	Knitted clothes	Ordinary clothes	Knitted clothes
Decorative stitching				
Number of stitches	28		21	
Tack length	6.5 ~ 16	4 ~ 8	3 ~ 7	
Tack width	1 ~ 3	1 ~ 2	1 ~ 2 (3)	1 ~ 2
Needle	DP × 17 #19	DP × 5 #9	DP × 5 #16	DP × #9
Presser foot stroke	17 mm			
Sewing speed	2,000 rpm			

MOTOR PULLEY AND SPEED

The LK3-B430 High Speed Bar Tacking Machine is capable of high speed sewing at a maximum speed of 2,300 rpm. When changing the speed, refer to the table below and select a speed suitable to the work. In case of using chemical thread, operate the machine at 1,800 rpm to prevent thread breakage due to heat.

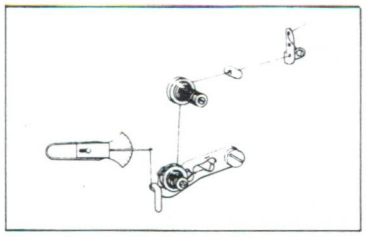
Frequency	Sewing speed (rpm)	Motor Pulley (Diameter)	High Speed V-Belt (Inches)	Low Speed V-Belt (Inches)
50 Hz	2,300	153105-0-01 (137)	082105-2-90 (52)	082104-9-90 (49)
	2,000	153107-0-01 (119.5)	082105-2-90 (52)	"
	1,800	153109-0-01 (107.8)	082105-1-90 (51)	"
60 Hz	2,300	153101-0-01 (115.5)	082105-1-90 (51)	"
	2,000	153101-0-01 (101)	082105-1-90 (51)	"
	1,800	153108-0-01 (91)	082105-0-90 (50)	"

STANDARD TENSION

Sub-class	-1 · -4 · -5 · -8	-2 · -3 · -6	-7 · -9
Use	For ordinary clothes	For denim	For knitted clothes
Upper thread tension (g)	80 ~ 120	180 ~ 220	110 ~ 150
Lower thread tension (g)	15 ~ 25	15 ~ 25	15 ~ 25
Thread take-up spring height (mm)	6 ~ 8	8 ~ 10	6 ~ 8
Thread take-up spring tension (g)	15 ~ 35	150 ~ 220	20 ~ 40
Thread take-up lever stroke (mm)	2 ~ 4	5	1 ~ 2

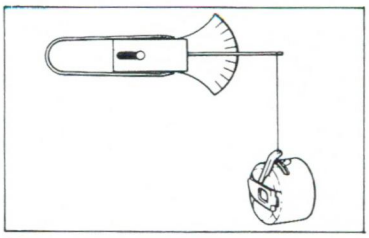
● **Tension Measurement**

Upper thread tension



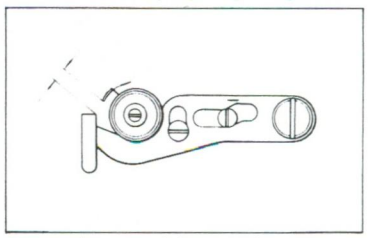
Start the machine, and measure as shown above.

Lower thread tension



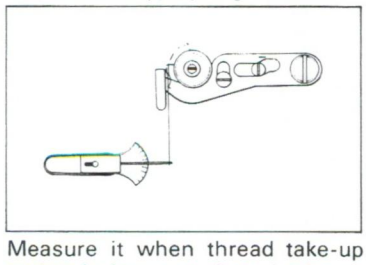
Measure as shown above.

Thread take-up spring height



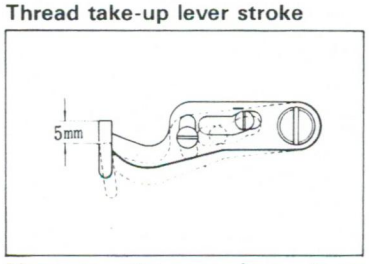
Start the machine and measure distance from thread take-up spring to thread take-up lever.

Thread take-up spring tension



Measure it when thread take-up spring is lower to thread take-up lever.

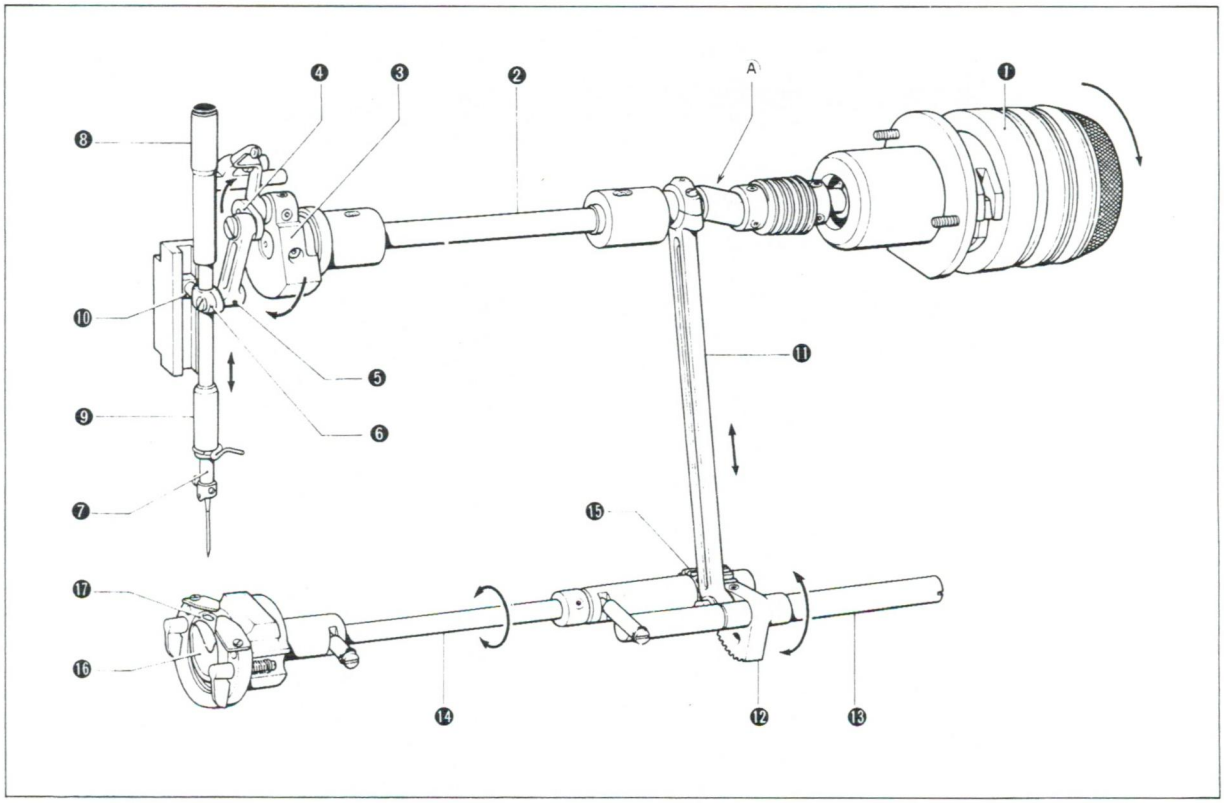
Thread take-up lever stroke



Measure distance from lever position when machine is started to its stop position.

MECHANISM

1 NEEDL BAR, THREAD TAKE-UP LEVER, LOWER SHAFT, SHUTTLE MECHANISMS



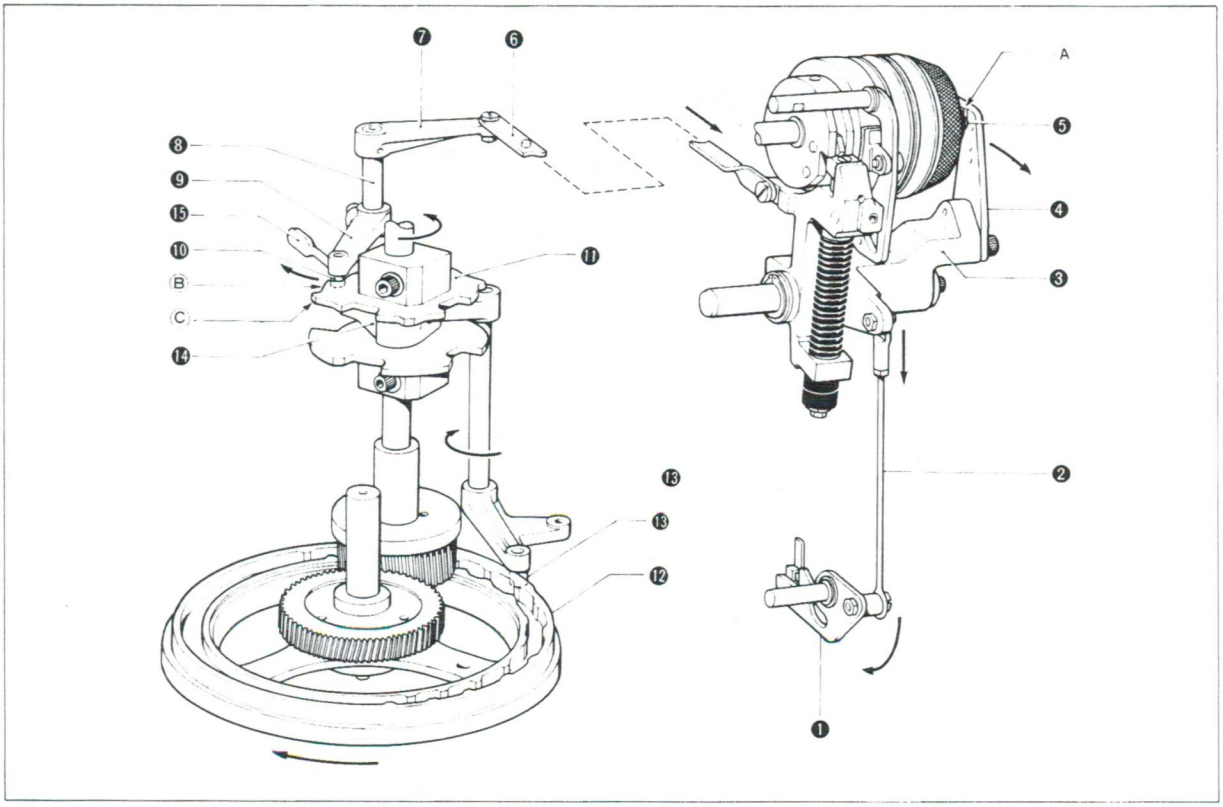
(1) Needle Bar and Thread Take-up Lever Mechanism

1. When pulley ❶ turns in the arrow direction, its rotating motion is conveyed to counter weight ❸ which is connected to upper shaft ❷.
2. Needle bar crank ❹ is attached to counter weight ❸ so that needle bar clamp ❻ is moved up and down via needle bar crank rod ❺.
3. Needle bar ❼, which is gripped by needle bar clamp ❻, is guided by needle bar bushing U ❽, needle bar bushing D ❾ and needle bar guide slide block ❿ to smoothly run up and down.

(2) Lower Shaft and Shuttle Mechanism

4. When pulley ❶ turns in the arrow direction, crank rod ⓫ moves up and down via the crank part Ⓐ of the upper shaft.
5. The lower end of crank rod ⓫ is connected to rock gear ⓬, and rocks about rock gear shaft ⓭.
6. Rock gear ⓬ engages lower shaft gear ⓯ which is fixed to lower shaft ⓮, and turns lower shaft ⓮ one half of a turn. Similarly, its motion is conveyed to driver ⓰ attached to the tip of lower shaft ⓮ to drive shuttle ⓱ one half of a turn.

2 CLUTCH MECHANISM

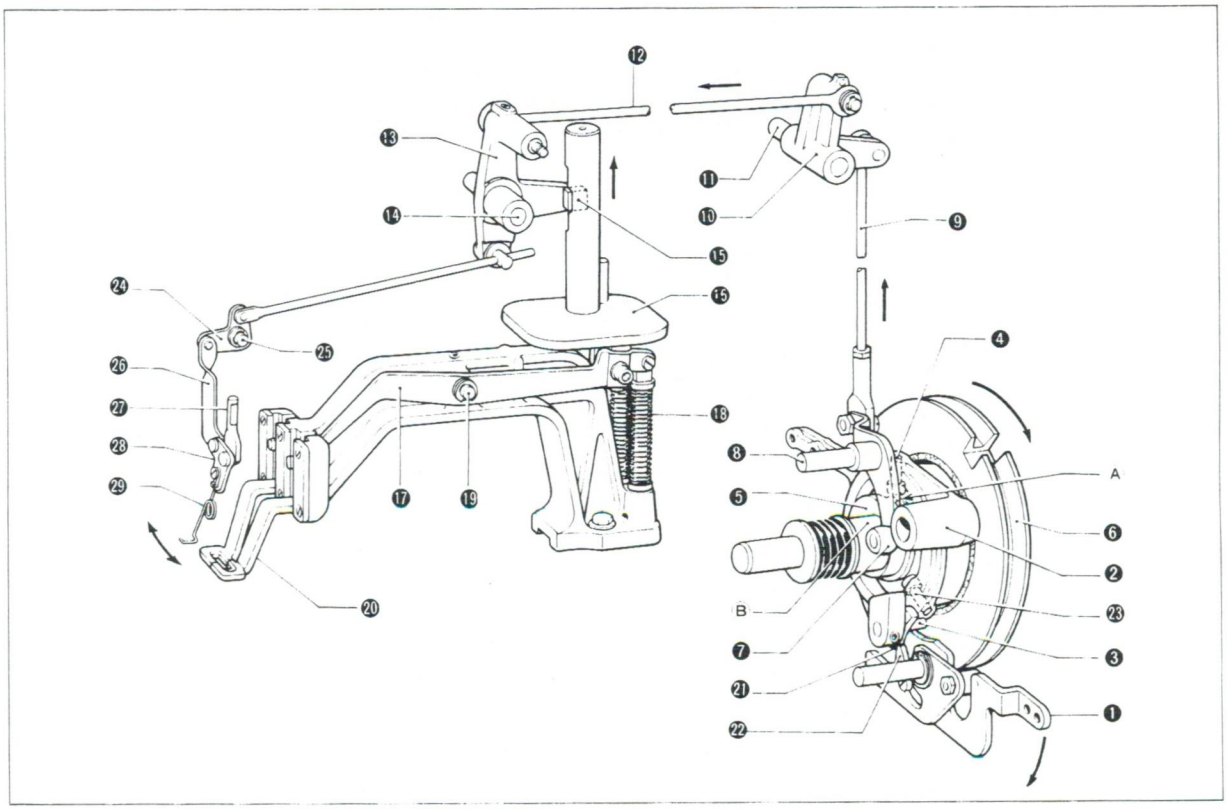


1. When start lever ❶ operates in the arrow direction, the low speed part Ⓐ of ball presser plate ❹, which is fixed to clutch lever ❸ via connecting rod ❷, gets in line with the center of steel ball ❺ to convey the power to the upper shaft.
2. One end of clutch connecting rod ❻ is connected to clutch lever ❸, and the other end to clutch actuating lever ❼ to drive clutch cam lever ❾ about clutch actuating lever shaft ❽ so that roller ❿ at its end goes up on the low speed part Ⓑ of clutch cam ⓫. This makes the machine sew 2 stitches at low speed from the start.
3. When roller ❿ goes up on the high speed part Ⓒ of clutch cam ⓫, control cam lever roller ⓭ falls from a projected part of feed cam ⓬ so that roller holder ⓮ comes under roller ❿. This makes the machine sew up to 4 stitches before the final stitch at high speed.
4. When roller ⓭ goes up on a projected part of feed cam ⓬, roller ❿ is released from roller holder ⓮ to fall on the high speed part Ⓒ of clutch cam ⓫, and then moves onto the low speed part Ⓑ. As the machine sews 4 stitches at low speed, roller ❿ gets into a recess of clutch cam ⓫.

(Stop Lever)

When stop lver ⓯ is pushed in the arrow direction, roller ❿ is released from roller holder ⓮ and gets into a recess of clutch cam ⓫.

3 POWER WORK CLAMP LIFTER AND THREAD WIPER MECHANISMS



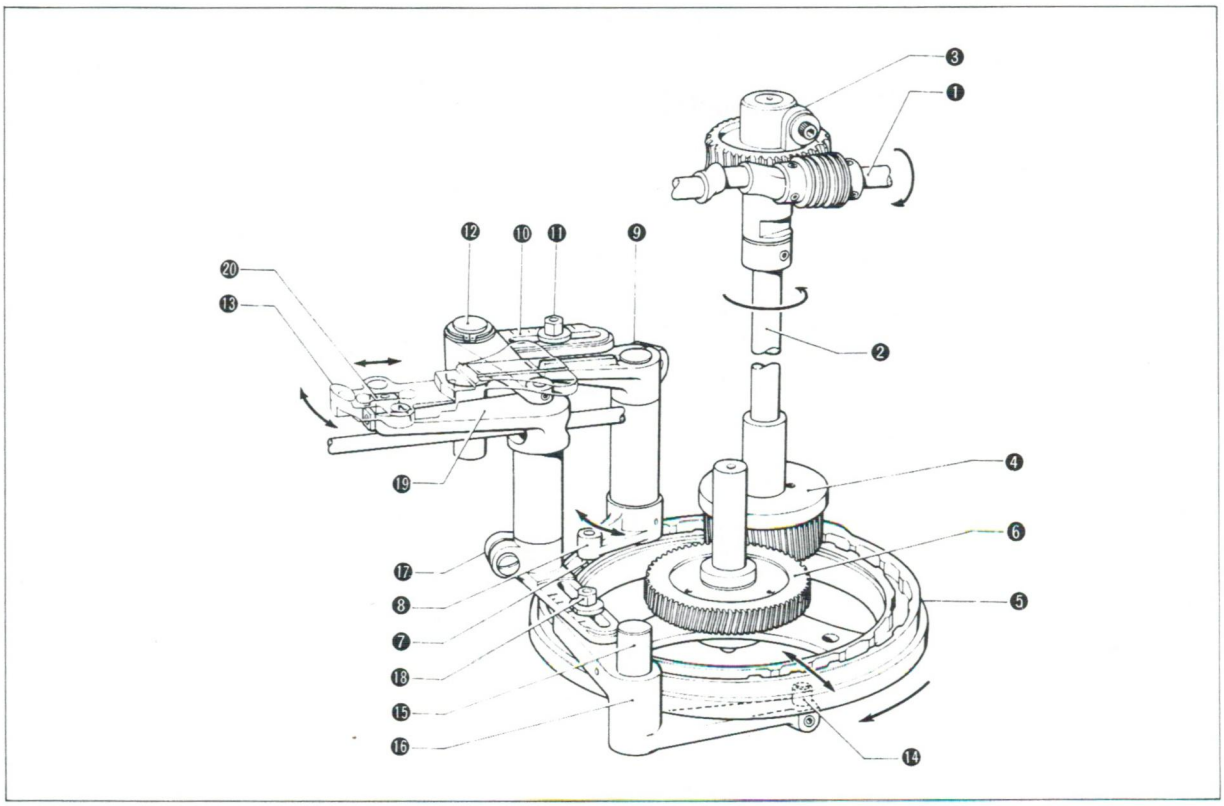
(1) Power Work Clamp Lifter Mechanism

1. When power actuating lever ❶ operates in the arrow direction, roller ❸ attached to the lower end of clutch actuating lever ❷ is pushed up so that roller ❹ disengages from the cam part Ⓐ of power cam ❺. Thus power cam ❺ contacts power pulley ❻ to be driven one half of a turn.
2. Roller ❼ contacts the work clamp lifter cam part Ⓑ to convey the motion to connecting rod ❾ via actuating lever shaft ❽ as fulcrum.
3. Connecting rod ❾ is connected to connecting lever ❿ to convey its motion to rod A ⓬ via connecting lever shaft ⓫ as fulcrum.
4. Rod A ⓬ is connected to work clamp lifter lever ⓭ to lift work clamp lifter plate ⓰ via slide block ⓯ which is fitted to work clamp lifter lever ⓭ that turns about work clamp lifter lever shaft ⓮.
5. Presser arm lever ⓱ which has been pushed down by work clamp lifter plate ⓰ is then pushed up by presser spring ⓲ so that work clamp ⓴ is lowered about presser arm lever shaft ⓳ as fulcrum.
6. When work clamp lifter roller shaft ㉑ disengages from start lever claw ㉒ upon sewing the final stitch, roller ㉓ disengages from the cam part Ⓐ so that power cam ❺ contacts power pulley ❻, which drives power cam ❺ one half of a turn to lift work clamp ⓴.

(2) Thread Wiper Mechanism

Thread wiper rod assembly ㉔ which is connected to the lower end of work clamp lifter lever ⓭ conveys its motion to thread wiper link ㉖ via thread wiper shaft ㉕ as fulcrum, and actuates thread wiper ㉙, which is connected to thread wiper arm ㉘, via thread wiper arm support ㉗ as fulcrum.

4 FEED MECHANISM



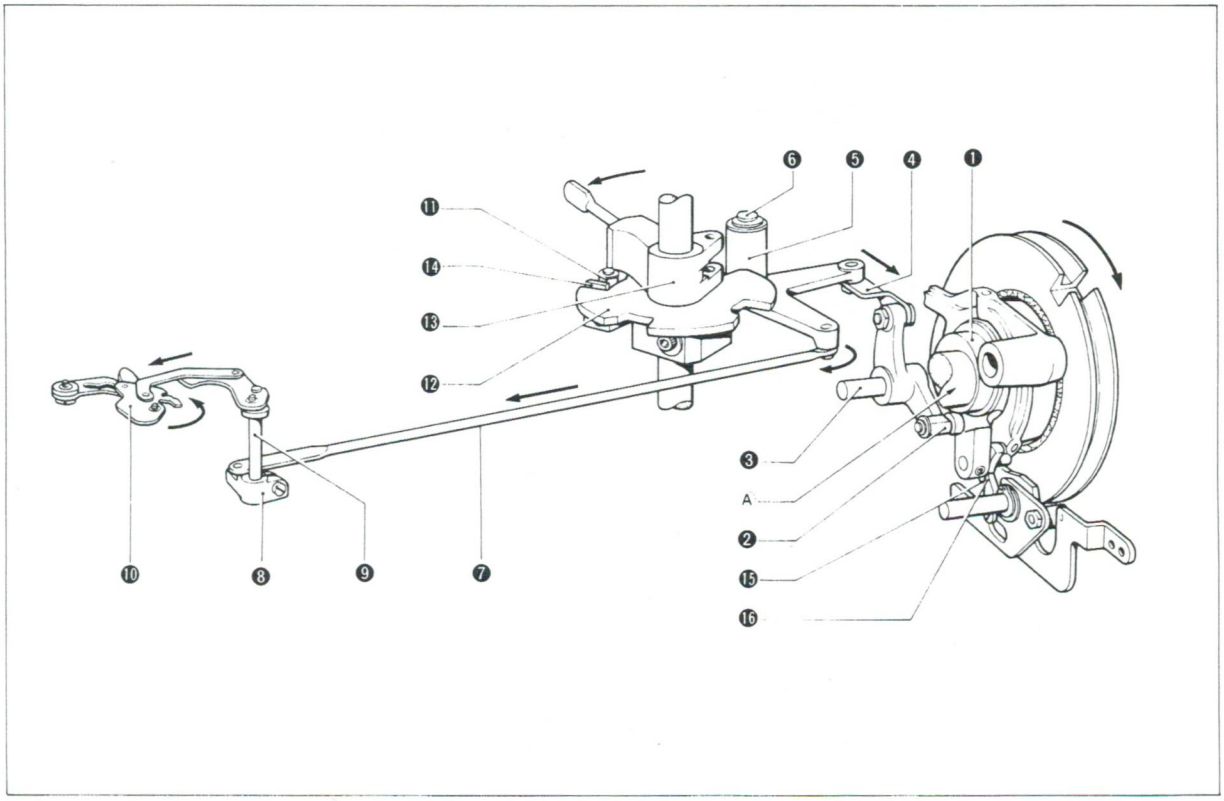
(1) Tack Width Mechanism

1. When upper shaft ❶ turns in the arrow direction, worm wheel ❸ which is connected to vertical shaft ❷ rotates in the arrow direction. Change gear W ❹ in mesh with the lower end of vertical shaft ❷ comes into mesh with change gear C ❻ which is engaged with feed cam ❺ so that feed cam ❺ rotates similarly in the arrow direction.
2. Roller ❼ fits in the groove of feed cam ❺ to convey the rocking motion to tack width feed lever ❽. Tack width regulator lever ❾, which is connected to tack width feed lever ❽, similarly rocks.
3. Tack width lever ❿ is connected to tack width regulator lever ❾ with nut ⓫ so that it moves feed guide ⓭ back and forth about tack width lever shaft ⓬ as fulcrum.

(2) Tack Length Mechanism

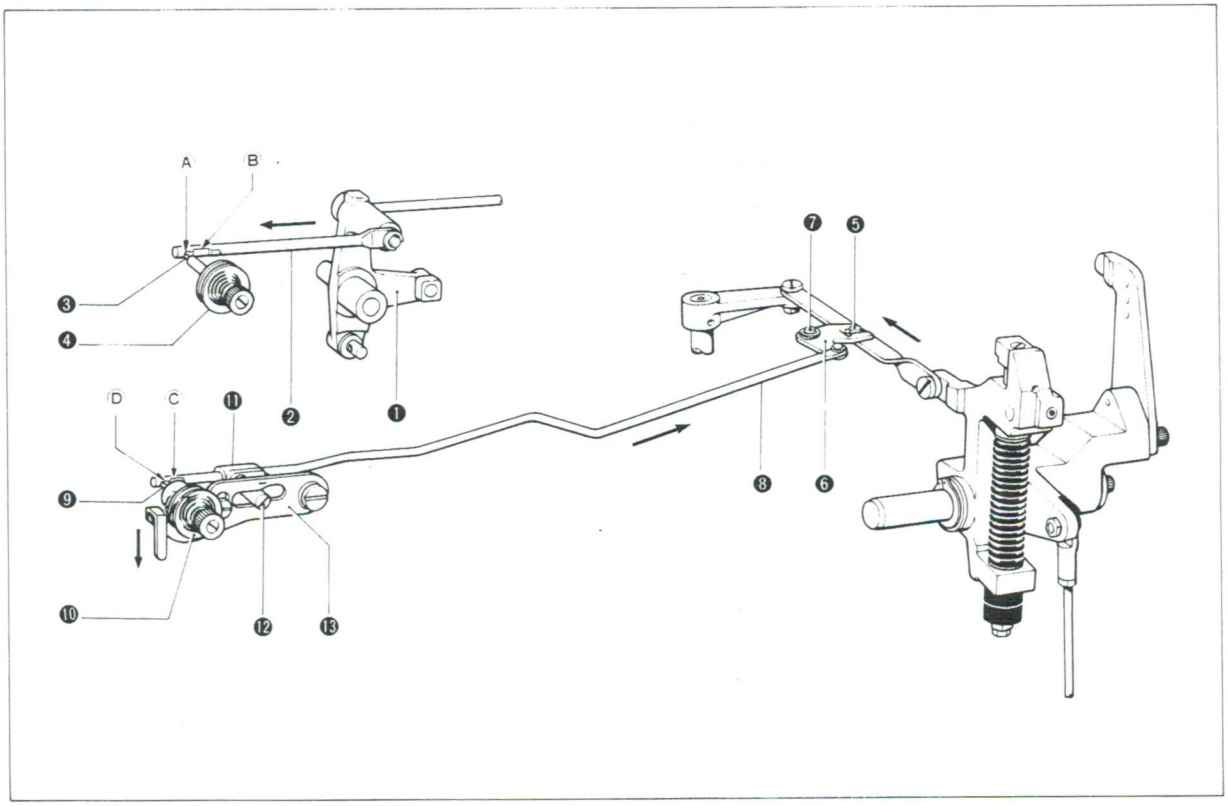
4. Roller ⓮ fits in the groove on the underside of feed cam ❺ to convey the rocking motion to back length feed lever ⓰ about tack length feed lever shaft ⓯ as fulcrum.
5. Tack length regulator lever ⓱ is connected to tack length feed lever ⓰ with nut ⓲ so that it rocks tack length lever ⓳. Similarly, slide block ⓴ fits into the slot of feed guide ⓭ to move feed guide sidewise.
6. The combination of the motions mentioned in Paragraphs 3 and 5 produces a sewing pattern.

5 THREAD TRIMMER MECHANISM



1. When power cam ❶ rotates one half of a turn in the arrow direction, roller ❷ in contact with the cam part Ⓐ of power cam ❶ is pushed down so that the motion is conveyed via thread trimming link ❹ to cam lever ❺ through driving shaft ❸ as fulcrum.
2. Cam lever ❺ conveys the motion to connecting rod ❼ via cam lever shaft ❻ as fulcrum to forcibly return movable knife ❿ via thread trimming arm B ❾, which is connected to thread trimming arm A ❽, to a specific position.
3. When roller ⓫ rides on the periphery of knife cam ⓬, roller holder ⓭ gets under roller ⓫ to hold roller ⓫ there till 4 stitches before the final stitch.
4. When cam lever claw ⓮ drops from the periphery of knife cam ⓬ one half into its recess, movable knife ❿ scoops an upper thread loop up and stop before the needle hole; and when work clamp lifter roller shaft ⓯ disengages from start lever claw ⓰, power cam ❶ rotates one half of a turn and movable knife ❿ cuts the thread.

6 THREAD TENSION AND TENSION RELEASE MECHANISMS



(1) Thread Tension Mechanism

The thread tension mechanism is interlocked with the power work clamp lifter mechanism. Tension release bar ❷ is connected to the upper end of work clamp lifter lever ❶. When the machine is started tension release pin ❸ is located at the cam part Ⓐ; and immediately before the movable knife cuts the thread, tension release pin ❸ falls into the cam part Ⓑ to momentarily tighten tension discs ❹ to prevent the upper thread from running on while thread cutting.

(2) Tension Release Mechanism

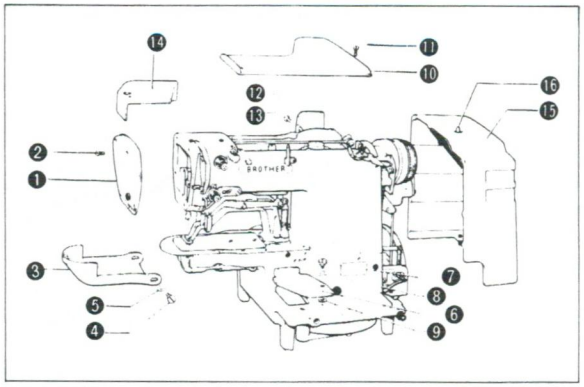
1. The tension release mechanism is interlocked with the clutch mechanism. When the clutch is engaged 90° before the stop cam reaches the stop position upon sewing the final stitch, tension release lever ❻ which is engaged with roller ❺ conveys the motion to tension release bar ❽ via tension release lever shaft ❼ as fulcrum.
2. When the machine is started, tension release pin ❾ is at the cam part Ⓒ; and when the stop cam reaches 90° before the stop position, tension release pin ❾ rides on the cam part Ⓓ to release tension discs ❿ and simultaneously conveys the motion to thread take-up lever ⓭ via guide stud ⓬ which is fixed to guide bearing ⓫, thereby feeding the necessary length of thread for starting the next sewing.

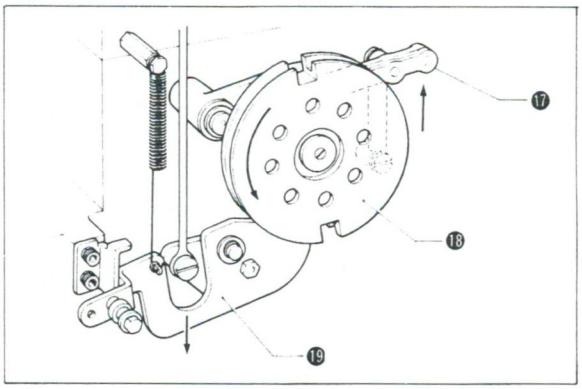
DISASSEMBLING PROCEDURE

1 COVER

1. Face plate ❶
   Remove by loosening three screws ❷.
2. Shuttle race cover ❸
   Remove two screws ❹ and washers ❺ at right and left, and remove the cover.
3. Bed cover R ❻
   Remove screw ❼ and washer ❽, and then bed cover R ❻. Also remove washer ❾ in the recess of the bed.
4. Top cover ❿
   Remove top cover ❿ by loosening six screws ⓫.
5. Side cover ⓬
   Remove side cover ⓬ by loosening four screws ⓭.
6. Bed cover L ⓮
   Open bed cover L ⓮, and pull it out upward.
7. Belt cover ⓯
   Remove belt cover ⓯ by pushing button ⓰.

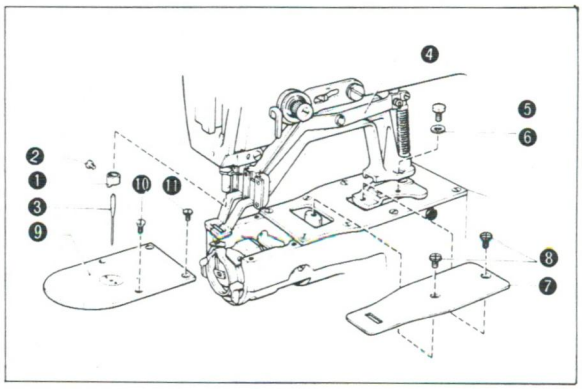
   (Note)
   Push drive lever ⓱ up in the arrow direction, turn power pulley ⓲ to lower the work clamp, hold drive lever ⓱ there, push power actuating lever ⓳ in the arrow direction, release drive lever ⓳, and turn the pulley by hand one or two turns.
8. Raise the machine head, and remove the V-belt.
9. Return the machine head.
10. Remove the chain.





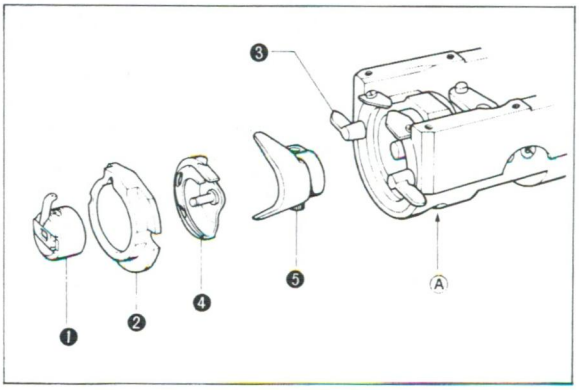
2 PRESSER ARM

1. Needle bar thread guide ❶
   Remove screw ❷, needle ❸, and then needle bar thread guide ❶.
2. Presser arm ❹
   Remove presser arm ❹ by taking off bolts ❺ and washers ❻ at right and left.
3. Feed plate ❼
   Remove feed plate ❼ by taking off two screws ❽.
4. Needle plate ❾ by taking off two screws ❿ and two screws ⓫.



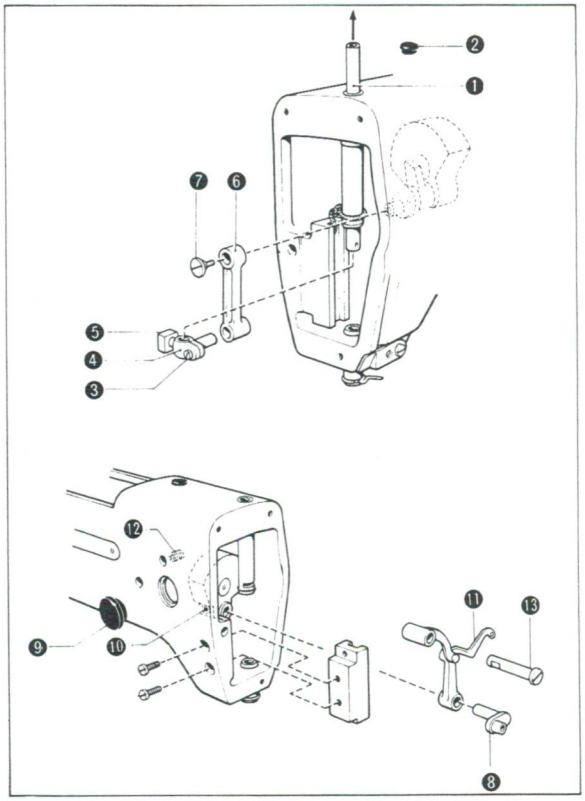
3 SHUTTLE

1. Bobbin case ❶
   Remove bobbin case ❶ by holding the latch.
2. Shuttle race ring ❷
   Turn shuttle race ring set claws ❸ out to the right and left, and remove shuttle race ring ❷. Remove shuttle hook ❹ at the same time.
3. Driver ❺
   Turn the pulley by hand until the bolt comes to the adjusting hole Ⓐ, then loosen the bolt, and remove driver ❺.



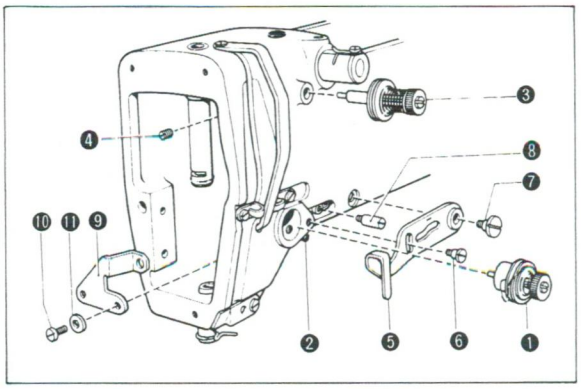
4 NEEDLE BAR

1. Needle bar ❶
   Remove oil cap ❷, loosen screw ❸, pull needle bar ❶ upward of the arm, and remove needle bar clamp ❹ together with slide block ❺.
2. Remove screw ❼ (left-handed) and then needle bar ❶.
3. Needle bar crank ❽
   Remove cap ❾, loosen screw ❿, and remove needle bar crank ❽.
4. Thread take-up lever ⓫
   Loosen screw ⓬, pull out stud ⓭, and remove thread take-up lever ⓫.



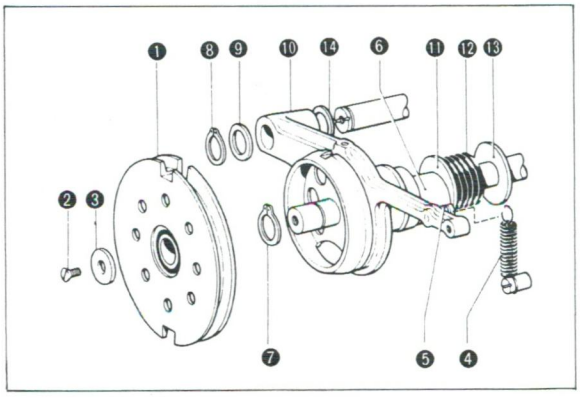
5 THREADING

1. Main tension assembly ❶
   Loosen screw ❷, and remove main tension assembly ❶, exercising care not to drop the pin out of it.
2. Sub-tension assembly ❸
   Loosen screw ❹, and remove sub-tension assembly ❸, also exercising care not to drop the pin out of it.
3. Thread take-up lever ❺
   Remove two screws ❻ and ❼, and then thread take-up lever ❺.
4. Guide stud ❽
   Remove it by turning it with a screwdriver.
5. Tension release bar plate ❾
   Remove two screws ❿ and washers ⓫, and then tension relase bar plate ❾.



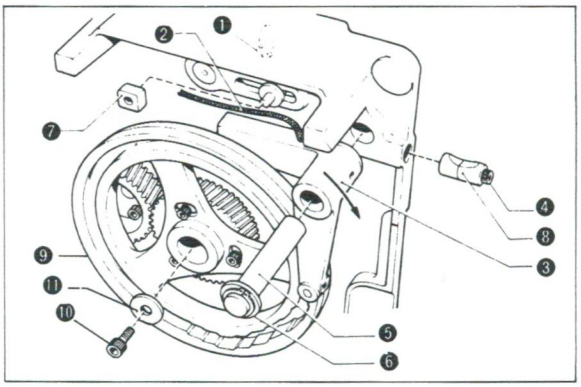
6 POWER WORK CLAMP LIFTER

1. Power pulley ❶
   With the machine at the stop position, remove screw ❷ and washer ❸, and then power pulley ❶.
2. Drive lever spring ❹
   Remove it from pin ❺.
3. Power cam ❻
   (1) Remove stop ring ❼.
   (2) Remove stop ring ❽ and washer ❾, and then power cam ❻ together with drive lever ❿. Also remove washer ⓫, spring ⓬, washer ⓭ and washer ⓫.



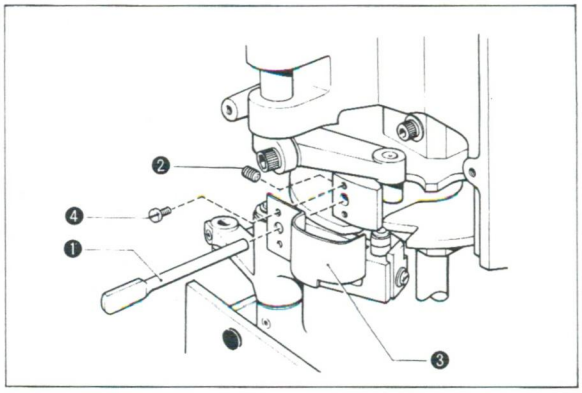
7 FEED

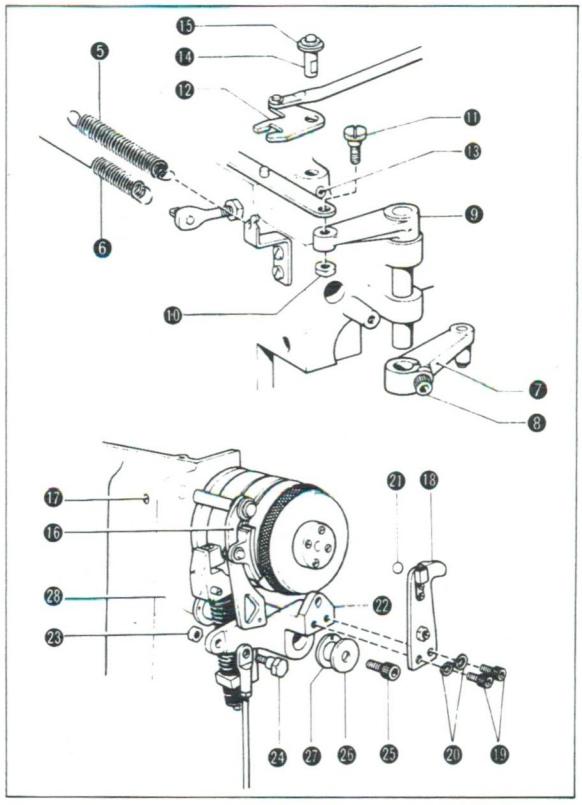
1. Raise the machine head.
2. Loosen screw ❶, and pull out wich ❷ from tack length feed lever ❸.
3. Tack length feed lever ❸
   Loosen bolt ❹, remove tack length feed lever shaft ❺ together with washer ❻, and remove tack length feed lever ❸ by moving it in the arrow direction, exercising care not to drop slide block ❼.
4. Pull out pinch sleeve ❽.
5. Feed cam ❾
   Remove bolt ❿ and washer ⓫.



8 CLUTCH AND BRAKE

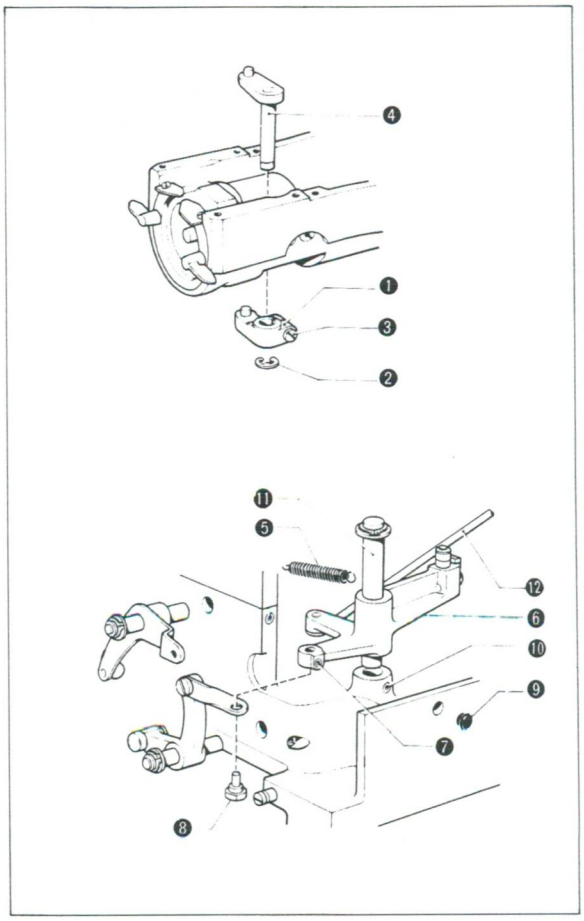
1. Lower the machine head to the level position.
2. Emergency stop lever ❶
   Loosen screw ❷ and remove emergency stop lever ❶.
3. Roller holder cover ❸
   Remove two screws ❹, and then roller holder cover ❸. Temporarily install emergency stop lever ❶ after removing roller holder cover ❸.
4. Clutch spring ❺
   Disengage only the end of clutch spring ❺ which is hooked to the spring hook.
5. Brake spring ❻
   Disengage brake spring ❻ from the spring hook.
6. Clutch cam lever ❼
   Loosen bolt ❽, and remove clutch cam lever ❼.
7. Clutch actuating lever ❾
   Remove nut ❿ and screw ⓫, and then clutch actuating lever ❾.
8. Tension release lever ⓬
   Loosen screw ⓭, and pull out tension release lever shaft ⓮ together with washer ⓯. It can easily be removed if the pulley turning crank rod is at left as viewed from the rear of the machine.
9. Brake assembly ⓰
   Loosen screw ⓱, and remove brake assembly ⓰ together with the shaft.
10. Ball presser plate ⓲
    Remove two bolts ⓳ and washers ⓴, and then ball presser plate ⓲. Also remove steel ball ㉑, exercising care not to drop it.
11. Clutch lever assembly ㉒
    (1) Remove nut ㉓ and eccentric screw ㉔.
    (2) Remove bolt ㉕, washer ㉖, and washer ㉗.
    (3) After removing clutch lever assembly ㉒, remove washer ㉘.





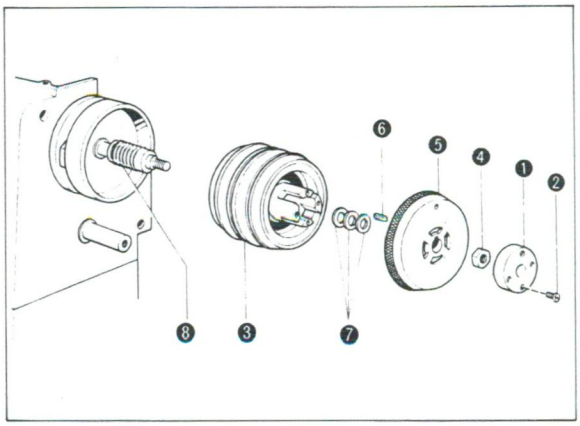
9 THREAD TRIMMER

1. While turning the pulley, operate the emergency sotp lever until the knife cam lever claw dropps into the recess of the knife cam.
2. Raise the machine head.
3. Thread trimming arm A ❶
   Remove E-shaped stop ring ❷, loosen screw ❸, and remove thread trimming arm A ❶.
4. Thread trimming arm B ❹
   Pull it upward of the bed.
5. Lower the machine head to the level position.
6. Knife cam lever spring ❺
   Unhook the knife cam lever end of spring ❺.
7. Knife cam lever ❻
   (1) Loosen screw ❼, and remove stud ❽.
   (2) Remove oil cap ❾, loosen screw ❿, pull out knife cam lever shaft ⓫, and remove knife cam lever ❻ together with connecting rod ⓬.



10 PULLEY

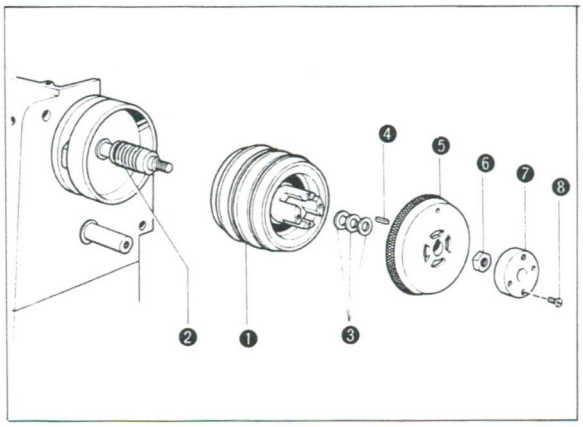
1. Ball holder ❶
   Remove four screws ❷, and then ball holder ❶.
2. Pulley assembly ❸
   Remove nut ❹ (left-handed), clutch plate ❺, key ❻, washers ❼, and then pulley assembly ❸. Also remove spring ❽.



ASSEMBLING PROCEDURE

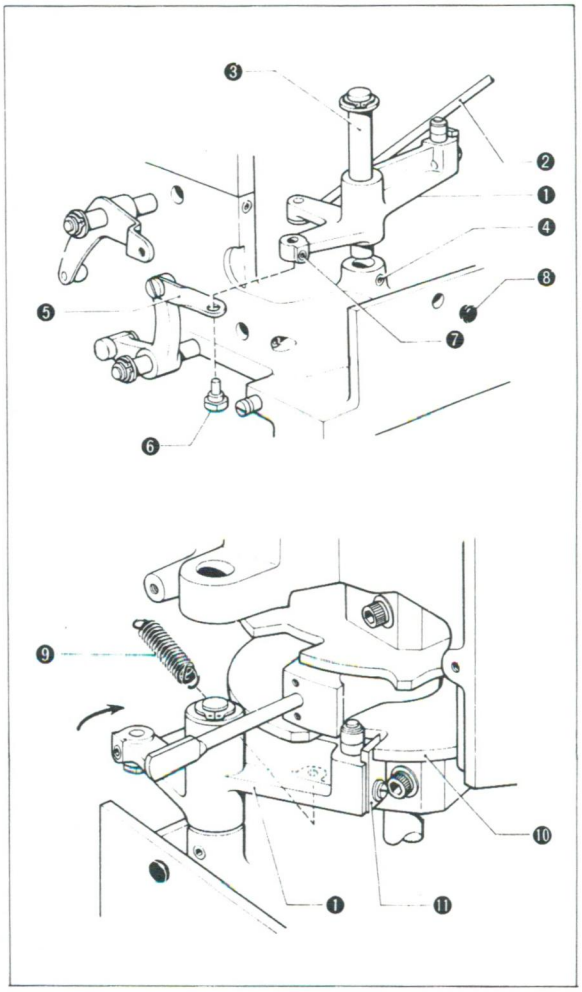
1 PULLEY

1. Pulley assembly ❶
   (1) Fit spring ❷ over the upper shaft, push pulley assembly ❶ onto the upper shaft toward the arm, fit three washers ❸ onto the upper shaft, and then insert key ❹ into the keyway.
   (2) Install clutch plate ❺ in such a way that the keyway is in line with the key, and tighten nut ❻ (left-handed).
2. Ball holder ❼
   Tighten ball holder ❼ with four screws ❽.

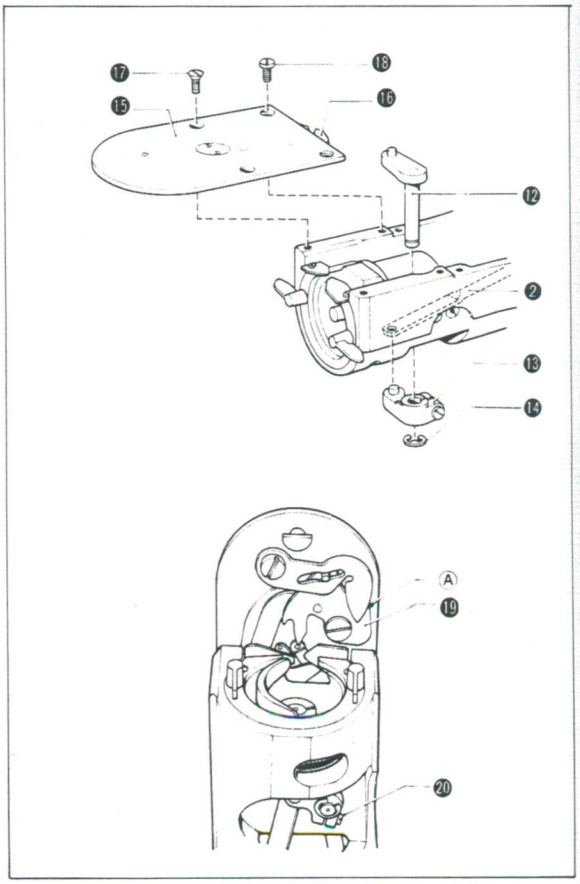


2 THREAD TRIMMER

1. Return the machine head onto the oil pan.
2. Knife cam lever ❶
   (1) Pass the tip of connecting rod ❷ through the bed, and tighten knife cam lever shaft ❸ with screw ❹.
   (2) Connect thread trimming link ❺ with stud ❻, and temporarily tighten screw ❼.
   (3) Put oil cap ❽ on.
3. Knife cam lever spring ❾
   Turn the pulley until knife cam lever claw ⓫ gets into the recess of knife cam ⓾, and hook spring ❾ to the pin at the bottom of knife cam lever ❶.
4. Operate knife cam lever ❶ in the arrow direction, and turn the pulley until the knife cam lever roller rides on the periphery of knife cam ⓾.

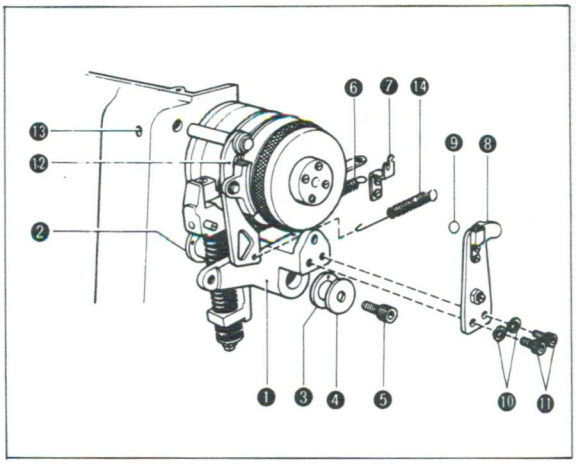


5. Raise the machine head.
6. Thread trimming arm B ⑫
   Insert it from above the bed.
7. Thread trimming arm A ⑬
   Fit the pin into the tip of connecting rod ②, slide thread trimming arm A ⑬ onto the lower end of thread trimming arm B ⑫, and snap stop ring ⑭ on.
8. Needle plate assembly ⑮
   Fit the slot of thread trimming arm C ⑯ over the pin on thread trimming arm B ⑫, and tighten two each screws ⑰ and ⑱.
9. Move movable knife ⑲ until its tip meets the needle plate mark Ⓐ, and tighten screw ⑳.

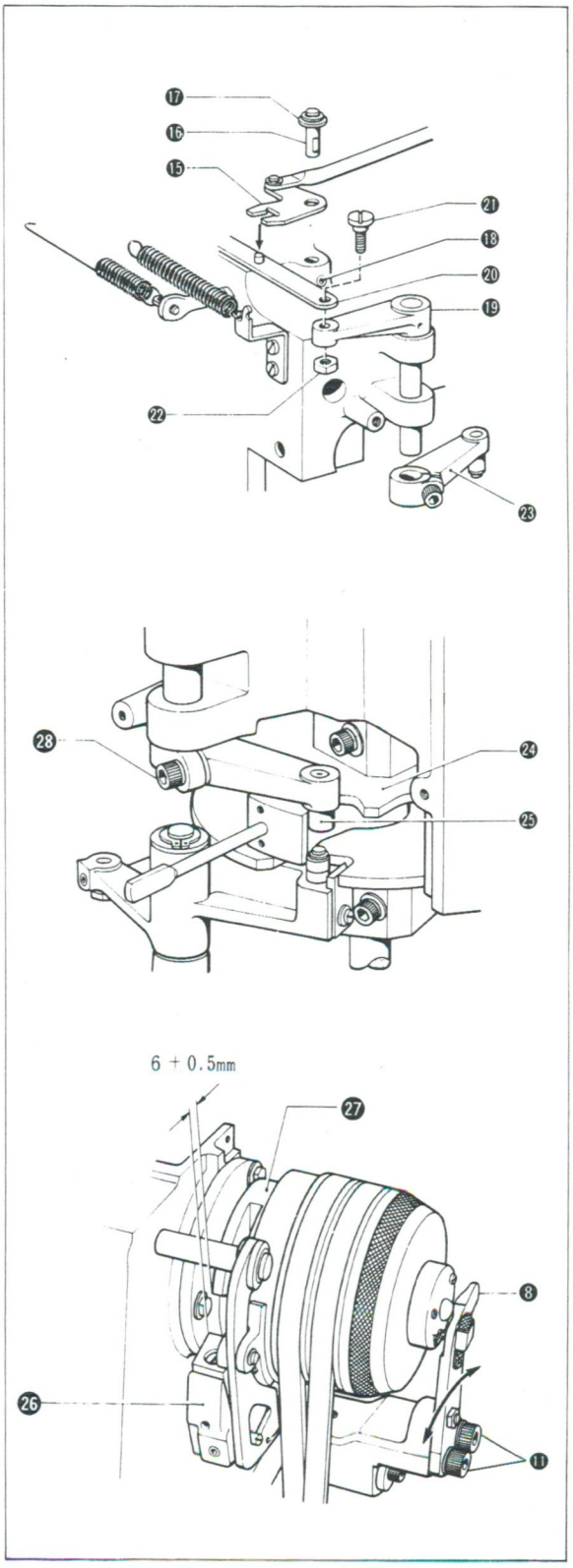


3 CLUTCH AND BRAKE

1. Clutch lever assembly ①
   Install clutch lever assembly ① with washers ②, ③, ④, and bolt ⑤, and hook one end of clutch spring ⑥ to spring hook ⑦.
2. Ball presser plate ⑧
   Put steel ball ⑨ in the ball holder, and temporarily tighten it with two spring wahsers ⑩ and bolts ⑪.
3. Brake assembly ⑫
   Fit it on the arm, and fasten with screw ⑬, making sure that the brake shoe is in line with the center of the stop cam.
4. Brake spring ⑭
   Hook brake spring ⑭ to the lower end of the brake assembly and the spring hook.

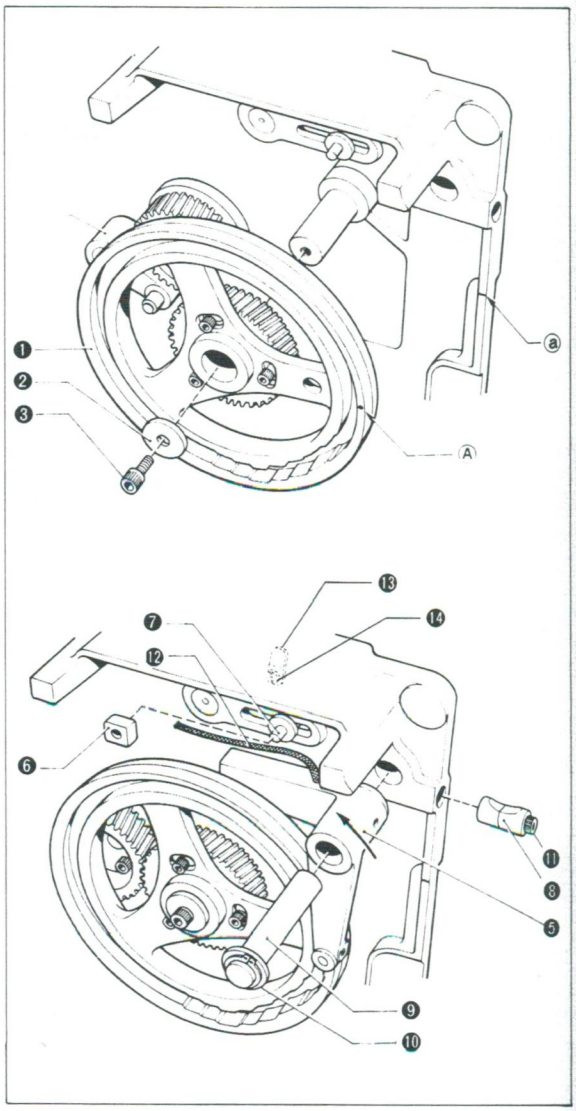


5. Tension release lever ⑮
   Insert the tip of it into the arm, put washer ⑰ on tension release lever shaft ⑯, and tighten screw ⑱. The tension release lever ⑮ can easily be installed if the crank rod is shifted to the left as viewed from the rear of the machine by turning the pulley.
6. Clutch actuating lever ⑲
   Insert it into the arm, and connect its tip to clutch connecting rod ⑳ with screw ㉑ and nut ㉒.
7. Clutch cam lever ㉓
   (1) Fit clutch cam lever ㉓ over the lower end of clutch actuating lever ⑲.
   (2) Turn the pulley until clutch cam lever roller ㉕ rides on the low speed part of clutch cam ㉔.
   (3) Adjust the gap between stopper ㉖ and stop cam ㉗ to 6 ± 0.5 mm, then push clutch cam lever roller ㉕ to the low speed part of clutch cam ㉔, and tighten bolt ㉘. Check that there is no play in axial directions.
   (4) Similarly, with clutch cam lever roller ㉕ on the low speed part of clutch cam ㉔, loosen two bolts with ⑪ and move ball presser plate ⑧ to the right or left until the mark of ball presser plate ⑧ is in line with the center of the steel ball, and then retighten two bolts ⑪.



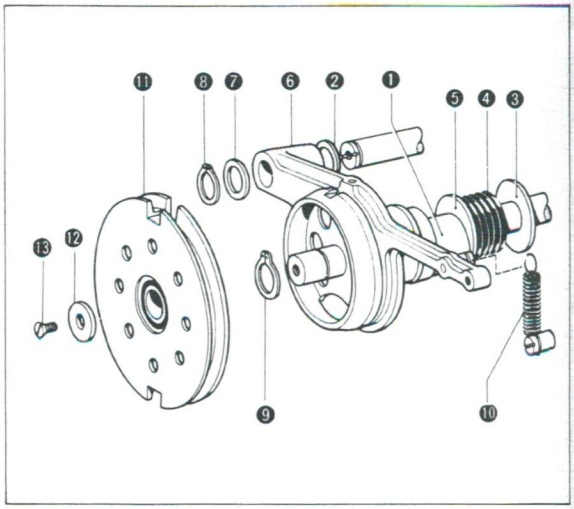
4 FEED

1. Raise the machine head.
2. Feed cam ❶
   With the stopper in contact with the stop cam (stop position), fit the cam lever roller into the cam groove, and install feed cam ❶ with washer ❷ and bolt ❸ in such a way that the mark Ⓐ of the feed cam meets the mark ⓐ of the bed. In this case, move cam lever ❹ so that the cam lever roller rides on the periphery of the feed cam.
3. Tack length feed lever ❺
   (1) Fit slide block ❻ onto tack length regulator shaft ❼.
   (2) Fit the roller into the cam groove, move it in the arrow direction, and fit slide block ❻ into the groove.
   (3) Insert pinch sleeve ❽ into the matching hole in the bed, fit washer ❿ onto tack length feed lever shaft ❾, and tighten it with bolt ⓫.
   (4) Lead the wick ⓬ out of the tack length feed lever ❺ to the leaf spring ⓭, and tighten it with screw ⓮.



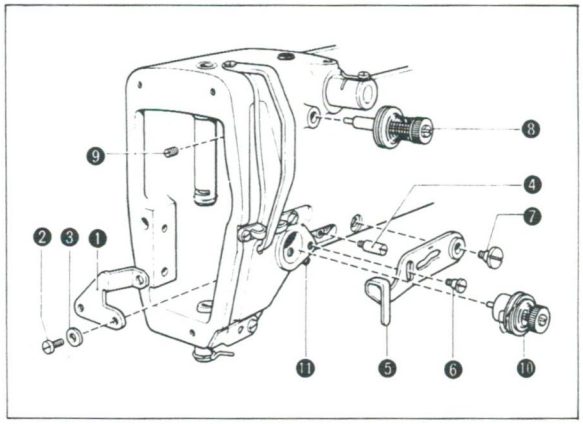
5 POWER WORK CLAMP LIFTER

1. Power cam ❶
   (1) Fit washer ❷ onto the drive lever shaft.
   (2) Fit washer ❸, spring ❹ and washer ❺ onto the power pulley shaft.
   (3) Fit drive lever ❻ onto the drive lever shaft and power pulley shaft, and put washer ❼ and stop rings ❽ and ❾ on.
   (4) Hook drive lever spring ❿ to the pin on the drive lever.
2. Power pulley ⓫
   Install it with washer ⓬ and screw ⓭.



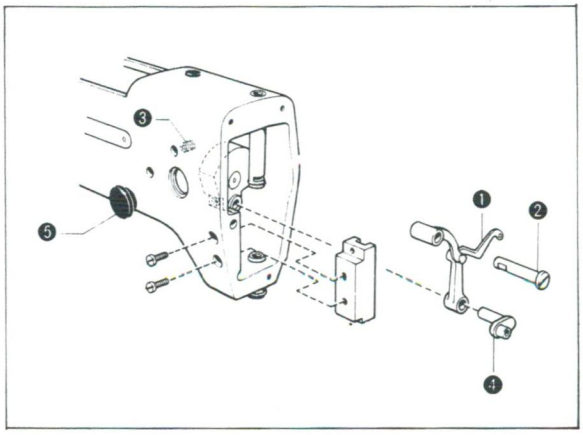
6 THREADING

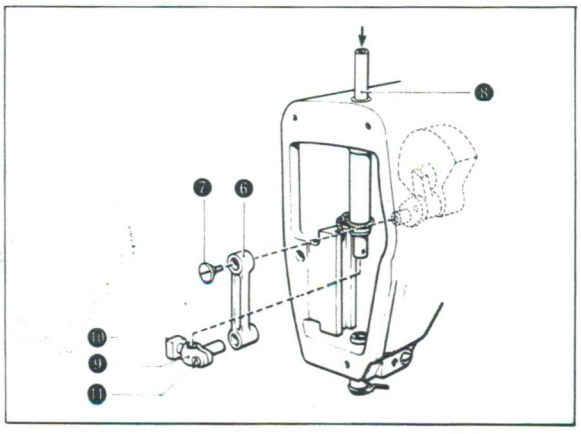
1. Tension release bar plate ❶
   Connect it to the tip of the tension release bar, and temporarily fasten it with two each screws ❷ and washers ❸.
2. Guide stud ❹
   Install it on the thread take-up guide bearing, using a screwdriver.
3. Thread take-up lever ❺
   Install it with two screws ❻ and ❼.
4. Sub-tension ❾
   Temporarily fasten it to the arm with screw ❾.
5. Main tension ❿
   Install it on the arm with screw ⓫.



7 NEEDLE BAR

1. Thread take-up lever ❶
   Install it with stud ❷, and tighten it with screw ❸.
2. Needle bar crank ❹
   Insert it into the lower end of thread take-up lever ❶, and tighten one of the two screws, whichever is ahead in the rotating direction, until it hits the screw stop.
3. Put oil cap ❺ on.
4. Needle bar connecting rod ❻
   Fasten it to the needle bar crank with screw ❼ (left-handed).
5. Needle bar ❽
   Fit slide block ❿ onto needle bar clamp ❾, insert it into the needle bar connecting rod ❻ and needle bar guide, insert needle bar ❽ into the arm from above, and temporarily tighten it with screw ⓫.





6. Needle bar positioning

(1) Turn the pulley to lower the needle bar to its lowest position. Loosen screw ⓫, and move the needle bar up or down so that the top reference line Ⓐ on the needle bar meets the lower end of needle bar bushing ⓬.

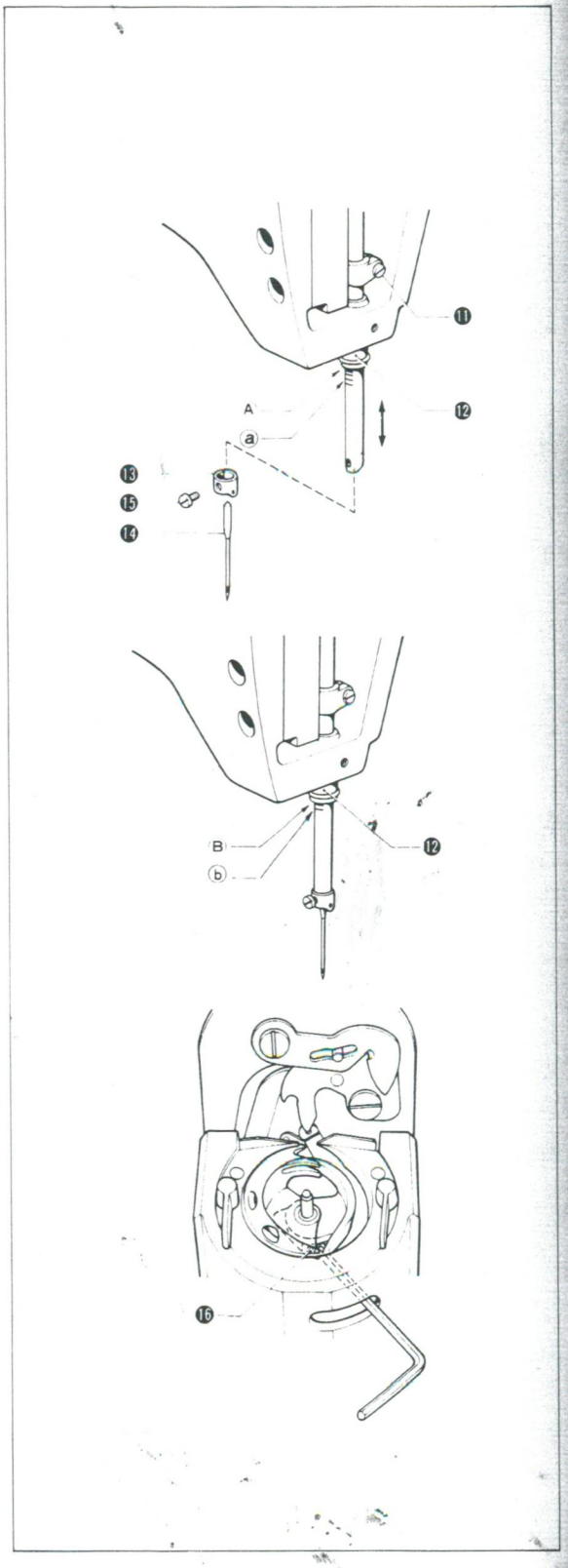
*If a DP × 17 needle is used, adjust it so the second lowest reference line ⓐ meets the lower end of the needle bar bushing.

(2) After this adjustment, fit needle bar thread guide ⓭ onto the needle bar, insert needle ⓮ into place with its long groove facing the front, and fasten it with screw ⓯.

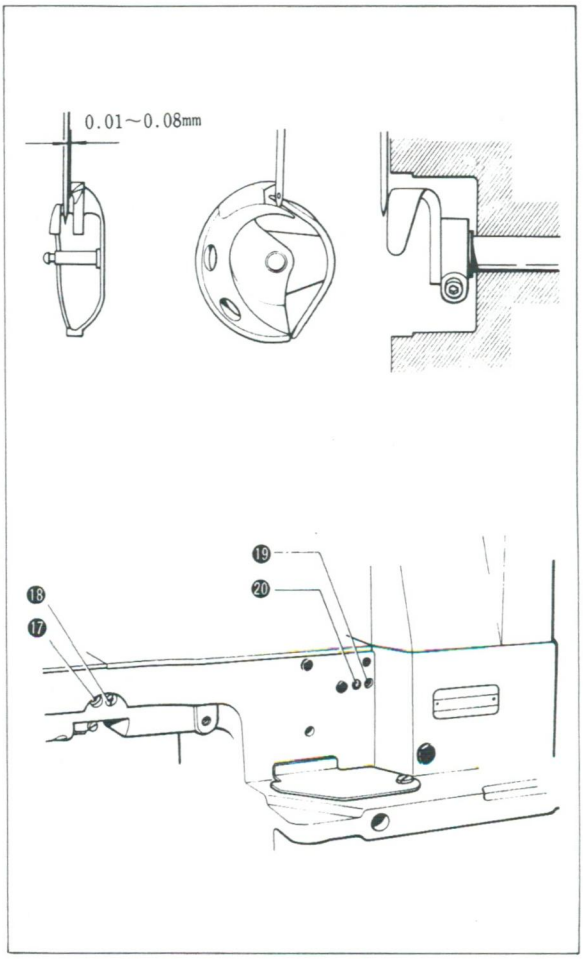
(3) Raise the machine head, fit the driver onto the lower shaft, and install the shuttle hook.

(4) Turn the pulley so that the lower end of the needle bar bushing ⓬ meets the second highest reference line Ⓑ in its ascent from the lowest position. At this time, move the driver so that the point of the shuttle hook meets the center of the needle, and tighten bolt ⓰ through the adjusting hole.

*If a DP × 17 needle is used, adjust it so the lowest reference line ⓑ meets the lower end of the needle bar bushing ⓬.



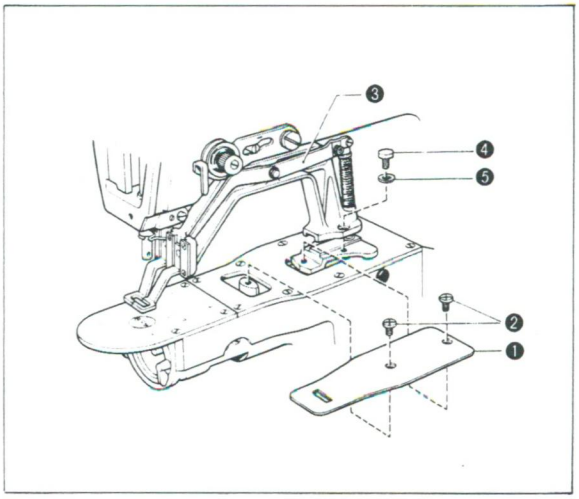
7. Clearance between needle and shuttle hook
   Turn the pulley so that the point of the shuttle hook meets the center of the needle. Loosen screw ⓱ and turn eccentric shaft ⓲ so that the clearance between the point of the shuttle hook and the needle is 0.01 to 0.08 mm.
8. Clearance between needle and driver
   Loosen screw ⓳ and turn eccentric shaft ⓴ so that the driver contacts needle lightly when the point of the shuttle hook meets the center of the needle.
9. After the adjustment, put the needle bar oil cap on.
10. Remove the shuttle hook and needle.



8 PRESSER ARM

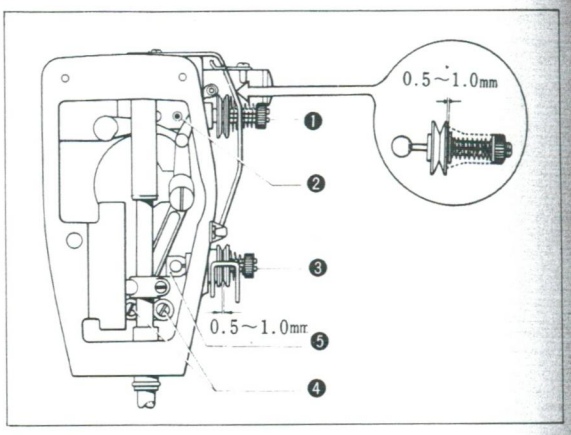
1. Feed plate ❶
   Temporarily tighten two screws ❷.
2. Presser arm ❸
   Install presser arm ❸ with two each bolts ❹ and washers ❺. When installing it, turn the pulley until the needle bar is down lowest (Reference needle position varies specifications), and make sure that the needle falls in the center of the work clamp opening.
3. Position feed plate ❶ as suitable to the work clamp, and tighten screws ❷.

*Refer to the Feed Adjustment on page 24.



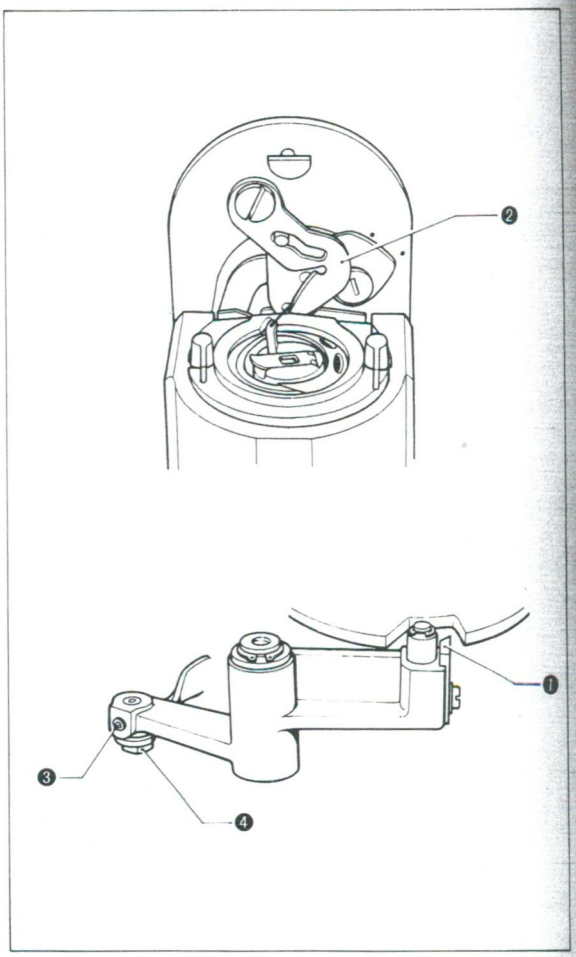
9 DISC CLEARANCES OF MAIN AND SUB TENSIONS

1. Sub-tension ❶
   Loosen screw ❷, and move the sub-tension in or out so that the tension disc presser will make a clearance of 0.5 to 1.0 mm at the machine stop position.
2. Main tension ❸
   Loosen two screws ❹, and move tension release bar plate ❺ to the right or left so that the main tension discs will make a clearance of 0.5 to 1.0 mm at the machine stop position.



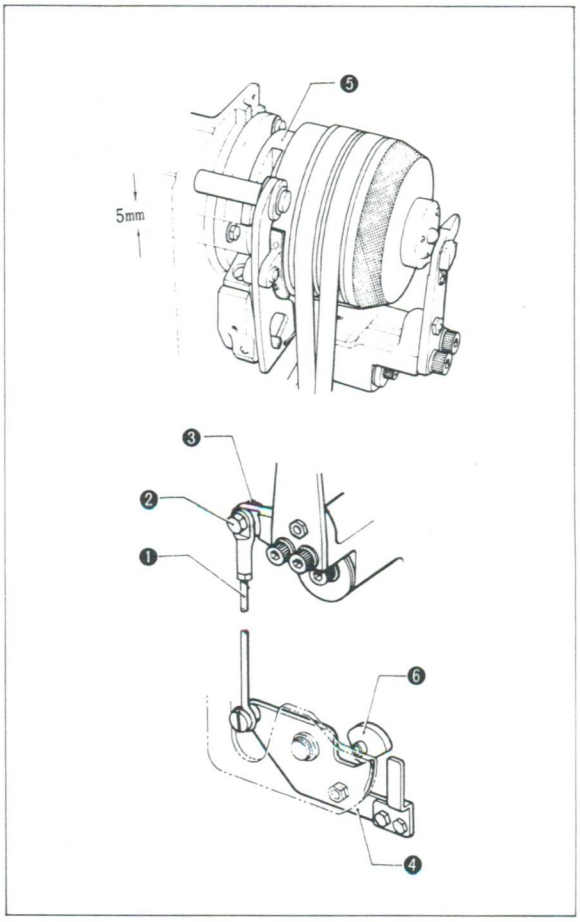
10 MOVABLE KNIFE POSITIONING

1. Remove shuttle hook and shuttle race ring.
2. When the power pulley is turned little by little in the rotating direction at the machine stop position (with the work clamp down), knife cam lever claw ❶ drops one step further. In this condition, loosen screw ❸, and turn stud ❹ so that thread retainer ❷ contacts the lower thread.



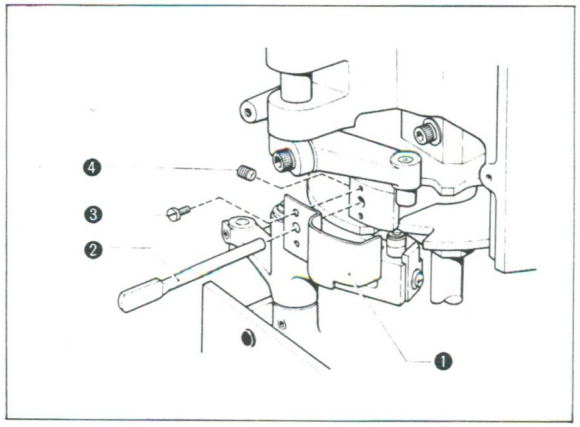
11 START LEVER POSITIONING

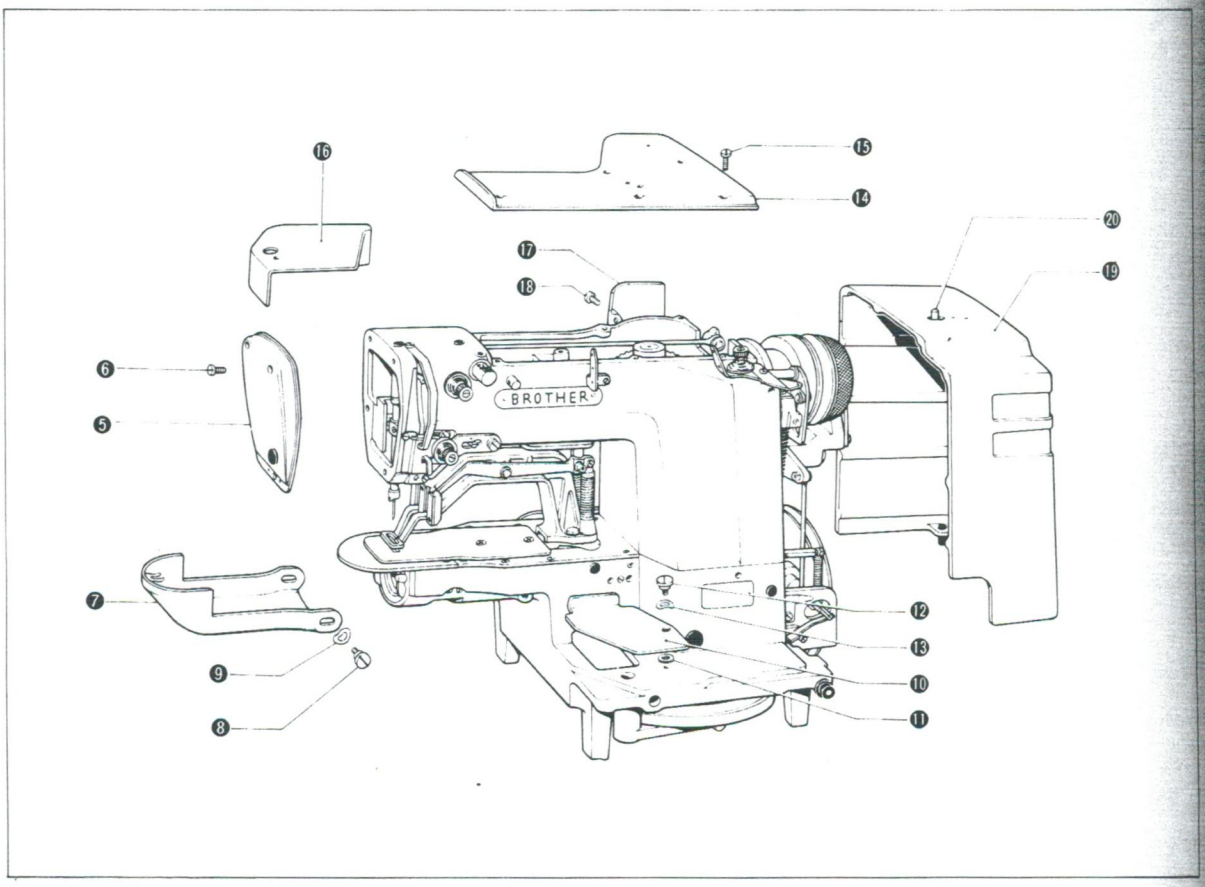
1. Start rod ❶
   Temporarily tighten eccentric screw ❷ with nut ❸ at the machine stop position.
2. Start lever ❹
   Turn the pulley by hand until stop cam ❺ comes to 5 mm before the stop position. Turn eccentric screw ❷ so that roller shaft ❻ disengages at this position. After this adjustment, tighten nut ❸.



12 COVER

1. Roller holder cover ❶
   Pull out emergency stop lever ❷, and install roller holder cover ❶ with two screws ❸. After its installation, insert emergency stop lever ❷ back into place, and tighten screw ❹.



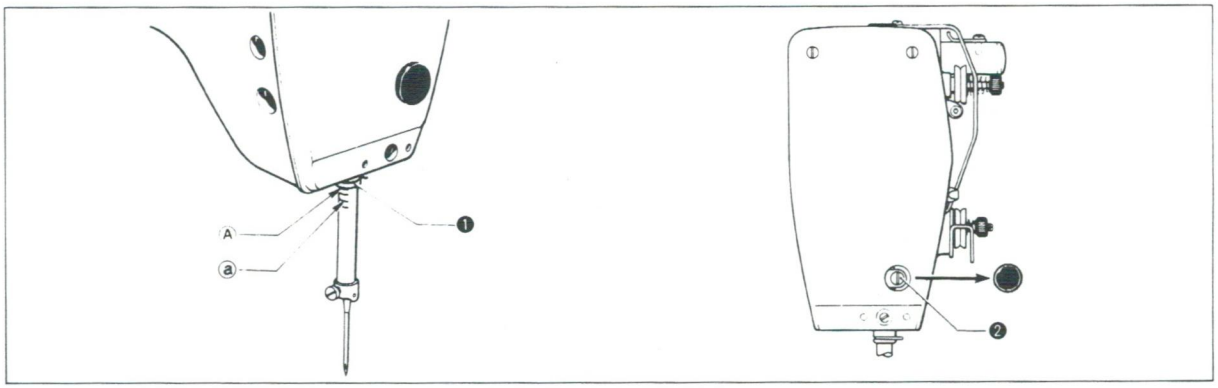


2. Face plate ❺
   Fasten face plate ❺ with three screws ❻.
3. Shuttle race cover ❼
   Install it with two each screws ❽ and washers ❾.
4. Bed cover R ❿
   Place washer ⓫ in the recess of the bed, and fasten bed cover R ❿ with screw ⓬ and washer ⓭.
5. Top cover ⓮
   Fasten top cover ⓮ with six screws ⓯.
6. Bed cover L ⓰
   Fit it over the bed mounting shaft.
7. Side cover ⓱
   Install it with four screws ⓲.
8. Place the V-belt on.
9. Place the chain on.
10. Belt cover ⓳
    While depressing button ⓴, install it.

ADJUSTING PROCEDURE

1 NEEDLE BAR

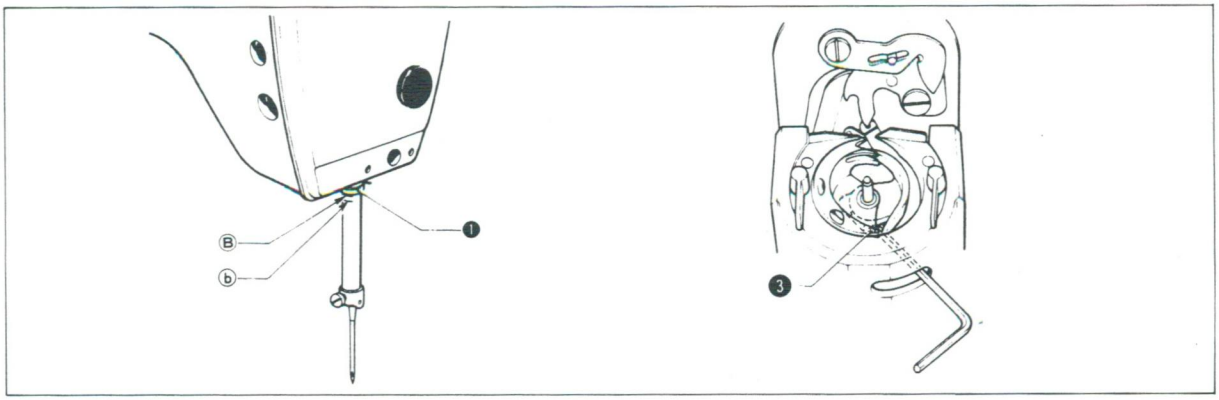
1. Needle bar height adjustment



Turn the pulley to lower the needle bar to its lowest position. Then loosen screw ❷ and move the needle bar up or down so that the uppermost reference line Ⓐ of the needle bar is flush with the lower end of the needle bar bushing ❶.

*If using a DP × 17 needle, adjust the needle bar so that the reference line second from the buttom ⓐ is flush with the base of the bushing.

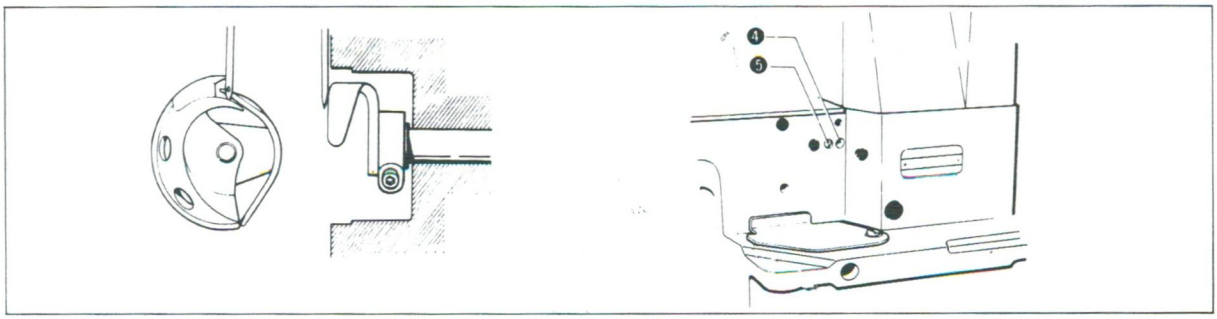
2. Needle bar stroke adjustment



Turn the pulley to move the needle bar up from its lowest position and set the reference line Ⓑ, second from the top of the needle bar, flush with the lower end of the needle bar bushing ❶. Then, with the needle bar in this position, loosen bolt ❸ and move the driver so that the top of the shuttle hook is in line with the center of the needle.

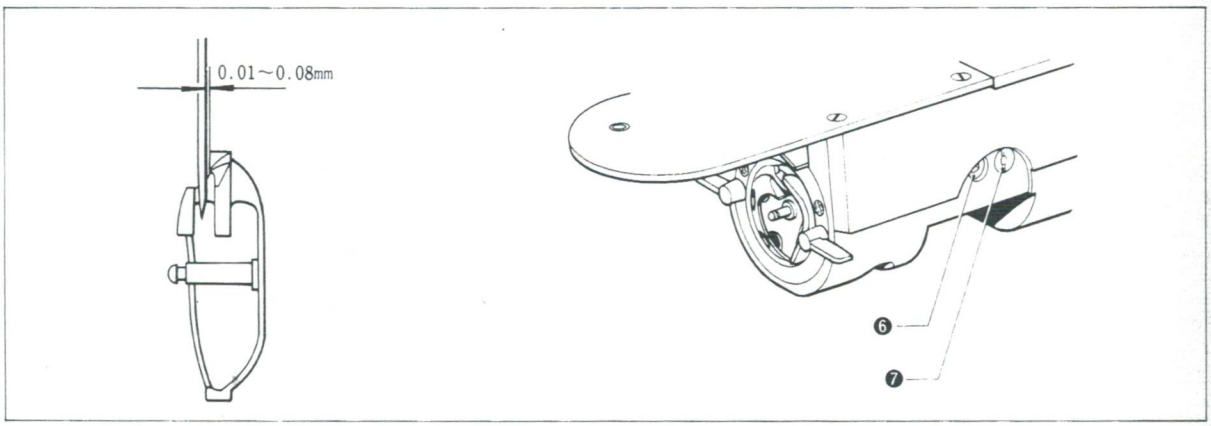
*If using a DP × 17 needle, adjust the needle bar so that the lowest reference line ⓑ is flush with the base of the needle bar bushing.

3. Driver and needle contact adjustment



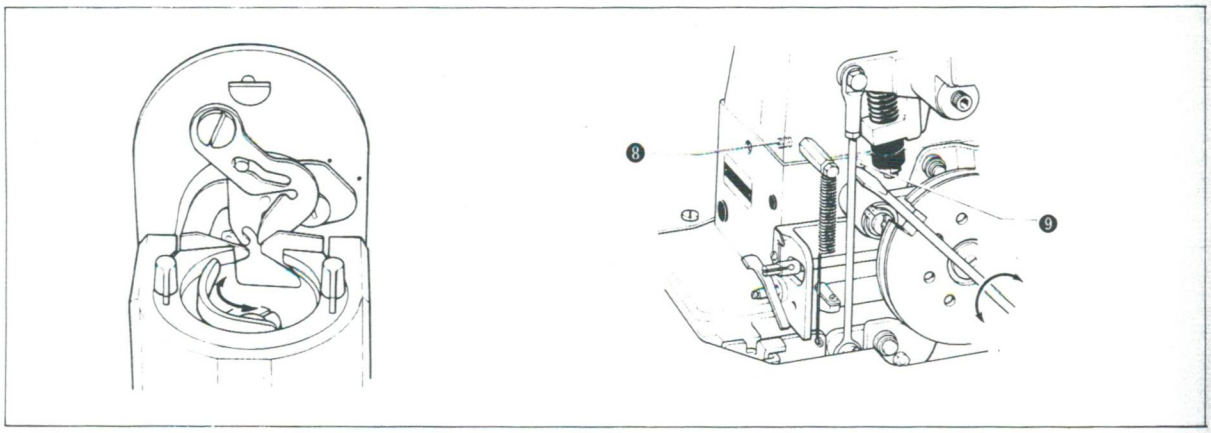
Turn the pulley to bring the top of the shuttle hook into line with the center of the needle. Loosen screw ❹ and turn the eccentric shaft ❺ so that the needle comes into contact with the driver. If the needle is received deeper than necessary it may cause skipped stitches. Again, if the needle does not contact the driver, the top of the shuttle hook may be subjected to great wear and tear. Take care when making this adjustment.

4. Needle and shuttle hook clearance adjustment



Turn the pulley to bring the top of the shuttle hook into line with the center of the needle. Then loosen screw ❻ and turn the eccentric shaft ❼ so that the clearance between the needle and the top of the shuttle hook is 0.01 to 0.08 mm.

5. Lower shaft gear backlash adjustment



Loosen screw ❽ and turn rock gear shaft ❾ so that there appears to be a play of 0.04 to 0.07 mm at the top of the driver when it is moved in the rotating direction by hand.

2 FEED

● Reference Needle Position

Reference needle position varies with specifications. Adjust by referring to the table below.

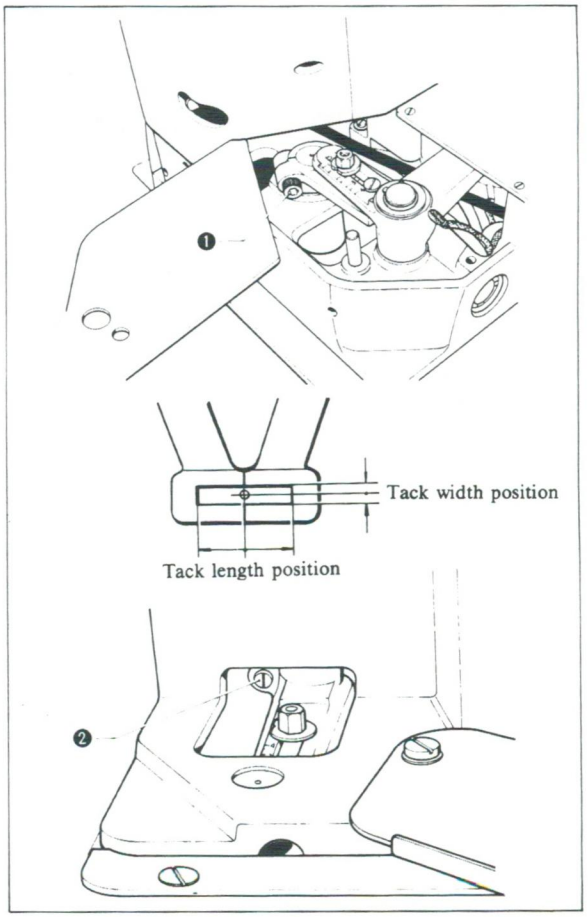
Specifications	-1	-2	-3	-4	-5	-6	-7	-8	-9
Reference Needle Position	7 stitches		3 stitches	8 stitches			7 stitches	8 stitches	7 stitches

1. Tack width adjustment

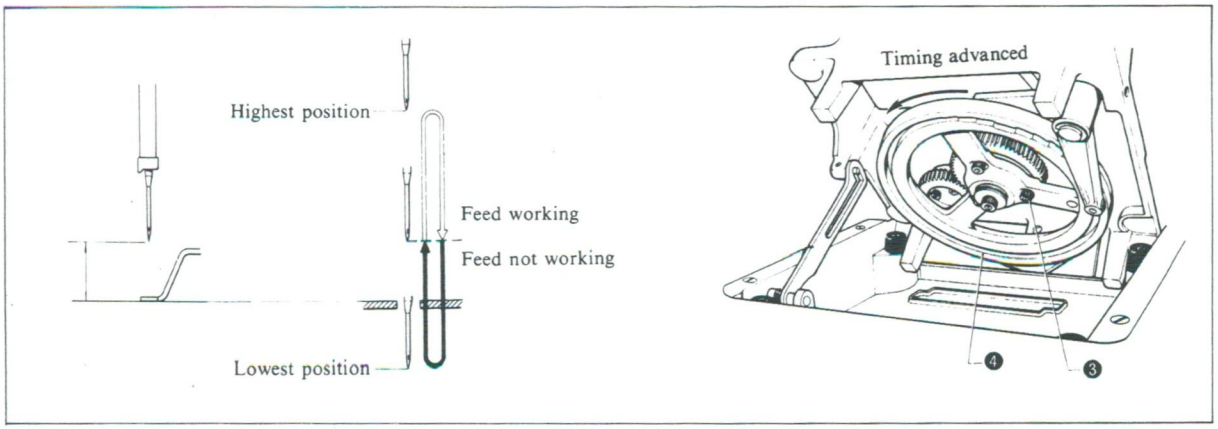
Turn the pulley by hand until the needle shown the Reference Needle Position on the preceding page (which varies with the specifications) falls into the needle hole. Loosen bolt ❶, and move the presser arm forward or back so that the needle falls in the center of the work clamp in tack width directions.

2. Tack length adjustment

Turn the pulley by hand until the needle shown the Reference Needle Position on the preceding page (which varies with the specifications) falls into the needle hole. Loosen screw ❷, and move the presser arm to the right or left so that the needle falls in the center of the work clamp in tack length directions.



3. Needle and feed timing adjustment

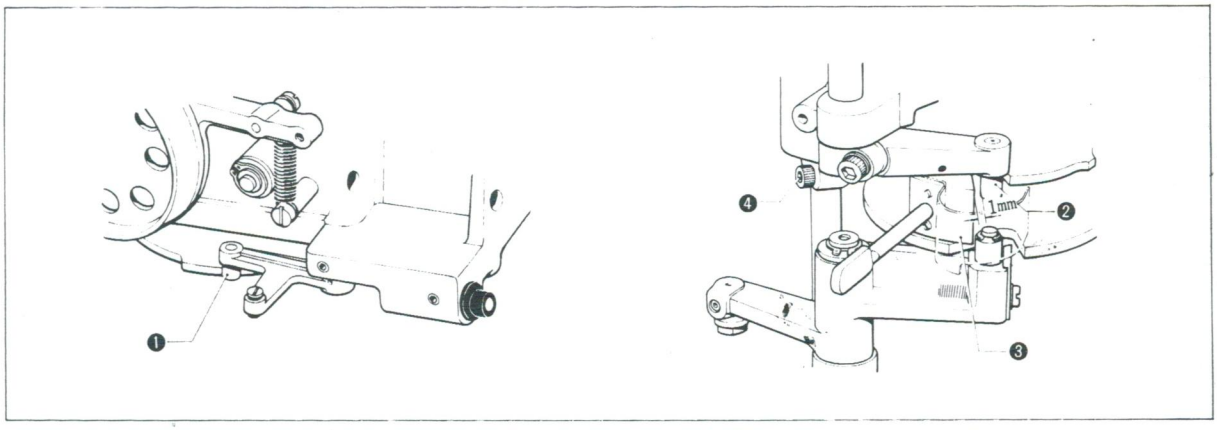


Loosen three bolts ❸ and turn feed cam ❹ little by little to adjust the timing of the needle and feed so that the feed and stop periods will be uniform as the needle runs up and down (from the top of the needle plate to the tip of the needle: 3 mm for ordinary clothes, 10 mm for denim, 17 mm for knitted clothes). The feed timing advances as the feed cam is turned in the rotating direction.

*When sewing heavy material, advance the feed timing to obtain satisfactory sewing performance.

3 VERTICAL SHAFT

1. Roller holder lever position adjustment



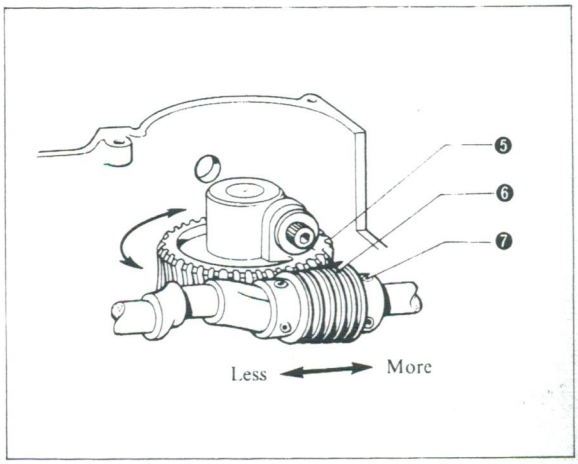
With the machine at the stop position (roller ❶ riding on the projected part on the periphery of the feed cam), loosen bolt ❹ and move roller holder ❸ to adjust the clearance between clutch cam lever roller ❷ and roller holder ❸ to 1 mm.

2. Worm wheel backlash adjustment

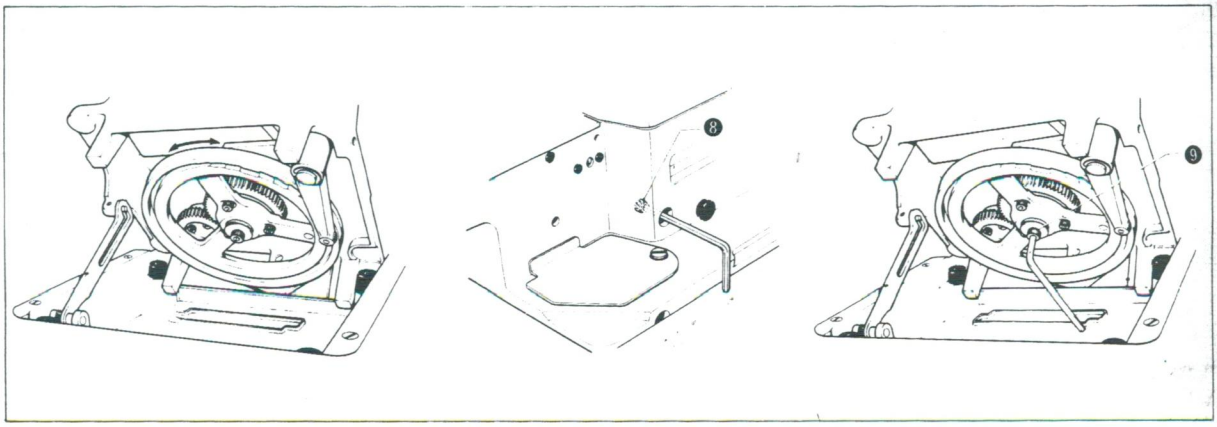
With the machine at the stop position, loosen six screws ❼ for worm ❻, and move worm ❻ so that worm wheel ❺ has a play of 0.02 to 0.05 mm when the clutch cam, or the knife cam is gently moved by hand. Play increases if worm ❻ is moved in the forward direction of the machine, or decreases if the worm is moved backward.

After this adjustment, check the timing of the needle and feed; the position and timing of the movable knife; and the clutch cam timing.

* After this adjustment, turn the machine by one cycle and make sure that the worm wheel turns smoothly.



3. Change gear backlash adjustment



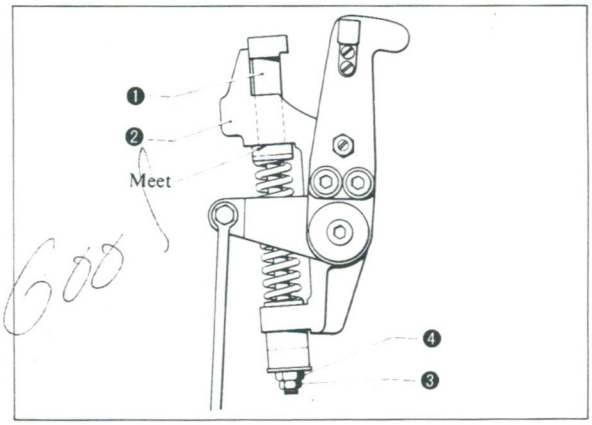
Loosen screw ❽, and turn cam shaft ❾ to adjust the change gear to have a play of 0.02 to 0.05 mm when the feed cam is turned just so much as to be free of vertical shaft play with the machine at the stop position.

* After this adjustment, turn the machine by one cycle and make sure that the machine runs smoothly.

4 CLUTCH AND BRAKE

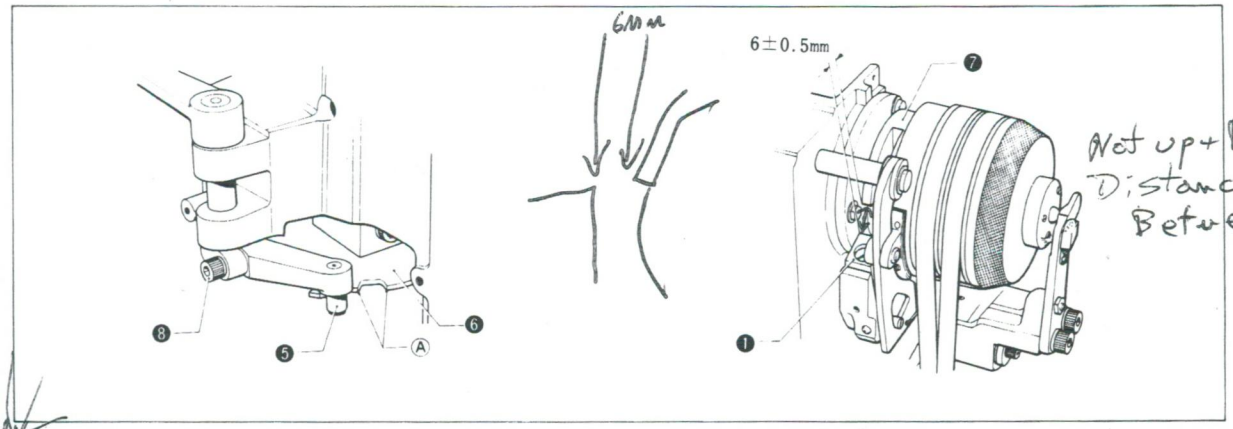
1. Stopper adjustment

With the machine at the stop position, loosen nut ❸ and adjust nut ❹ so that the bottom of stopper ❶ meets the end of clutch lever ❷.



Good

2. Clutch lever position adjustment



Not up + Down Distance Between

With clutch cam lever roller ❺ on the low speed part Ⓐ of clutch cam ❻, loosen bolt ❽ and adjust the clearance between stop cam ❼ and stopper ❶ to 6 ± 0.5 mm.

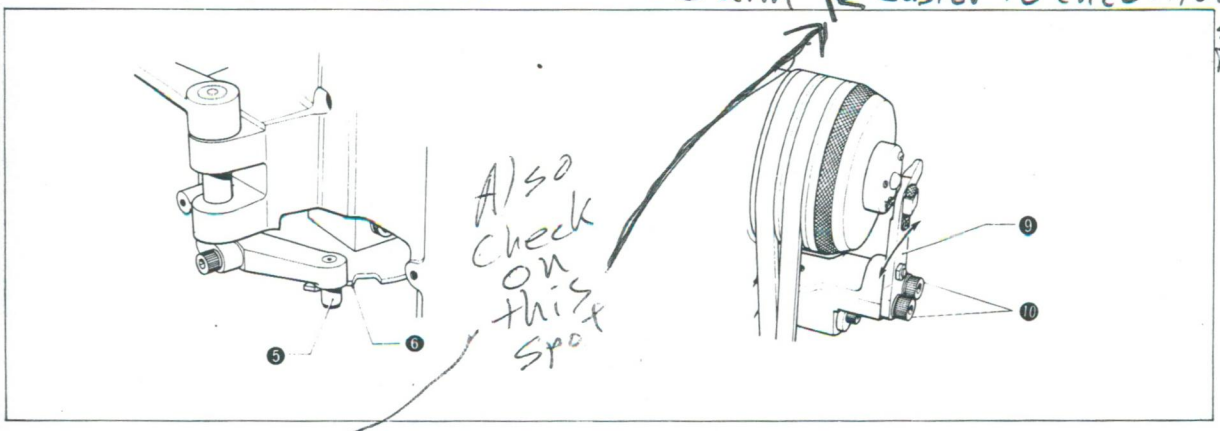
*In this case, it is suggested that the clutch lever spring be removed for easy adjustment.

Distance Between

Slow speed part A.

3. Ball presser plate position adjustment

Clutch Cam ← Easier to check Here



same Distance

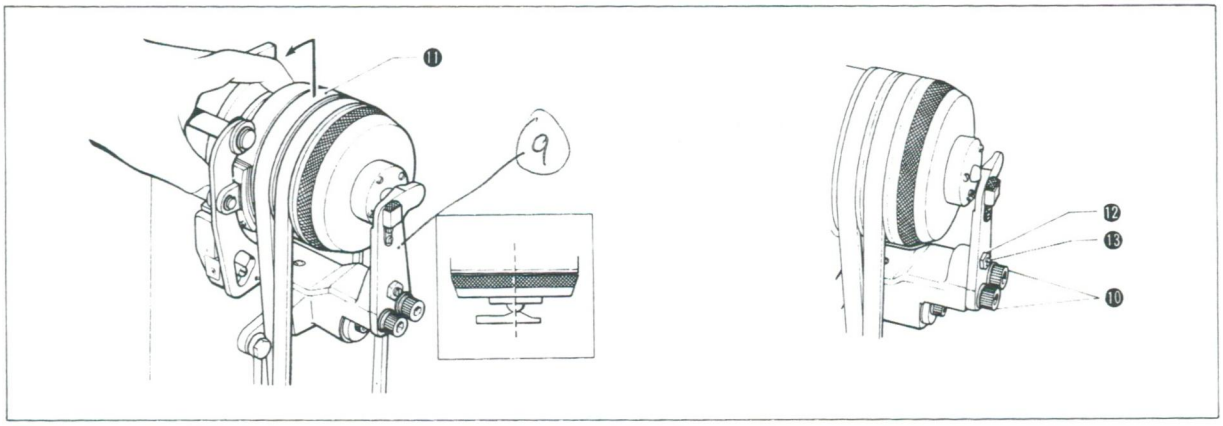
Also check on this spot

(1) With clutch cam lever roller ❺ on the low speed part of clutch cam ❻, loosen two bolts ❿ and move ball presser plate ❾ to the right or left so that the mark of ball presser plate ❾ meets the center of the steel ball.

→ Also in this condition push on foot chain or (start actuator) See if any movement from Ball prosser Loose Line

" Also clutch No movement

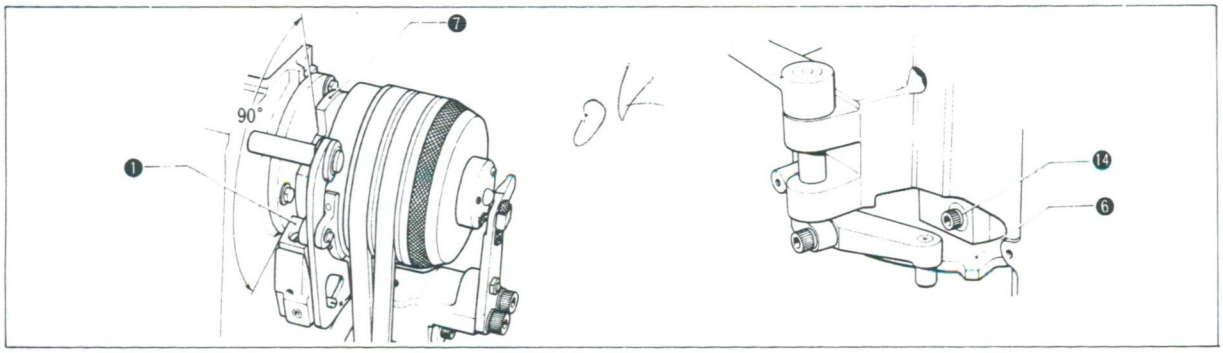
see Adjustment 7



(2) Bring the mark of ball presser plate ❾ to meet the center of the steel ball, loosen two bolts ❿ and nut ⓬ to such an extent that low speed pulley ⓫ hardly slips when the stop cam is locked and low speed pulley ⓫ turned by hand, and adjust by turning adjusting screw ⓭. After this adjustment, run the machine at high speed, and make sure that the high speed pulley will not slip.

*If, after years of use, the pulley slips even after the above-mentioned adjustment, refer to the pulley disassembly instructions on Page 12, remove one washer, and make a re-adjustment.

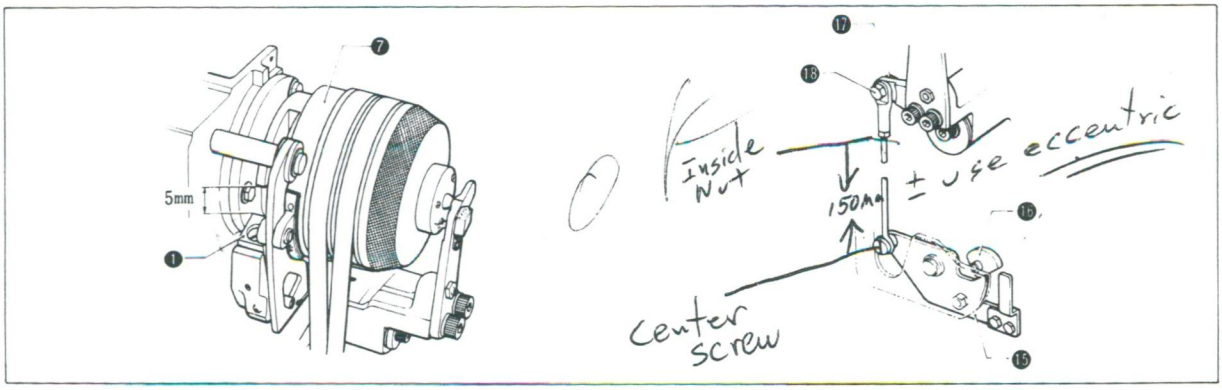
4. Clutch cam timing adjustment



Loosen bolt ⓮ and turn clutch cam ❻ so that stopper ❶ contacts stop cam ❼ 90° before the machine stop position.

*The timing advances as the clutch cam is turned in the rotating direction.

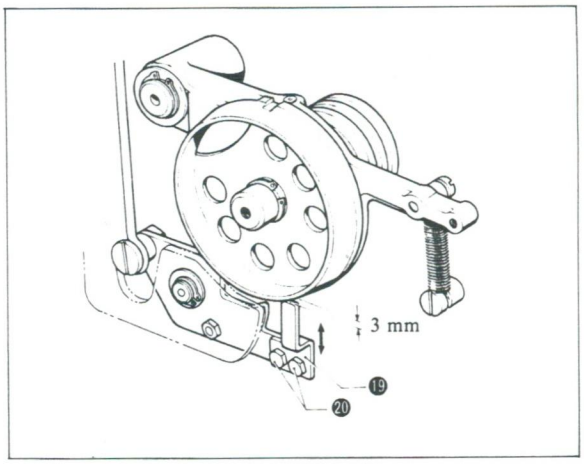
5. Start lever position adjustment



Loosen nut ⓱ and turn eccentric screw ⓲ so that roller shaft ⓰ disengages from start lever ⓯ when stop cam ❼ reaches 5 mm before the machine stop position.

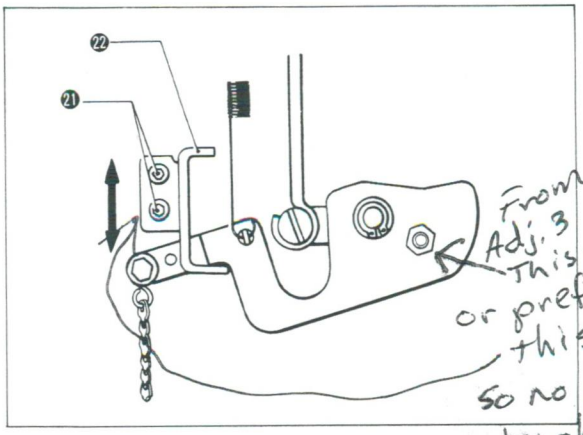
6. Start safe lever adjustment

Loosen two bolts ⑳ and move start safe lever ⑲ up or down so that the clearance between it and periphery of the power cam is 3 mm at the machine stop position.



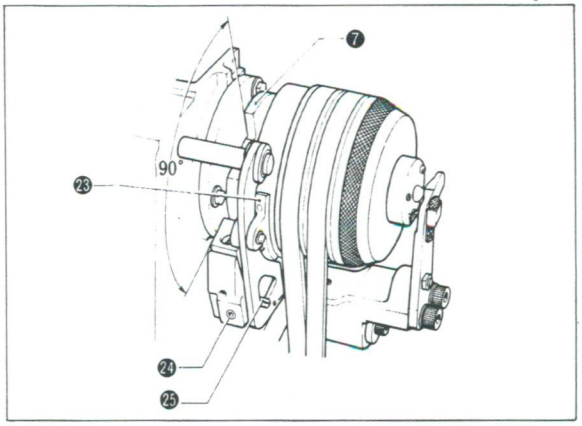
7. Start stopper position adjustment

Loosen two bolts ㉑ and move stopper ㉒ up or down so that, when the treadle is depressed two steps, the mark of the ball presser plate meets the center of the steel ball.



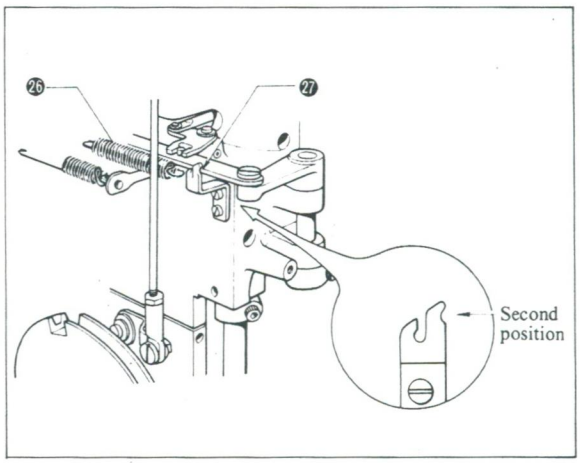
8. Brake adjustment

Loosen screw ㉔ and turn brake actuating pin ㉕ so that, when stop cam ❼ reaches 90° before the machine stop position, brake shoe ㉓ contacts stop cam ❼.



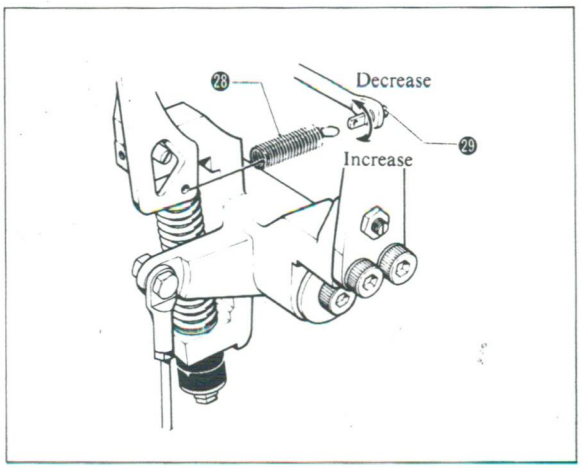
9. Clutch lever spring pressure adjustment

If the clutch lever operates so hard that the clutch will not positively fall upon sewing the last stitch, reconnect clutch lever spring ㉖ to the second position ㉗ of the clutch lever spring hook.



10. Brake spring pressure adjustment

If a very heavy material is sewn with the machine of the standard specifications, the stop cam might not turn all the way to the stop position upon sewing the last stitch due to increased friction resistance between the needle and the material. In such a case, unhook brake spring ㉘, and turn spring hook ㉙ counterclockwise to reduce the brake spring pressure.



5 POWER WORK CLAMP LIFTER

1. Power drive lever adjustment

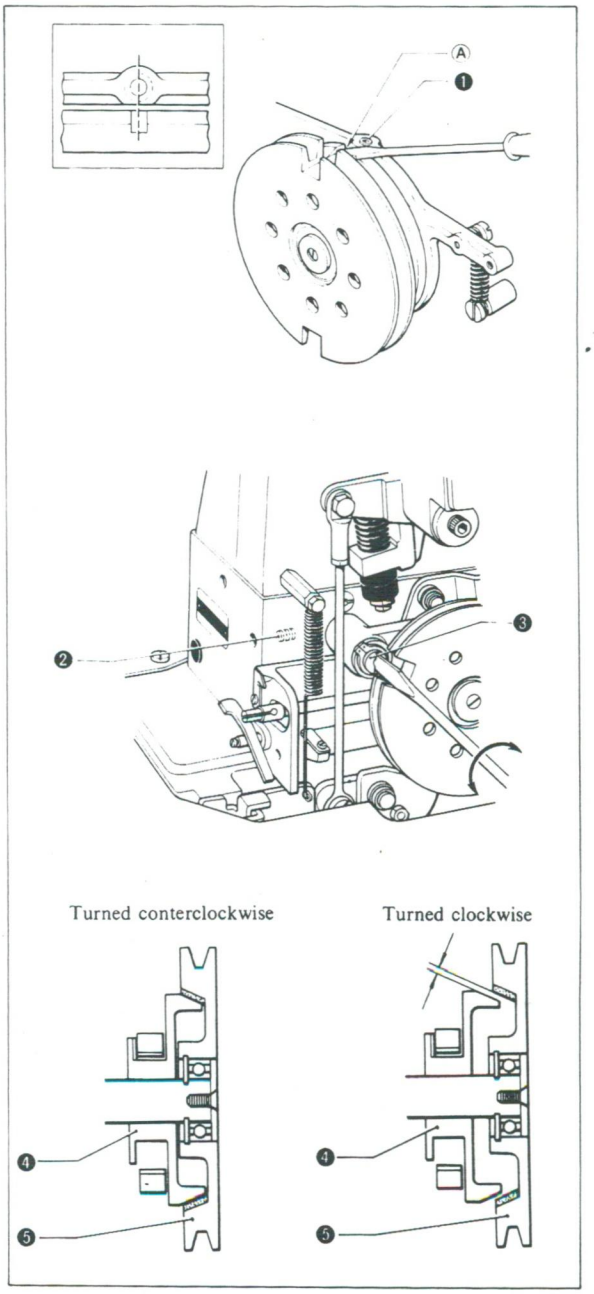
(1) Check that the slot Ⓐ of the power cam is in line with the center of roller ❶ at the machine stop position (with the work clamp up). If not, insert a screwdriver into the slot, and push the power cam so that it is aligned with the roller.

(2) Loosen screw ❷, and turn power drive lever shaft ❸ counterclockwise so that power cam ❹ contacts power pulley ❺.

(3) Turn power drive lever shaft ❸ clockwise little by little so that there is a slight clearance between power cam ❹ and power pulley ❺ (enough for power pulley ❺ to lightly turn when pushed with a finger tip).

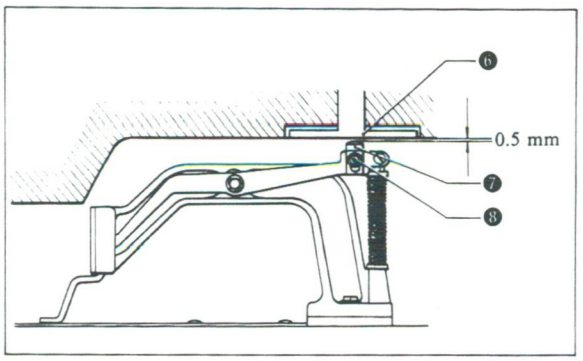
(4) Similarly, check that there is a slight clearance between power cam ❹ and power pulley ❺ at the machine stop position (with the work clamp down).

(5) With the V-belt on in place and the work clamp up, turn the power pulley backward and check that the power cam will not turn together with the power pulley. Similarly, when the work clamp is down, check that the power cam will not turn together with the power pulley.



2. Work clamp height adjustment

The maximum rise of the work clamp at the machine stop position is 17 mm from the top of the needle plate to the work clamp. To adjust it, loosen bolt ❽ and move presser arm lever plate ❼ up or down so that the clearance between work clamp lifter plate ❻ and presser arm lever plate ❼ is 0.5 mm.

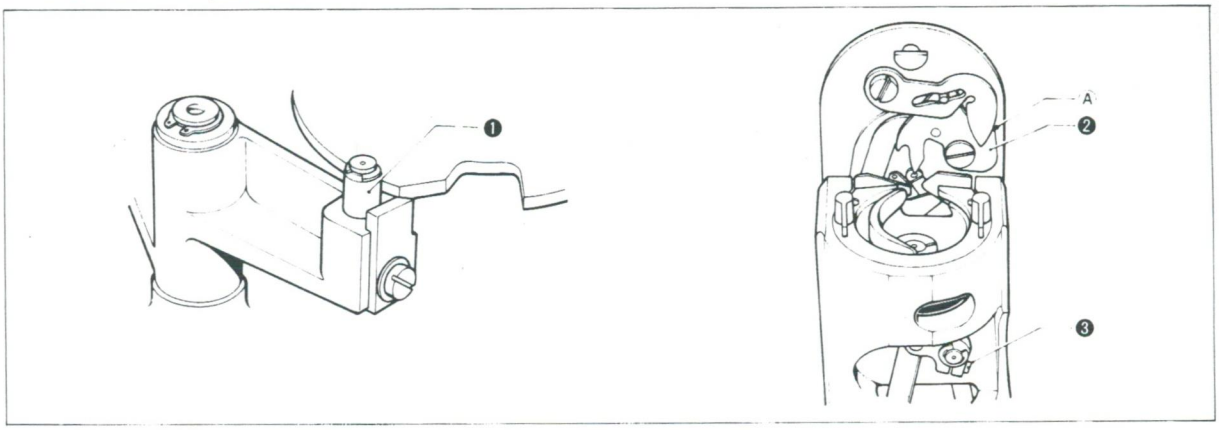


- **Standard Work Clamp Height**

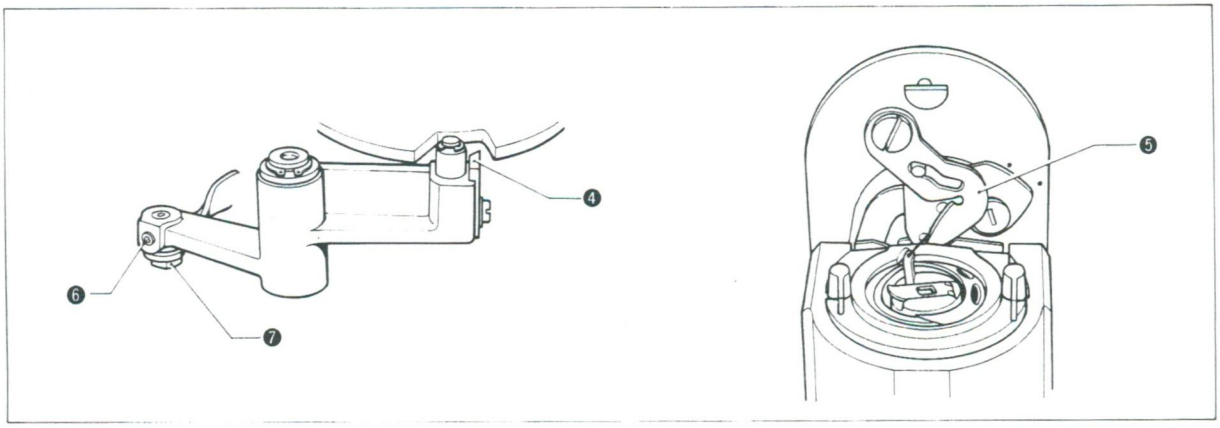
Use	Work Clamp Height
Ordinary, Knitted clothes	10 mm
Denim	15 mm

6 THREAD TRIMMER

1. Movable knife position



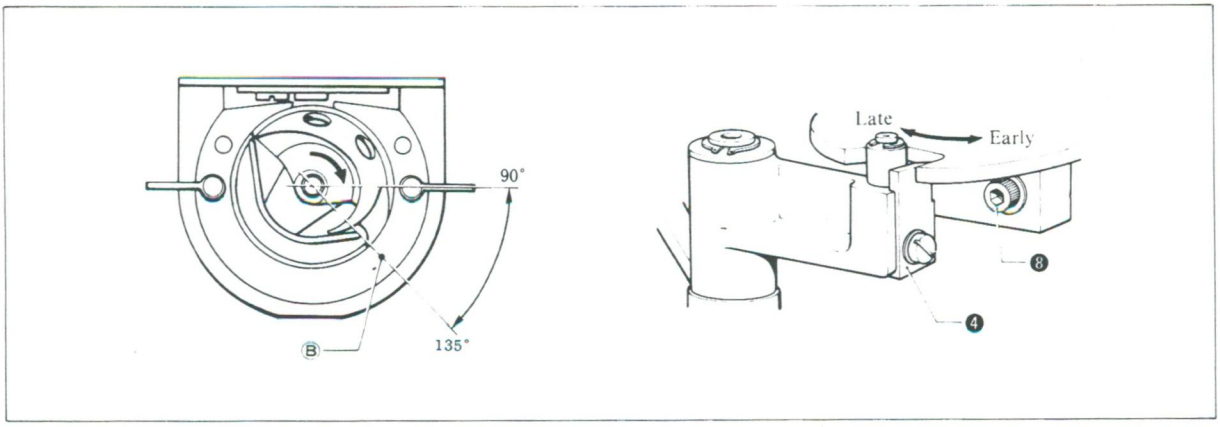
(1) With knife cam lever roller ❶ on the periphery of the knife cam, loosen screw ❸ and move movable knife ❷ so that its corner meets the mark Ⓐ (outside) of the needle plate.



(2) When the power pulley is turned little by little in the rotating direction at the machine stop position (with the work clamp down), knife cam lever claw ❹ drops one step further. In this condition, loosen screw ❻, and turn stud ❼ so that thread retainer ❺ contacts the lower thread.

*If the above adjustment is incomplete, the lower thread might break due to excessive tension.

2. Moveble knife timing adjustment

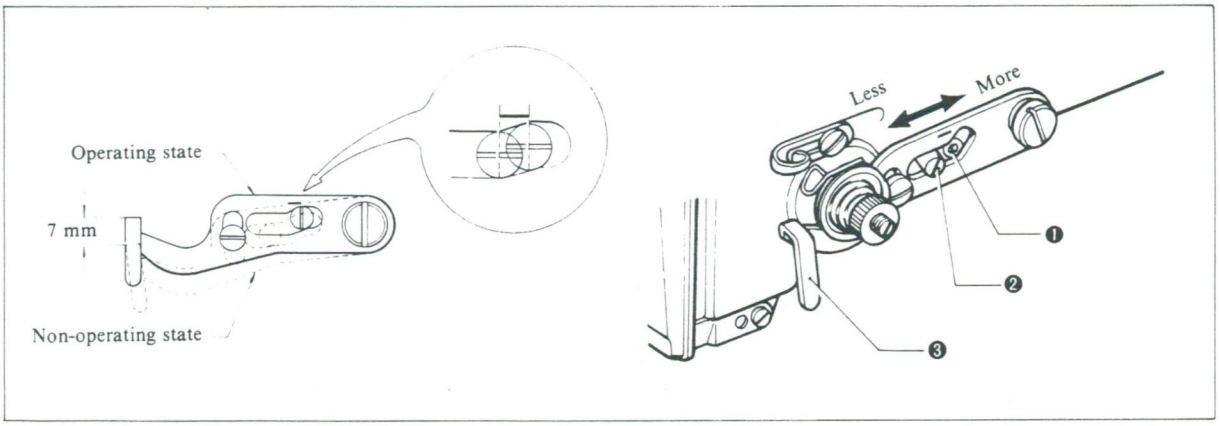


Loosen bolt ❽ and turn knife cam to adjust the movable knife timing so that knife cam lever claw ❹ drops into a recess of the knife cam when the shuttle hook point is between 90° and 135° (until it meets the mark Ⓑ of the shuttle race ring) upon sewing the final stitch.

*The timing advances as the knife cam is turned in the rotating direction.

7 THREAD TENTION AND TENSION RELEASE

1. Thread take-up lever stroke adjustment



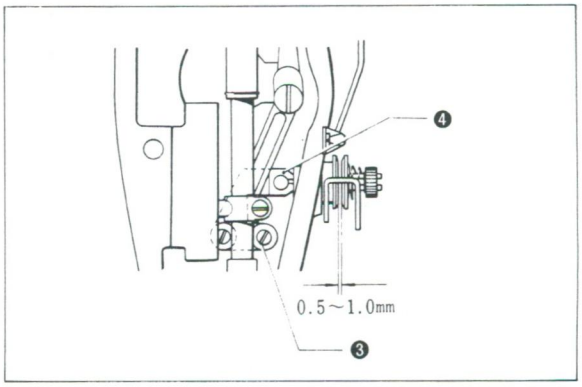
Thread take-up lever stroke can be adjusted up to 7 mm maximum. Adjust it as appropriate to the work to be sewn.

(1) With the machine in operation, loosen screw ❶, and move guide shaft ❷ to the right or left. The smaller the stroke, the better will be the stitches on the wrong side. However, the stroke must not be so small as to cause the thread to slip out.

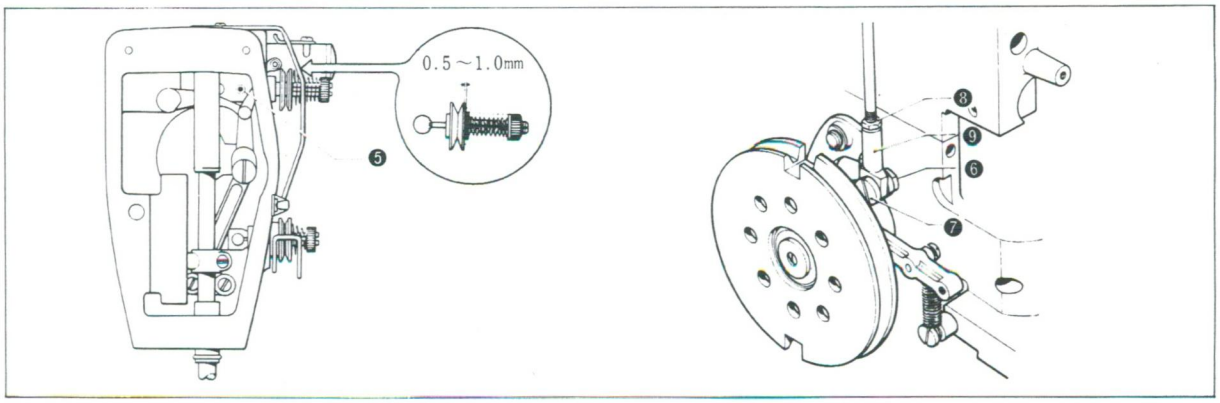
* In adjusting the thread take-up lever stroke, adjust it so that the center of guide shaft ❷ will always be within the mark range.

2. Main tension disc clearance adjustment

With the machine at the stop position, loosen two screws ❸ and move tension release bar ❹ to the right or left so that the main tension discs have a clearance of 0.5 to 1 mm.



3. Sub-tension adjustment



(1) Sub-tension disc clearance

With the machine at the stop position, loosen screw ❺ and move the sub-tension assembly so that the sub-tension discs will have a clearance of 0.5 to 1.0 mm

(2) Sub-tension timing

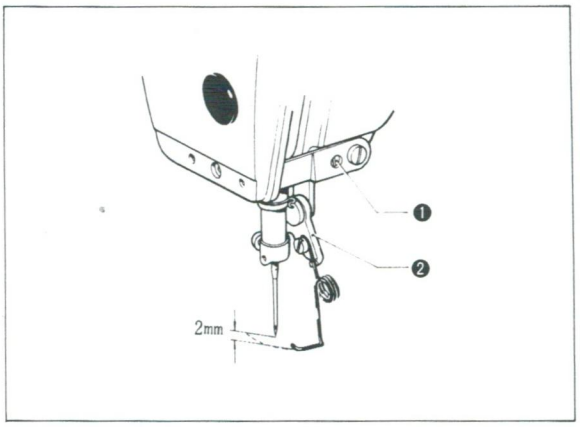
Loosen nut ❻, remove screw ❼, loosen nut ❽, and turn work clamp lifter adjusting joint ❾ so that the sub-tension discs will tighten immediately before the movable knife cuts the thread.

* The sub-tension discs tighten sooner as the work clamp lifter adjusting joint is turned in.

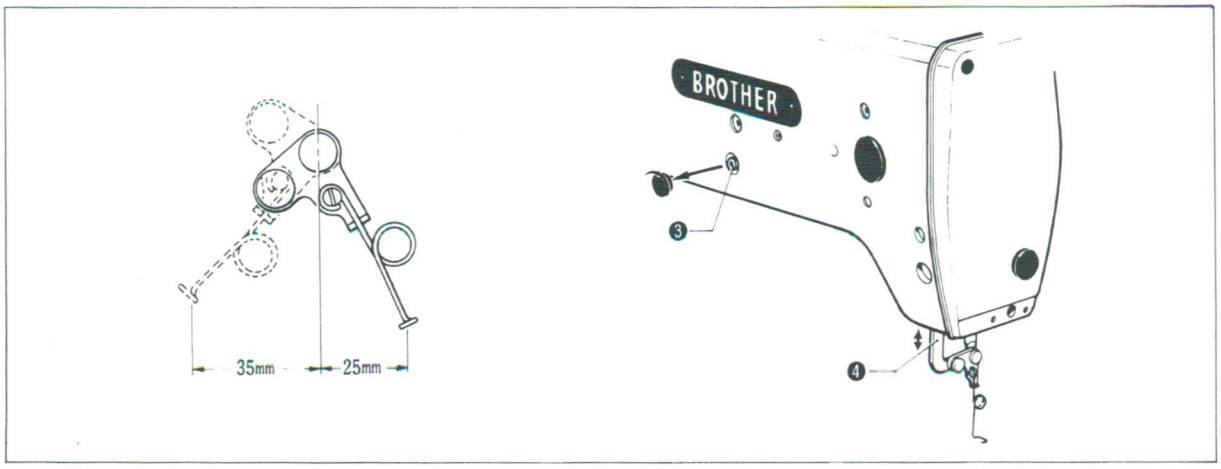
8 THREAD WIPER

1. Thread wiper height adjustment

Loosen screw ❶, and move thread wiper arm supporter ❷ up or down so that the clearance between the wiper and the tip of the needle will be 2 mm when the wiper passes under the needle.



2. Thread wiper stroke adjustment



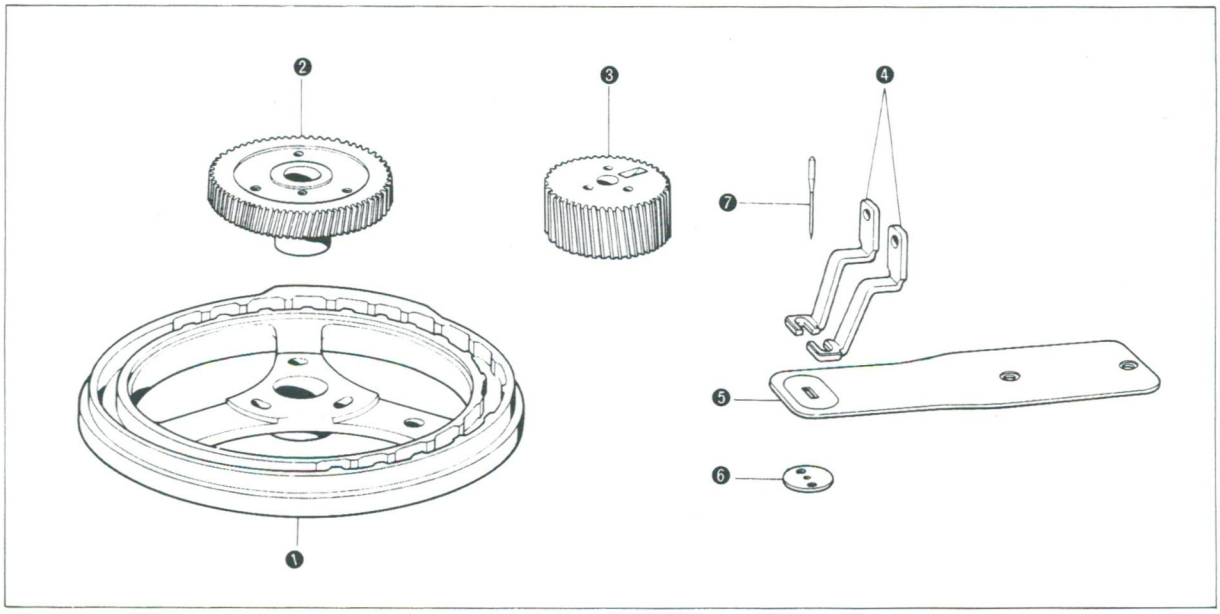
Loosen screw ❸, and move thread wiper link ❹ up or down so that the wiper will be 25 mm from the center of the needle bar before it wipes the thread, or 35 mm from the same after it has wiped the thread.

STITCH CHANGING PROCEDURE

1 FROM ORDINARY STITCHES TO KNITTED STITCHES

- **Necessary replacement parts**

❶ Feed cam ❷ Change gear C ❸ Change gear W ❹ Work clamps L, R ❺ Feed guide ❻ Needle hole plate ❼ Needle

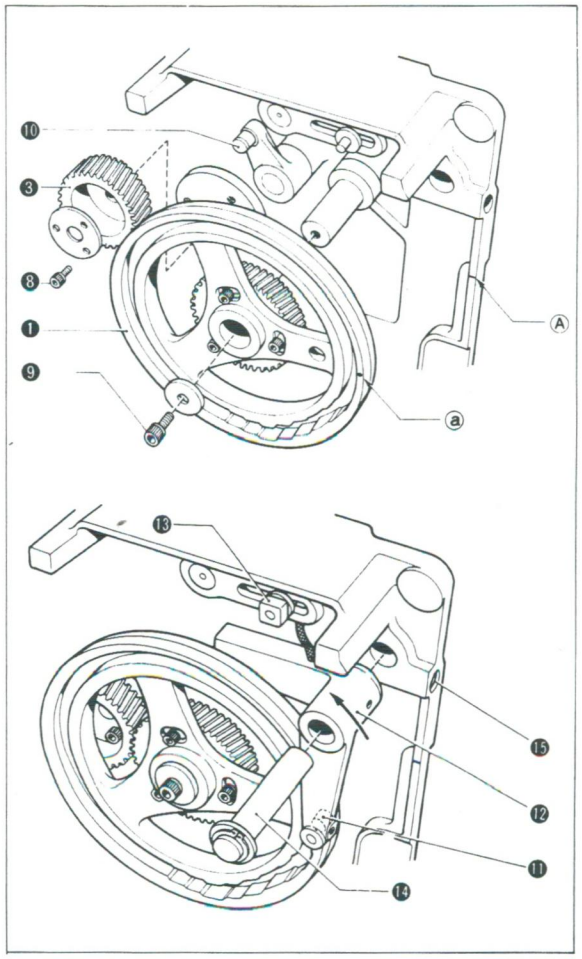


(Procedure)

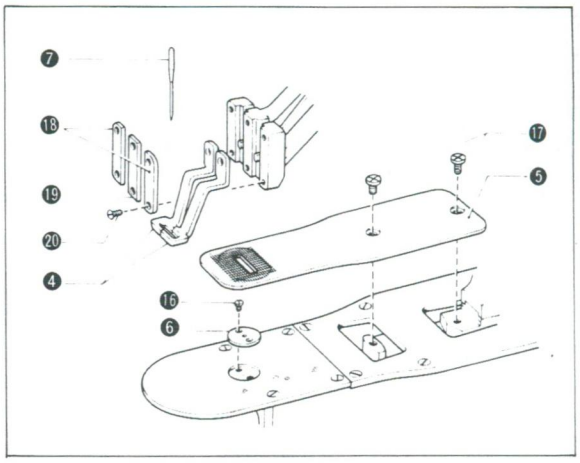
When changing the number of stitches, be sure to do so at the machine stop position.

1. Install change gear W ❸ with three bolts ❽.
2. Match the mark of feed cam ⓐ with the mark Ⓐ of the bed, and install it with bolt ❾. Check that roller ❿ is in the back groove of the feed cam.
3. Fit tack length feed lever roller ⓫ into the front groove, and move tack length feed cam lever ⓬ in the arrow direction so that slide block ⓭ gets into the slot of the tack length feed cam lever.
4. Install tack length feed cam lever shaft ⓮ with bolt ⓯.
5. Fasten the wick out of the tack length feed cam lever with the wick holder.

*Refer to the List of Replacement Parts on Page 37, and have the necessary parts ready on hand for stitch change.



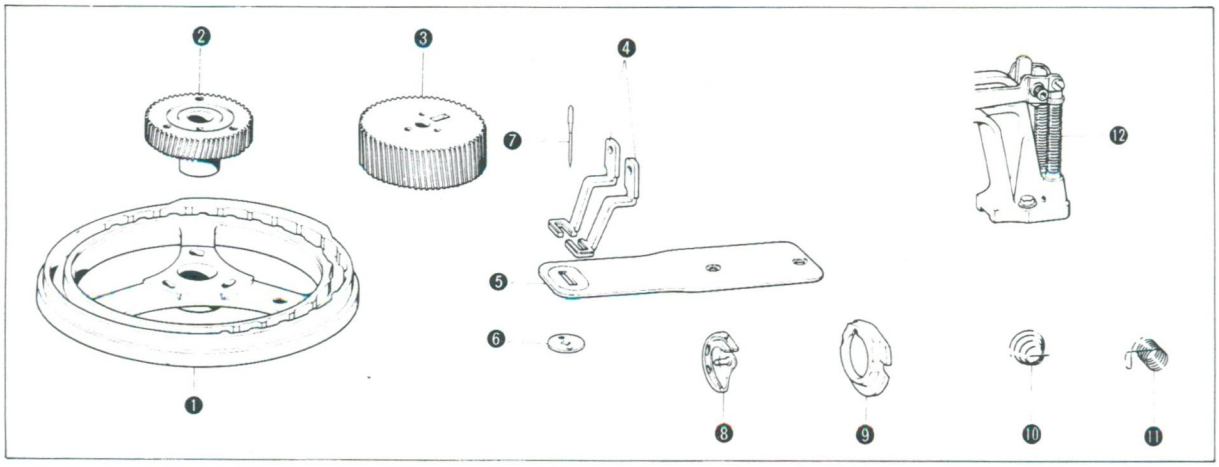
6. Fasten needle hole plate ❻ with two screws ⓰.
7. Temporarily fasten feed plate ❺ with two screws ⓱.
8. Fit work clamps L, R ❹ in place, and fasten work clamp guide brackets A ⓲ and B ⓳ with six screws ⓴.
9. Tighten two screws ⓱, making sure that when the work clamp is lowered, it does not deviate from the opening in the feed plate.
10. Install needle ❼.



2 FROM ORDINARY STITCHES TO DENIM STITCHS

● **Necessary replacement parts**

❶ Feed cam ❷ Change gear C ❸ Change gear W ❹ Work clamps L, R ❺ Feed plate ❻ Needle hole plate ❼ Needle ❽ Shuttle hook ❾ Shuttle race ring ❿ Tension spring ⓫ Thread take-up spring ⓬ Presser spring

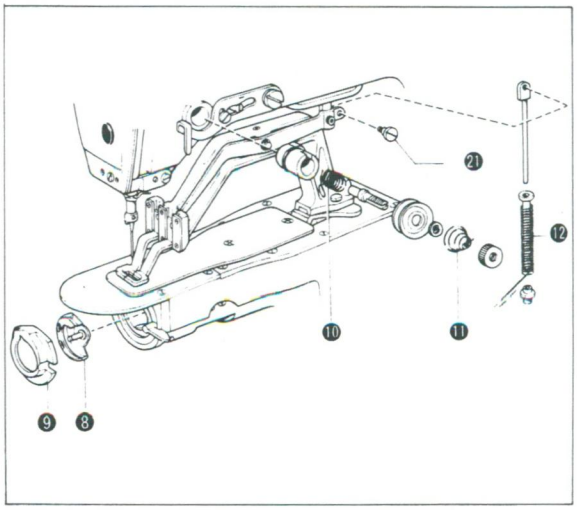


(Procedure)

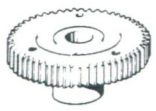
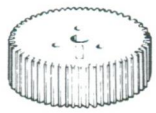
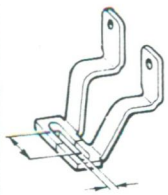
When changing the number of stitches, be sure to do so at the machine stop position.

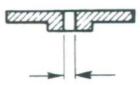
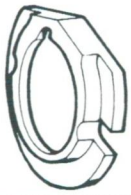
1. Refer to Steps 1 to 10 on the preceding page, and install the respective parts.
2. Install shuttle hook ❽ and shuttle race ring ❾.
3. Remove the tension bracket, and install thread take-up spring ❿ and tension spring ⓫.
4. Remove screw ㉑, and install presser spring ⓬.
5. After the above-mentioned installation, adjust the needle bar height and needle bar stroke. (See Page 23.)

* Refer to the List of Replacement Parts on Page 37, and have the necessary parts ready on hand for stitch change.



3 LIST OF REPLACEMENT PARTS

Uses / Name of part	Ordinary clothes	Denim	Knitted clothes
Feed cam 	Feed cam S (42 stitches) 152727-0-01 Feed cam S (28 stitches) 153054-0-01 Feed cam K (28 stitches) 153343-0-01 Feed cam K (42 stitches) 153344-0-01	Feed cam D (42 stitches) 153053-0-01 Feed cam D (35 stitches) 153314-0-01 Feed cam D (28 stitches) 153321-0-01	Feed cam M (28 stitches) 152726-0-01 Feed cam M (42 stitches) 153315-0-01
Change gear C 	Change gear 42C (42 stitches) 152722-0-00 Change gear 28C (28 stitches) 152720-0-00	Change gear 42C (42 stitches) 152722-0-00 Change gear 35C (35 stitches) 153313-0-00 Change gear 28C (28 stitches) 152720-0-00	Change gear 28C (28 stitches) 152720-0-00 Change gear 42C (42 stitches) 152722-0-00
Change gear W 	Change gear 42W (42 stitches) 152721-0-00 Change gear 28W (28 stitches) 152719-0-00	Change gear 42W (42 stitches) 152721-0-00 Change gear 35W (35 stitches) 153312-0-00 Change gear 28W (28 stitches) 152719-0-00	Change gear 28W (28 stitches) 152719-0-00 Change gear 42W (42 stitches) 152721-0-00
Work clamp L, R 	4 × 18 (tack width 2 mm) R. 152777-0-01 L. 152778-0-01 5 × 22 (tack width 3 mm) R. 153201-0-01 L. 153202-0-01 4 × 12 (tack width 2 mm) R. 152779-0-01 L. 152780-0-01 5 × 12 (tack width 3 mm) R. 153203-0-01 L. 153204-0-01	5 × 22 (tack width 3 mm) R. 152781-0-01 L. 152782-0-01	4 × 12 (tack width 2 mm) R. 152779-0-01 L. 152780-0-01
Feed plate (Sunken type)  	6 × 23 (tack width 3 mm) 153205-0-01 12 × 31 (Sunken type L) 153055-0-01 5 × 13 (tack width 2 mm) 152791-0-01 6 × 13 (tack width 3 mm) 153206-0-01 12 × 24 (Sunken type S) 153207-0-01	6 × 23 (tack width 3 mm) 152792-0-01	5 × 13 (tack width 2 mm) 152791-0-01

Uses / Name of part	Ordinary clothes	Denim	Knitted clothes
Needle hole plate 	Needle hole plate B (inner diameter 2.2) 152909-0-01	Needle hole plate C (inner diameter 2.2 with cross-shaped groove) 152910-0-01 Needle hole plate D (inner diameter 2.5 with cross-shped groove for very thick materials) 152911-0-01	Needle hole plate A (inner diameter 1.6) 152908-0-01
Needle 	Needle DP × 5 (#16) 107415-0-16	Needle DP × 17 (#19) 145646-0-19	Needle DP × 5 (#9) 107415-0-09
Shuttle hook 	Shuttle hook A 152685-0-01	Shuttle hook B 152687-0-01	Shuttle hook A 152685-0-01
Shuttle race ring 	Shuttle race ring A 152682-0-01	Shuttle race ring B 152686-0-01	Shuttle race ring A 152682-0-01
Main tension spring 	Main tension spring 104525-0-01	Main tension spring 107606-0-01	Main tension spring 104525-0-01
Thread take-up spring 	Thread take-up spring 145519-0-01	Thread take-up spring 144588-0-01	Thread take-up spring 145519-0-01
Presser spring 	Presser spring 152787-0-01	Presser spring 153052-0-01	Presser spring 152787-0-01

TROUBLESHOOTING CHART

Trouble	Cause	Check	Remedy	Page
Clutch does not engage, and machine operates continuously.	Clutch lever does not turn up enough.	Clearance between stop cam and stopper	Adjust clutch lever position.	27
	Ball presser plate is in wrong position in longitudinal directions in low speed operation.	Ball presser plate	Adjust ball presser plate position	27
	Ball presser plate is in wrong position in sidewise directions in low speed operation.	Ball preser plate	Adjust ball presser plate position.	27
	Clutch lever spring pressure is not enough.	Clutch lever spring pressure	Adjust clutch lever spring pressure, or replace spring.	30
	Ball presser plate is out of oil.	Ball presser plate oil	Supply oil to ball presser plate wick, or apply grease to it.	
	Roller holder is in wrong position.	Clearance between roller holder and roller	Adjust roller holder lever position.	26
Machine stops in low speed operation.	Ball presser plate is in wrong position in longitudinal directions in low speed operation.	Ball presser plate	Adjust ball presser plate position.	27
	Ball presser plate is in wrong position in sidewise direcitions in low speed operation.	Ball presser plate	Adjust ball presser plate position.	27
	Clutch lever does not turn up enough.	Clearance between stop cam and stopper	Adjust clutch lever position.	27
	Low-speed belt tension is not enough.	Low-speed belt tension	Adjust low-speed belt to yield about 10 mm.	
Clutch plate gets hot.	High-speed pulley is slipping in high speed operation.	High-speed pulley torque	Adjust ball presser plate position, or remove pulley washer.	27
Stop cam gets hot.	Low-speed pulley is slipping in low speed operation.	Ball preser plate position in longitudinal directions Ball presser plate position in sidewise directions	Adjust ball presser plate position.	27
	Clutch lever does not turn up enough.	Clearance between stop cam and stopper	Adjust clutch lever position.	27

Trouble	Cause	Check	Remedy	Page
No high speed operation	High-speed belt tension is not enough	High-speed belt tension	Adjust high-speed belt to yield about 10 mm.	
	High-speed pulley is slipping in high speed operation	High-speed pulley torque	Adjust ball presser plate position, or remove pulley washer.	27
Work clamp does not rise.	Machine does not run to stop position.	Clutch cam timing	Adjust clutch cam timing.	28
		Brake shoe contact timing	Adjust brake.	29
	Work clamp lifter roller shaft does not disengage from start lever.	Start lever position	Adjust start lever position.	28
	Power drive lever does not operate properly.	Power cam operation	Replace power drive lever spring.	
	Power cam operation is faulty.	Power cam operation	Adjust power drive lever.	31
			Oil power drive lever roller.	
Work clamp does not lower.	Power cam operation is faulty.	Low-speed belt tension	Adjust power drive lever.	31
	Low-speed belt tension is not enough.	Low-speed belt tension	Adjust low-speed belt to yield about 10 mm.	
Power pulley gets hot.	Power pulley torque is too small for power cam to turn to reference needle position.	Power pulley operation	Adjust power actuating lever.	31
	Power pulley torque is so great that power cam is forced back.			
Work clamp rise is incorrect.	Presser arm lever plate position is wrong.	Distance from work clamp to top of needle plate	Adjust work clamp height.	31
Work clamp opening and stitches are not in line.	Work clamp is out of position in tack width directions.	Position in tack width directions	Adjust work clamp in tack width directions.	25
	Work clamp is out of position in tack length directions.	Position in tack length directions	Adjust work clamp in tack length directions.	25

Trouble	Cause	Check	Remedy	Page
Start position is incorrect.	Feed cam position is wrong.	Feed cam position	Match heed cam mark in with bed mark.	35
Faulty start	Start stopper position is wrong.	Ball presser plate position	Adjust start stopper position.	29
Excessive shock at stop	Deceleration is not enough at low speed.	Clutch cam timing	Adjust clutch cam timing.	28
		Brake spring pressure	Adjust brake spring pressure.	30
		Brake shoe clearance	Adjust brake.	29
		Ball presser plate	Adjust ball presser plate position.	27
Thread wiper does not operate properly.	Thread wiper interferes with needle.	Clearance between thread wiper and needle point	Adjust thread wiper height.	34
	Thread wiper position is wrong.	Thread wiper position	Adjust thread wiper stroke.	34
Lower thread is wound unevenly.	Lower thread tension bracket position is wrong.	Lower thread tension bracket position	Adjust lower thread tension bracket position.	
Lower thread is not wound enough.	Bobbin presser position is wrong.	Thread volume	Adjust bobbin presser position.	
Thread slips out.	Main tension release timing is wrong.	Clutch cam timing	Adjust clutch cam timing.	28
	Needle thread length is uneven.	Roller shaft disengaging timing	Adjust start lever position.	28
	Thread take-up lever stroke is incorrect.	Thread take-up lever stroke	Adjust thread take-up lever stroke.	33

Trouble	Cause	Check	Remedy	Page
No high speed operation	High-speed belt tension is not enough	High-speed belt tension	Adjust high-speed belt to yield about 10 mm.	
	High-speed pulley is slipping in high speed operation	High-speed pulley torque	Adjust ball presser plate position, or remove pulley washer.	27
Work clamp does not rise.	Machine does not run to stop position.	Clutch cam timing	Adjust clutch cam timing.	28
		Brake shoe contact timing	Adjust brake.	29
	Work clamp lifter roller shaft does not disengage from start lever.	Start lever position	Adjust start lever position.	28
	Power drive lever does not operate properly.	Power cam operation	Replace power drive lever spring.	
	Power cam operation is faulty.	Power cam operation	Adjust power drive lever.	31
			Oil power drive lever roller.	
Work clamp does not lower.	Power cam operation is faulty.	Low-speed belt tension	Adjust power drive lever.	31
	Low-speed belt tension is not enough.	Low-speed belt tension	Adjust low-speed belt to yield about 10 mm.	
Power pulley gets hot.	Power pulley torque is too small for power cam to turn to reference needle position.	Power pulley operation	Adjust power actuating lever.	31
	Power pulley torque is so great that power cam is forced back.			
Work clamp rise is incorrect.	Presser arm lever plate position is wrong.	Distance from work clamp to top of needle plate	Adjust work clamp height.	31
Work clamp opening and stitches are not in line.	Work clamp is out of position in tack width direc-tions.	Position in tack width directions	Adjust work clamp in tack width directions.	25
	Work clamp is out of position in tack length directions.	Position in tack length directions	Adjust work clamp in tack length directions.	25

Trouble	Cause	Check	Remedy	Page
Upper thread breaks.	Upper thread tension is too great.	Upper thread tension	Adjust upper thread tension.	2
	Needle is installed in wrong way.	Needle direction	Install needle so its long groove faces front.	
	Thread is too thick for needle.	Thread and needle	Select thread suitable to needle.	
	Thread take-up spring tension and height are incorrect.	Thread take-up spring tension and height	Adjust thread take-up spring tension and height.	2
	Shuttle hook, needle hole plate or needle has flaws or burrs.	Flaws, burrs	Polish or replace defective parts.	
	Heat	Thread end	Use liquid cooler.	
Lower thread breaks.	Lower thread tension is too great.	Lower thread tension	Adjust lower thread tension.	2
	Needle hole plate or bobbin case edge has flaws.	Flaws	Polish or replace defective parts.	
Lower thread snaps.	Thread retainer position is wrong.	Thread retainer position	Adjust movable knife position.	32
	Thread retainer has flaws.	Flaws	Polish thread path, or replace thread retainer.	
Stitches skip.	Clearance between needle and shuttle hook point is too great.	Needle and shuttle hook clearance	Adjust needle and shuttle hook clearance.	24
	Needle and shuttle timing is wrong.	Needle bar stroke	Adjust needle bar stroke.	23
	Driver receives needle more than necesary.	Clearance between driver and needle	Adjust driver and needle contact.	23
	Needle is bent.	Needle bend	Replace needle.	
	Needle is installed wrong way.	Needle direction	Install needle so its long groove faces front.	
Needle breaks.	Needle hits shuttle hook.	Needle and shuttle hook clearance	Adjust needle and shuttle hook clearance.	23
		Needle bar stroke	Adjust needle bar stroke.	23
	Needle is bent.	Needle bend	Replace needle.	
	Needle runs off course.	Needle and feed timing	Adjust needle and feed timing.	25

Trouble	Cause	Check	Remedy	Page
Upper thread is not cut.	Fixed knife is blunt.	Fixed knife edge	Sharpen fixed knife or replace it.	
	Thread trimming lever spring pressure is too small for movable knife to run all way.	Thread trimming lever spring pressure	Replace thread trimming lever spring with a new one.	
	Movable knife does not scoop up upper thread.	Shuttle thread guide position	Adjust shuttle thread guide position.	
		Needle bar storke	Adjust needle bar stroke.	23
	Movable knife does not scoop upper thread due to final stitch skipping.	Final stitch skipping.	Refer to instructions for stitch skipping, and take steps to prevent it.	42
	Movable knife position is wrong.	Movable knife position	Adjust movable knife position.	32
	Sub-tension tightening timing is wrong.	Sub-tension tightening timing	Adjust sub-tension.	33
	Sub-tension tension is too small.	Sub-tension tension	Turn tension nut to adjust sub-tension.	
Thread gets caught.	Thread take-up spring tension and height are incorrect.	Thread take-up spring tension and height	Adjust thread take-up spring tension and height.	2
	Shuttle thread guide does not properly guide thread.	Shuttle thread guide position.	Adjust shuttle thread guide position.	
Stitches on wrong side of work are not good.	Thread take-up lever stroke is incorrect.	Thread take-up lever stroke	Adjust thread take-up lever.	33
	Needle thread length is uneven.	Needle thread length	Adjust sub-tension.	33
Thread tension poor	Upper thread tension is too small.	Upper thread tension	Adjust upper thread tension.	2
	Lower thread tension is too small.	Lower thread tension	Adjust lower thread tension.	2
	Thread take-up spring tension and height are incorrect.	Thread take-up spring tension and height	Adjust thread take-up spring tension and height.	2