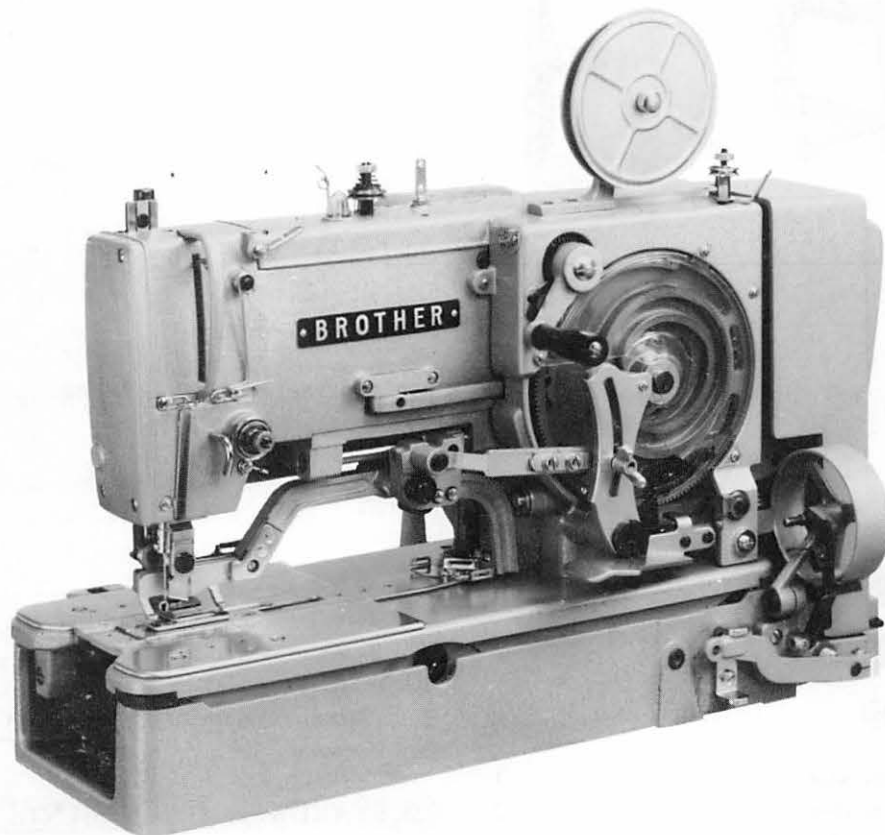


INSTRUCTION MANUAL
FOR
BROTHER LH4-B814-2, -3, -5



BROTHER INDUSTRIES, LTD.

NAGOYA, JAPAN

FEATURES



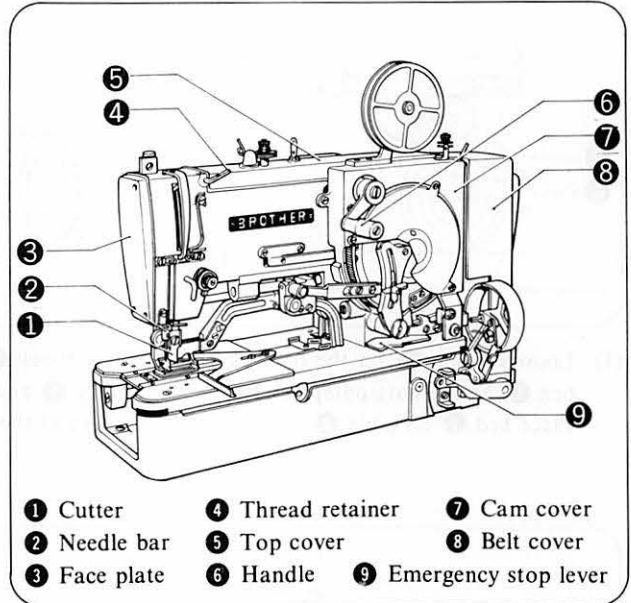
- Large work space for easy sewing.
- Buttonhole stitch width, stitch length, number of stitches per buttonhole and oil supply rate can be easily adjusted without tilting the machine head.
- If the upper thread breaks, the cutter locking device will work.
- Special endless flat belts are employed for slip-free, positive starting and slowdown. A tension pulley allows easy belt adjustment.
- The machine operates quietly with a minimum of vibration, and has great durability.
- Longitudinal and crosswise rulers are provided as accessories.

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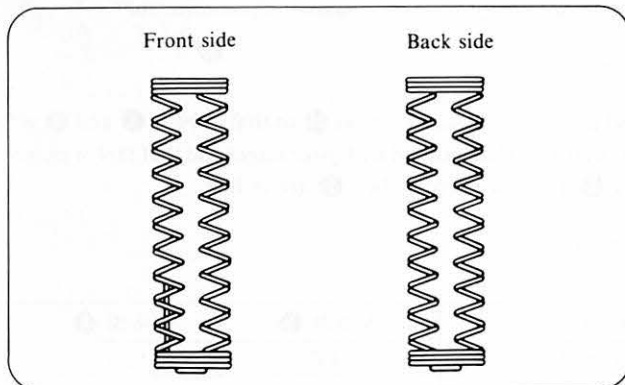
MACHINE MODELS

| Model | LH4-B814 | | |
|--------------------------------|----------------------------|----------|----------------------------|
| Sub-class | —2 | —3 | —5 |
| Main use | men's and women's garments | Knitwork | men's and women's garments |
| Max. sewing speed | 3,200 rpm | | 2,800 rpm |
| No. of Stitches per buttonhole | 60 to 360 | | |
| Feed system | Upper and lower feed | | Upper feed |
| Buttonhole length | 6.5 ~ 32 mm | | 32 ~ 48 mm |
| Buttonhole width | 2 ~ 6 mm | | |
| Max. sewing thickness | 4mm | 3.5 mm | 5 mm |
| Max. clamp lift | 13.0 mm | 12.5 mm | 12 mm |
| Needle bar stroke | 35.7 mm | | |
| Needle | DP × 5 | | |
| Lubrication | Automatic | | |
| Tape Winder | Installed | | |



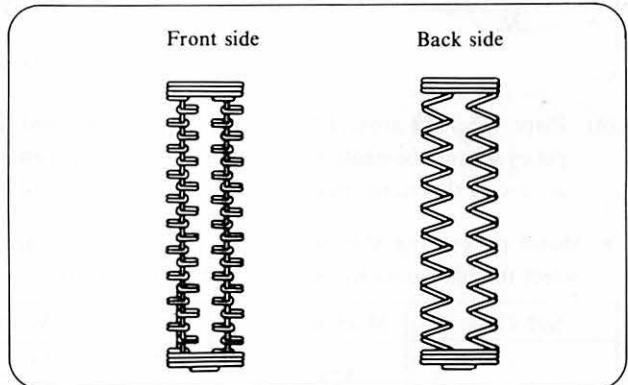
STITCH PATTERNS

Whip stitch



Only the upper thread runs on the top of the work and only the lower thread on the other side in zigzag form as zigzag stitches formed by a lock stitch zigzag machine.

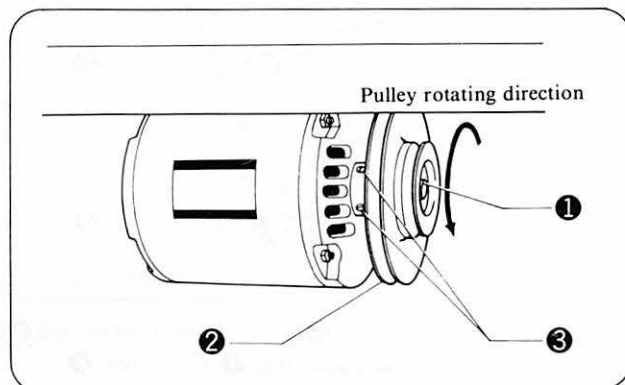
Purl stitch



The upper thread runs straight under an increased tension and the lower thread runs across the upper thread from both right and left.

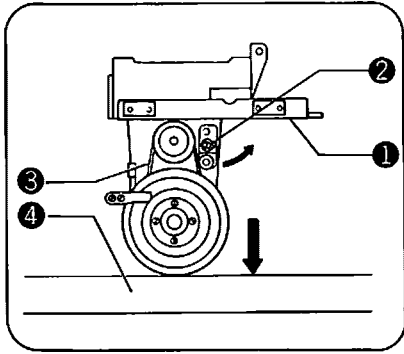
A. SETTING UP

1. Installation of the Motor Pulley

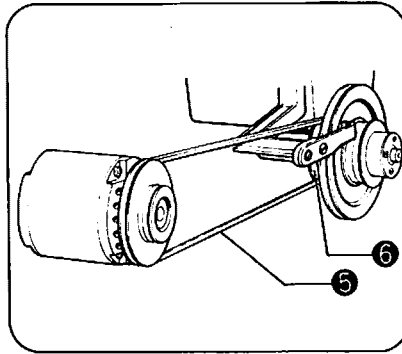


- (1) Slide motor pulley ② onto motor shaft ①, see that the screw holes in the motor pulley match the screw seats on the motor shaft, and tighten set screws ③ securely.

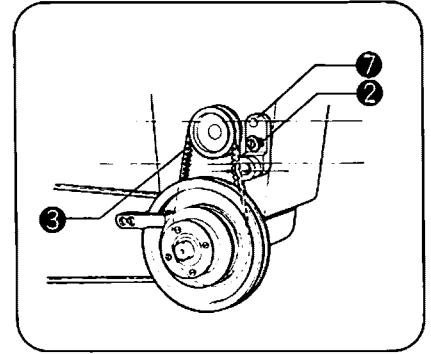
2. Installation of the Head Base



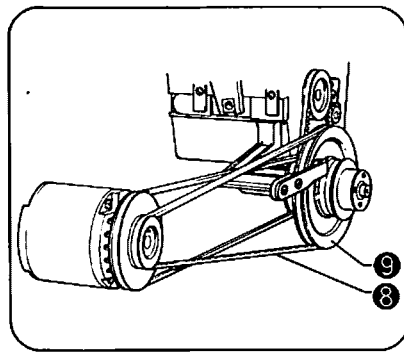
(1) Loosen screw ② on the back of bed ①, and remove pump belt ③. Place bed ① on table ④.



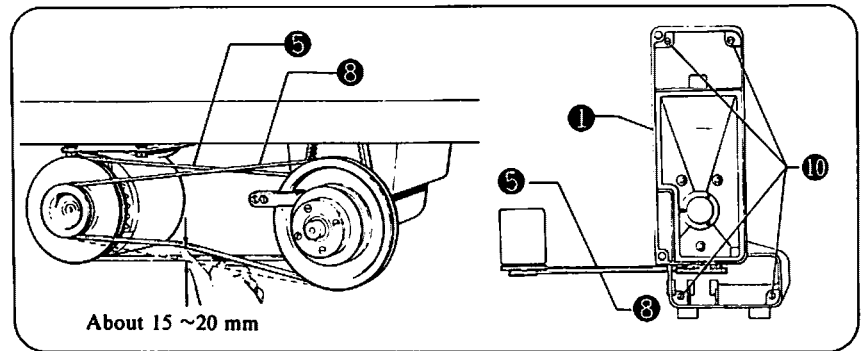
(2) Place V-belt ⑤ around high-speed pulley ⑥ and the larger-diameter groove of the motor pulley.



(3) Put pump belt ③ on. Slightly press pump belt tension lever ⑦ to make pump belt ③ tense, and tighten screw ②.



(4) Place V-belt ⑧ around low-speed pulley ⑨ and the smaller-diameter groove of the motor pulley.



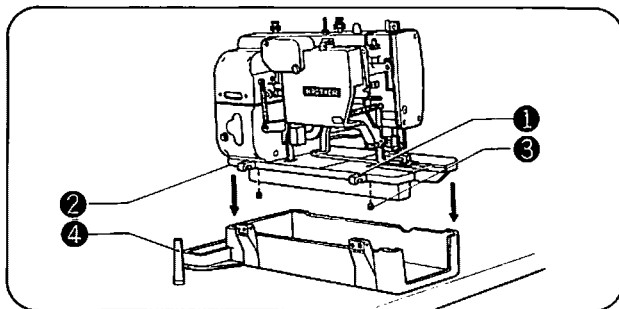
(5) Install bed ① and fasten it with wood screws ⑩ so that V-belts ⑤ and ⑧ will give in about 15 to 20 mm when pushed with your finger and that motor pulley, high-speed pulley ⑥ and low-speed pulley ⑨ are in line.

★ Motor pulleys and V-belts for 50Hz and 60Hz areas are different. Select the right ones by referring to the table below.

| Sub-class | Machine Speed | Frequency | Motor Pulley | V-belt ⑤ | V-belt ⑧ |
|-----------|---------------|-----------|----------------------|----------|----------|
| —2—3 | 3200 rpm | 50Hz | Motor Pulley 50 | 43" | 42" |
| | | 60Hz | Motor Pulley 60 | 41" | 41" |
| | 2800 rpm | 50Hz | Motor Pulley 60 | 41" | 41" |
| | | 60Hz | Motor Pulley 60—2800 | 40" | 41" |
| —5 | 2800 rpm | 50Hz | Motor Pulley 60 | 41" | 41" |
| | | 60Hz | Motor Pulley 60—2800 | 40" | 41" |

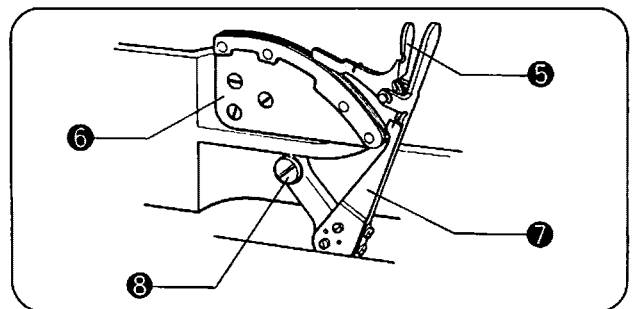
3. Installation of the Machine Head

1. Installation of the head



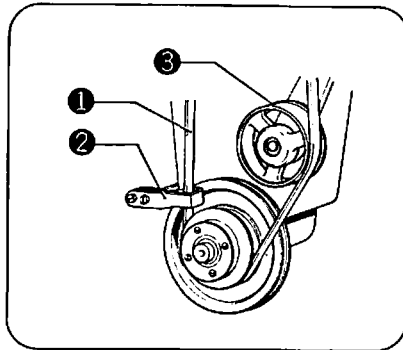
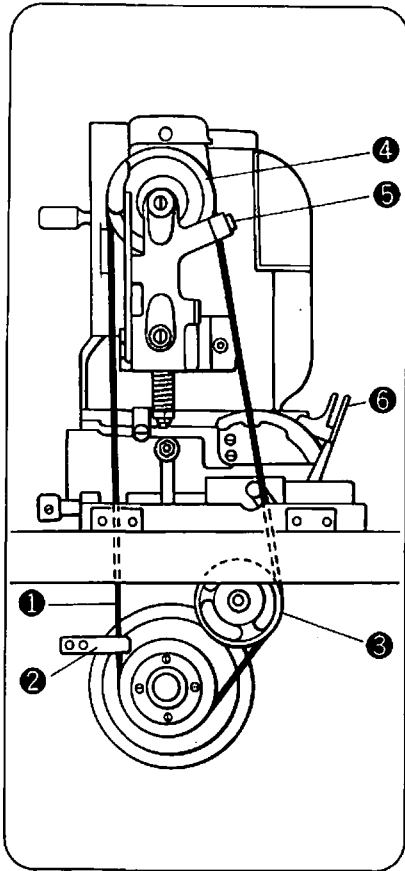
Insert head hinges ① into machine head ②, and tighten screws ③. Then place machine head ② on the bed. Drive head rest ④ into the table.

2. Installation of the tension pulley assembly

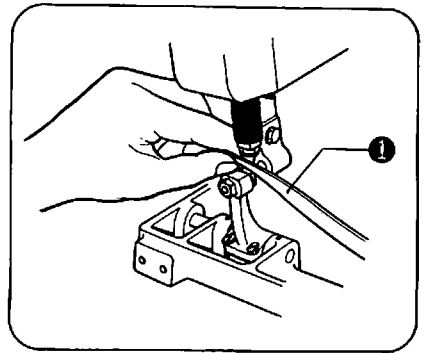


Engage tension pulley pawl ⑤ with tension lever ratchet ⑥, and install tension pulley assembly ⑦ with screw ⑧.

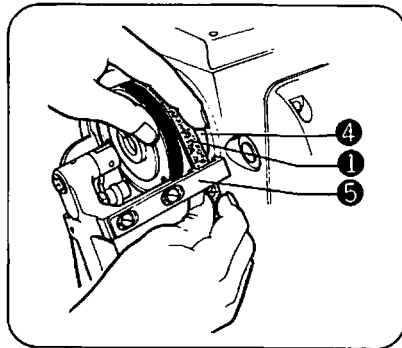
4. Putting Flat Belts On



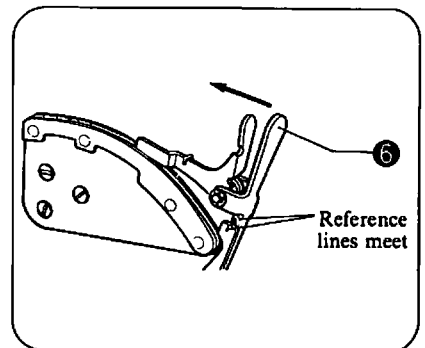
(1) Raise the clutch, pass flat belt ① into belt guide D ② and put the belt around the low-speed pulley and tension pulley ③.



(2) Pull flat belt ① out of the opening in the back of the bed.



(3) While pressing flat belt ① from above, turn idle pulley ④ and slide it into belt guide U ⑤.

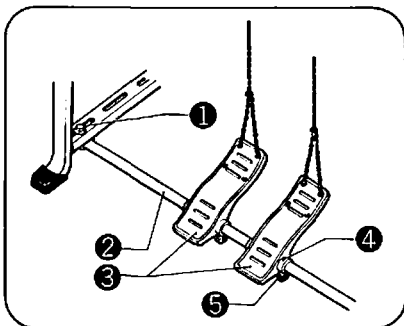


(4) Push tension lever ⑥ to align the reference lines.

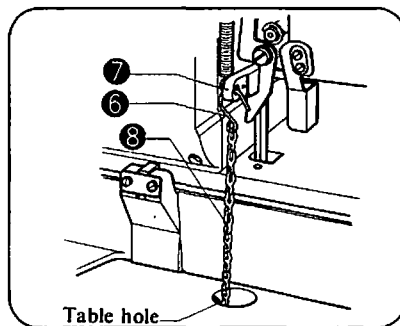
* If flat belt ① is too tight, return tension lever ⑥.

* Push the emergency stop lever and insert the clutch stopper into the stop cam. Move flat belt ① to the inner side of the low-speed pulley and idle pulley ④.

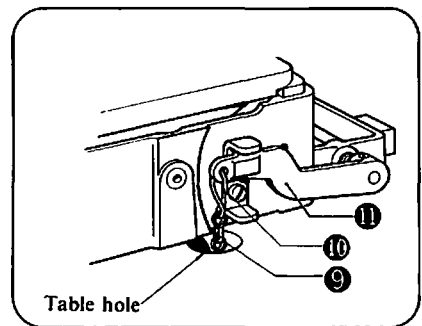
5. Installation of the Pedals and Chains



Loosen hexagonal bolt ①, and fit two pedals ③ and four pedal stops ④ onto support shaft ②. Fasten pedal stops ④ with screws ⑤ at positions where the pedals will move lightly.



Connect hook ⑥ to lower thread cutter lever ⑦, run chain ⑧ through the table hole, and hook the chain to the left pedal.

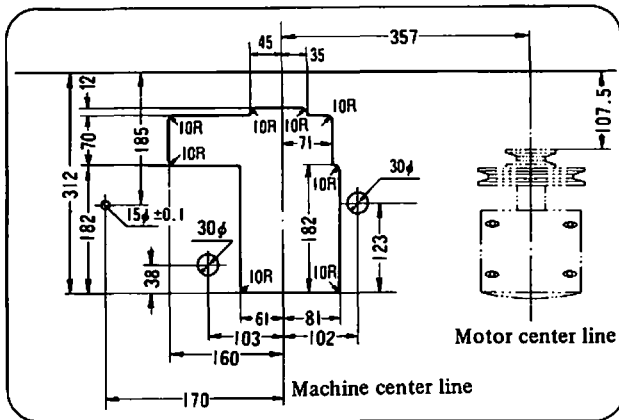


Connect hook ⑩ for the other chain ⑨ to clutch start lever ⑪, run chain ⑨ through the table hole and hook it to the right pedal.

MOTORS

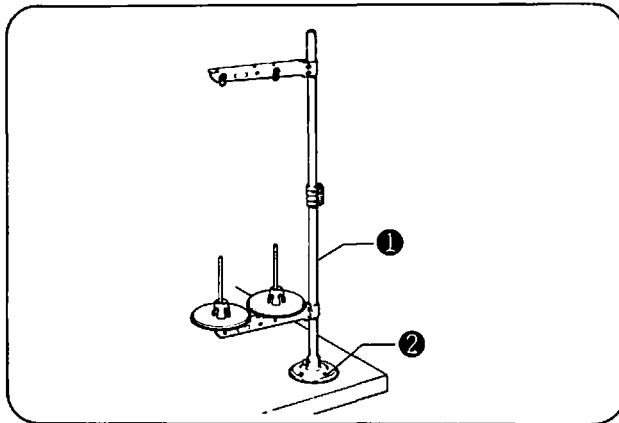
| | |
|----------------|--------------------------|
| Single - phase | 100V, 4-pole, 250W motor |
| Three - phase | 200V, 4-pole, 250W motor |

In case of using a commercial single-phase motor select a 4-pole motor with a power rating of 300W or more. In this case, install the motor as shown at left. The table center line is the same as the machine center line.



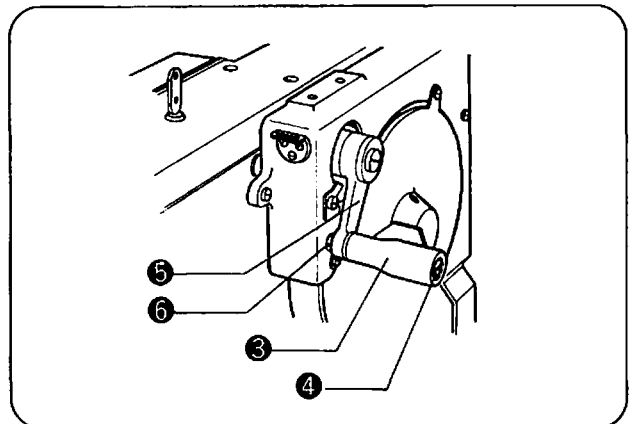
6. Installation of the Accessories

1. Installation of the spool stand



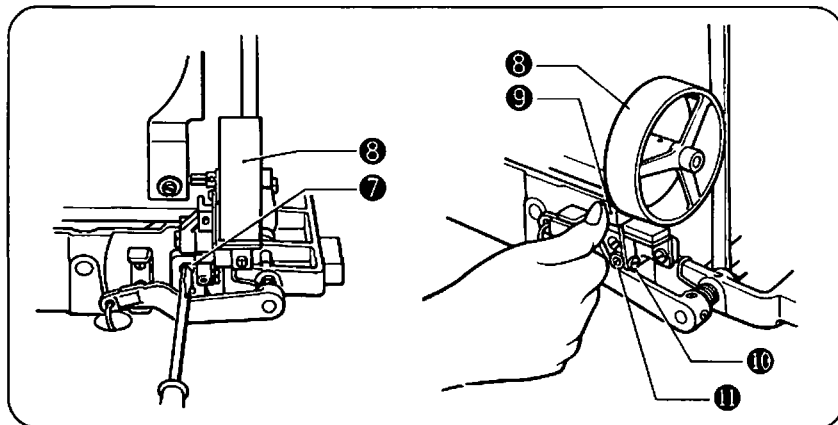
Install spool stand ① at the right rear corner of the table with screws ②.

2. Installation of the handle



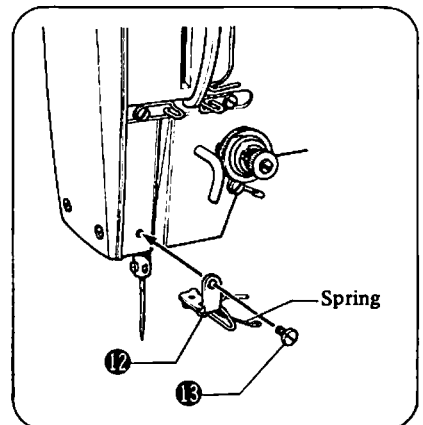
Slide handle ③ onto handle shaft ④, and fasten handle ③ to handle lever ⑤ with nut ⑥.

3. Installation of the bobbin winder



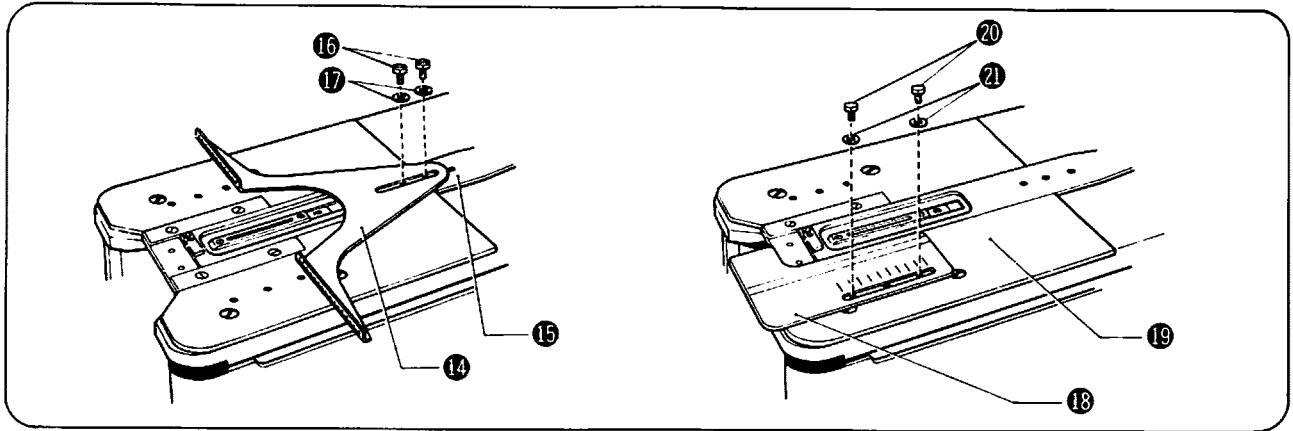
Install the bobbin winder on the bed with screw ⑦. Bobbin winder pulley ⑧ must be in line with the flat belt. Loosen screw ⑩ and adjust bobbin winder link shaft ⑪ by turning it so that, when bobbin winder link A ⑨ is pressed, bobbin winder pulley ⑧ will lightly touch the flat belt.

4. Installation of the sub-tension



Install the sub-tension ⑫ at machine head by screw ⑬. Strength and position of the spring are already adjusted, so be careful not to bend and remove it.

5. Installation of the crosswise ruler and longitudinal ruler

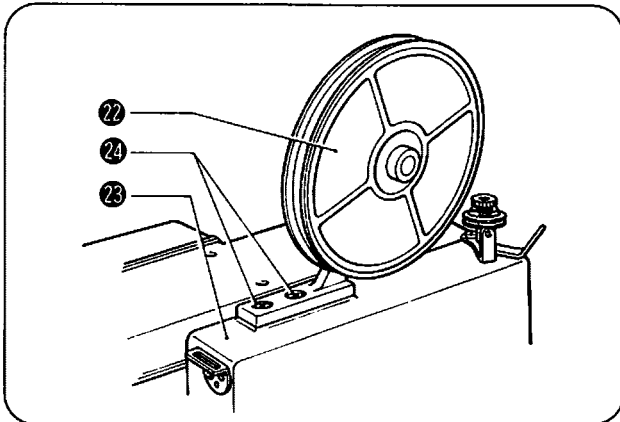


- (1) Fasten crosswise ruler 14 to length feed plate 15 with bolts 16 and washers 17.
- (2) Fasten longitudinal ruler 18 to bed cover 19 with bolts 20 and washers 21.

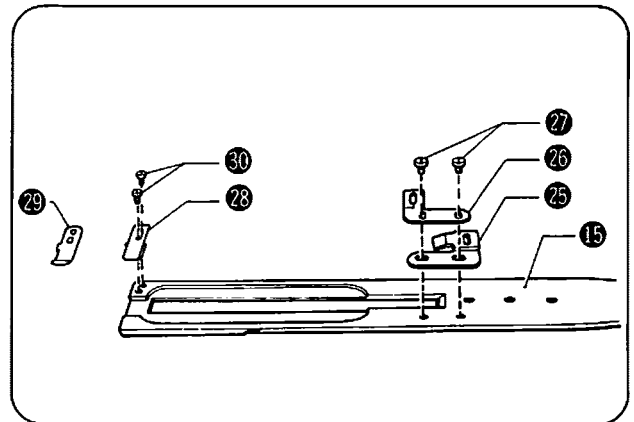
* In case of sub-class —5, fix ruler directly on the bed.

6. Installation of the tape winder and tape guide (in case of sub-class —2 and —3)

When elastic materials such as knitted materials is used, a strong buttonhole can be made with a tape at the backside of the material to be sewn altogether.

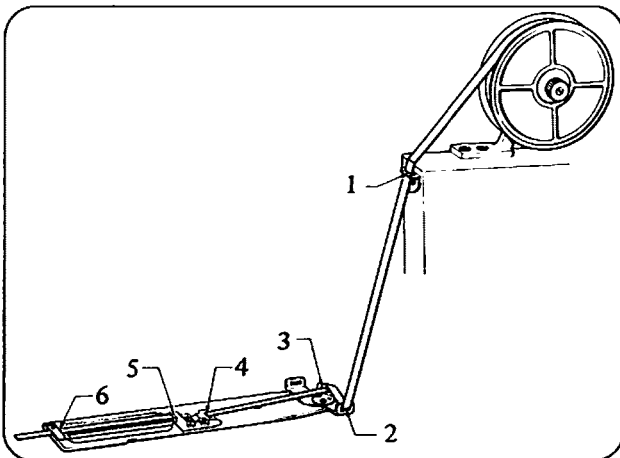


- (1) Install tape winder 22 on top cam cover 23 with screws 24.

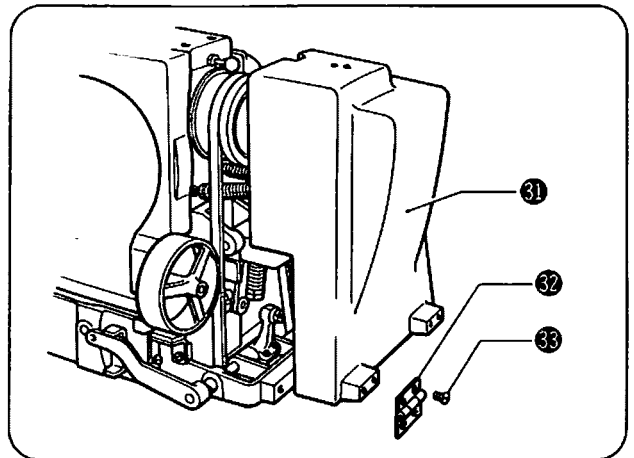


- (2) Fasten tape guide rear 25 and tape guide front 26 to length feed plate 15 by screws 27.
- (3) Fasten tape guard front 28 in case of sub-class —2 and fasten tape guard front 29 in case of sub-class —3 by screws 30.

7. Installation of the belt cover



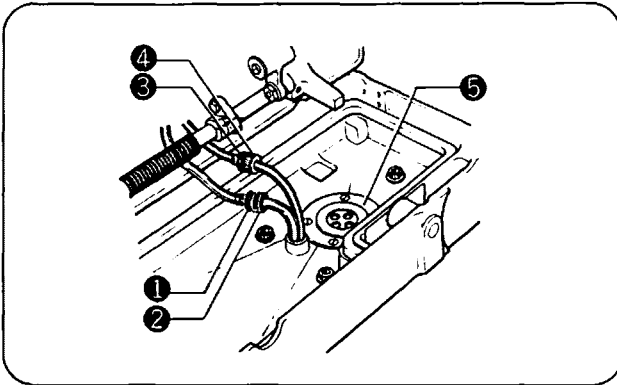
- (4) Pass a tape through as per the picture at the above.



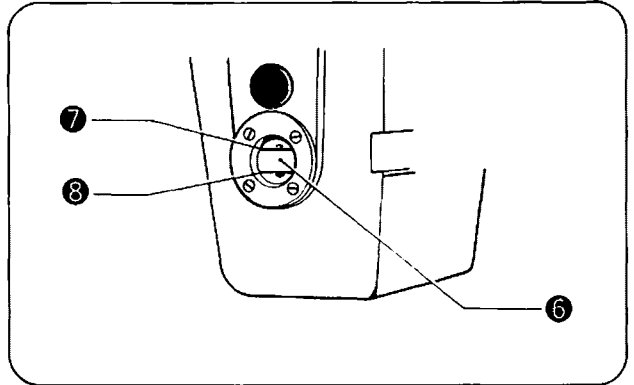
Fasten belt cover 31 to the back of the bed with belt cover hinge 32 and screws 33.

B. OILING AND TRIAL OPERATION

1. Oiling

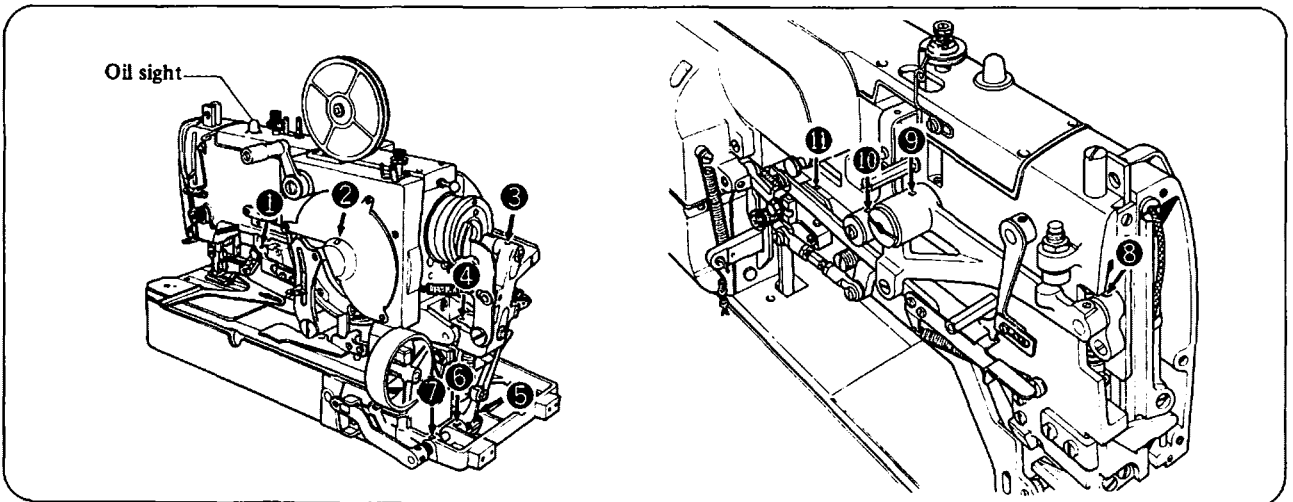


- (1) Remove belt and tilt the machine.
- (2) Connect vinyl tube joint (black) ① with joint nut (black) ②.
- (3) Connect vinyl tube joint (white) ③ with joint nut (white) ④.



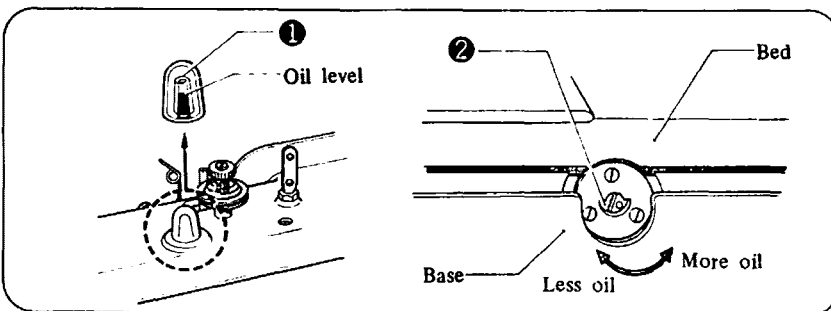
- (4) Gently pour oil into oil tank ⑥ under the table through filter ⑤ until the tank is filled up to upper reference line ⑦.
- If oil level falls below reference line ⑧.

○ Oiling



- ★ Remove the face plate, side cover and belt cover, and oil all working parts.
- ★ Pour a drop or two of oil to the arrow-indicated points daily. *Note: Use white spindle oil.

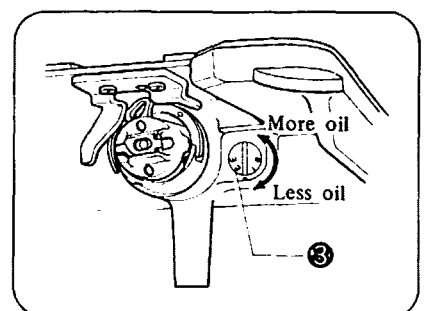
2. Oiling System Adjustment



A few minutes after the power is switched on, adjust oil flow regulator ② on the right of the base by turning it until oil level can be seen in gauge pipe ①.

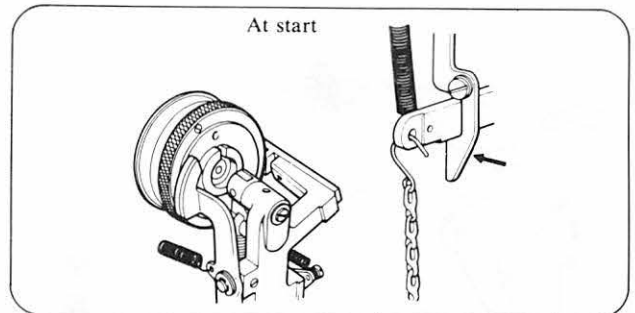
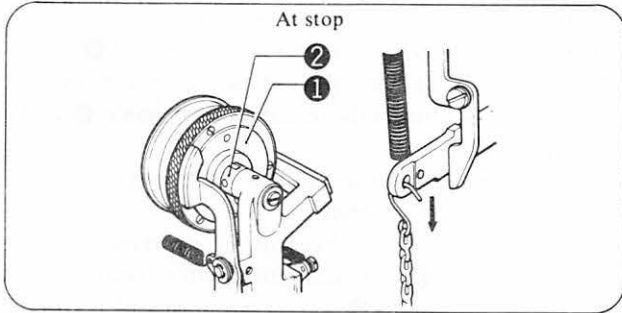
- * Oil level falls during sewing.

○ Hook oil flow adjustment



Adjust oil flow to the hook by turning oil regulator shaft ③ on the front of the bed.

3. Trial Operation

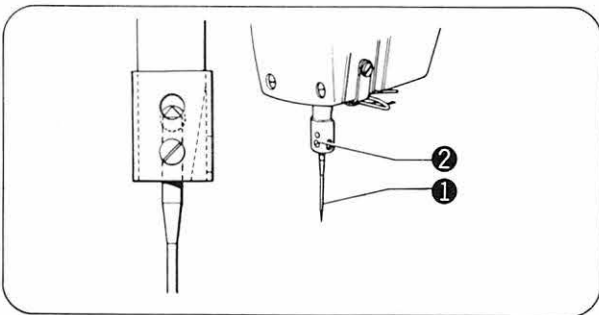


- (1) Before starting the machine, be sure to confirm that clutch stopper ② is in stop cam assembly ①.
- (2) Switch the machine on.
- (3) The machine will start when the right pedal is stepped on.

- (4) Release the pedal once the machine starts running. (If the pedal is kept stepped on, the machine will not stop.)
- (5) After a fixed number of stitches are made, the machine stops.
- (6) When the left pedal is stepped on, the work clamp rises. Repeat above steps (3), (4) and (5) a few times.

C. CORRECT OPERATION

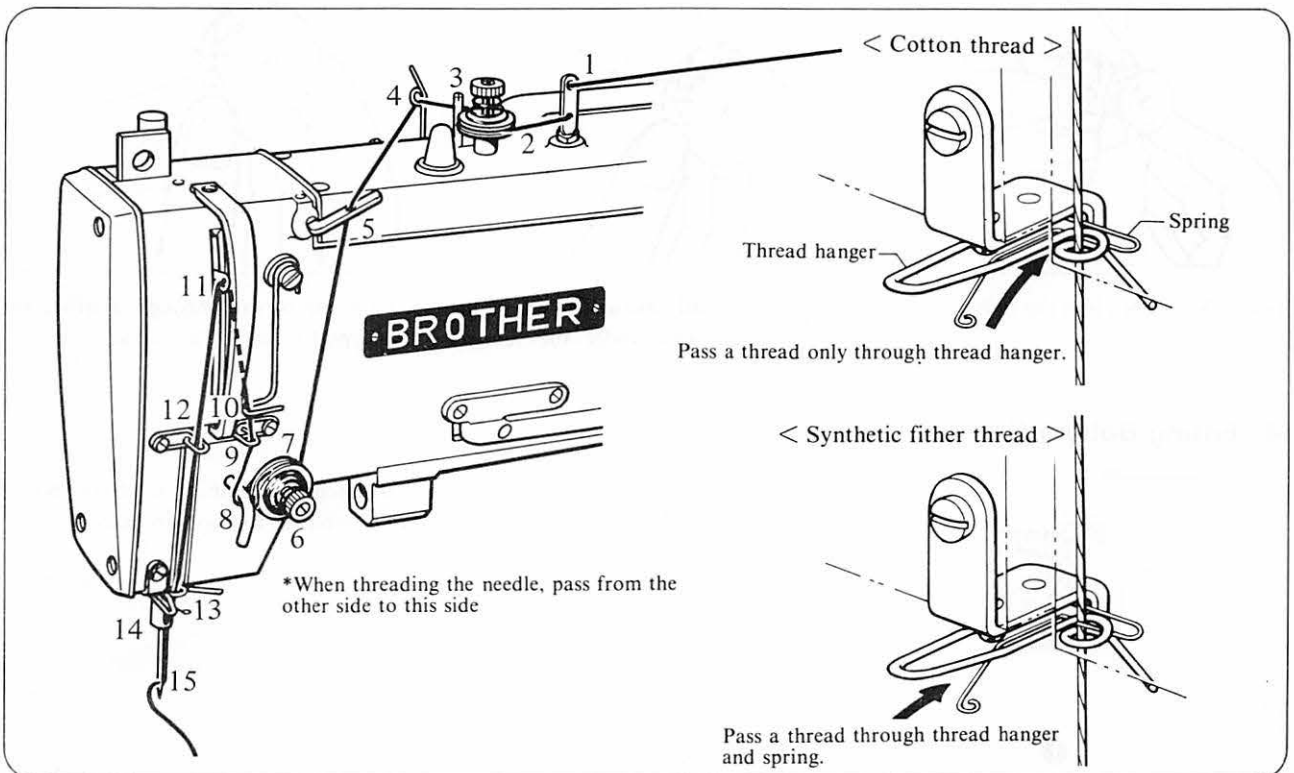
1. Fitting Needle into Place



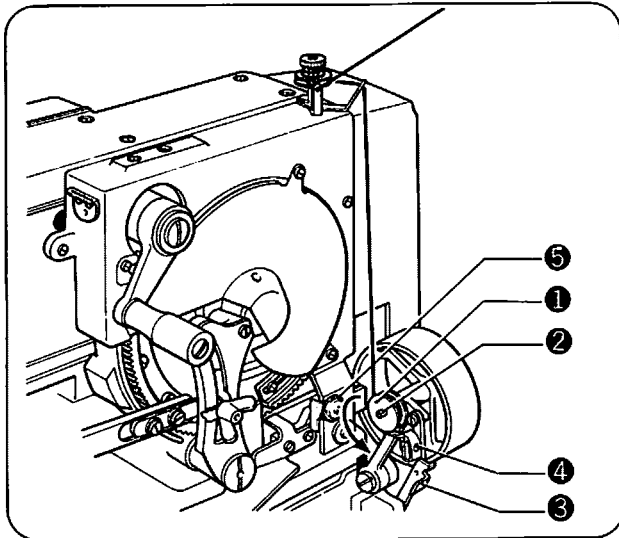
Use a DP × 5 needle ①.

Loosen set screw ②, hold the needle with its grooved side facing in your direction, and insert the needle all the way into the needle hole.

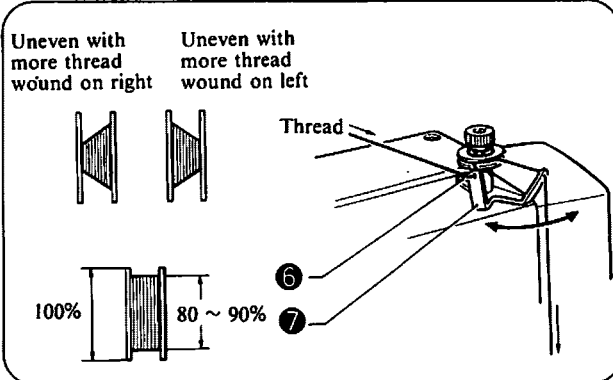
2. Upper Threading



3. Winding Lower Thread



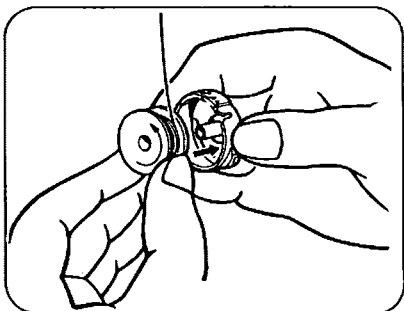
- (1) Check the power switch that it is on.
 - (2) Slide bobbin ① onto bobbin winder spindle ②.
 - (3) Pass the thread in the order of the numbers shown, and wind a few turns of the thread around bobbin ① in the arrow direction.
 - (4) Push bobbin winder link A ③ and release it. The thread will wind on the bobbin.
 - (5) After the bobbin finishes winding the thread, bobbin winder link A ③ automatic return to its original position.
 - (6) Remove the bobbin ① and cut the thread with the thread cutter ⑤.
- * Turn screw ④ to adjust the bobbin to the correct thread winding volume.



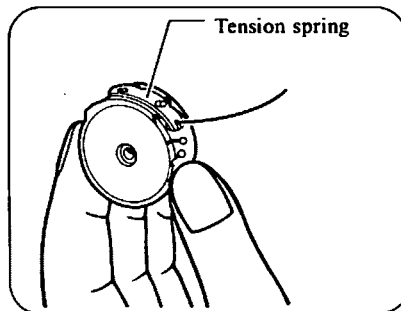
- * If the thread winds unevenly on the bobbin ①, loosen screw ⑥, and move bobbin winder tension guide ⑦ to the left or right as necessary.

◎ Threading bobbin case

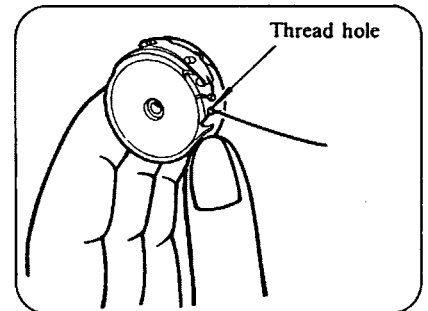
After winding the thread on the bobbin, pass the thread in the order shown below.



Insert the bobbin into the bobbin case.

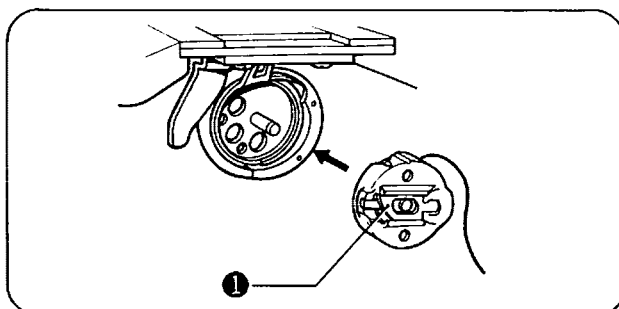


Pass the thread through a slit in the bobbin case and under the tension spring.



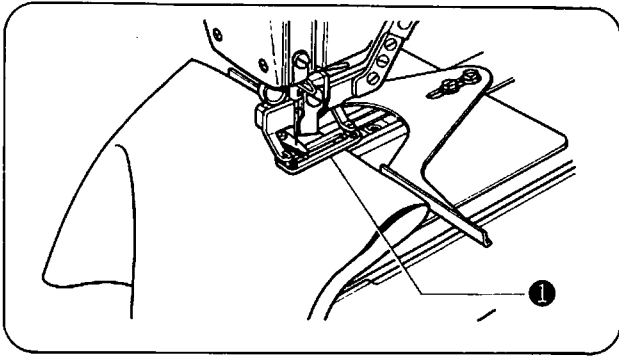
Pass the thread through another slit and pull it out of the thread hole.

4. Fitting Bobbin Case into Place



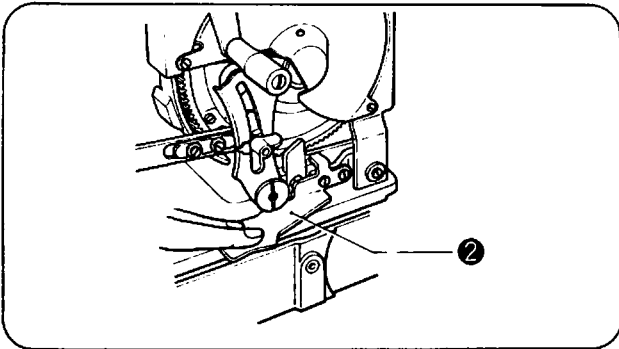
Hold the bobbin case by latch ①, and insert it into the hook. Let the thread end fall in front of the bobbin case.

5. Sewing



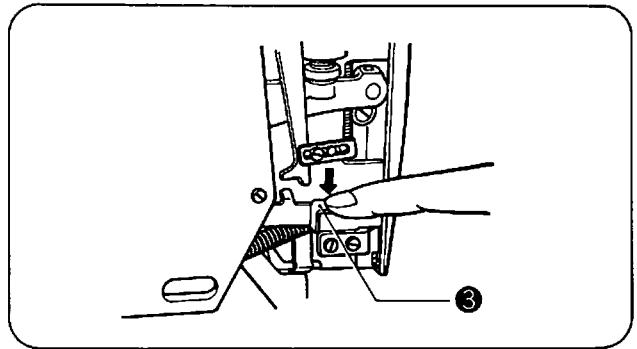
- (1) Make sure that the clutch stopper is in the stop cam, and then switch the power on.
- (2) Depress the left pedal to raise work clamp ①, place your work under it, and release the left pedal.
- (3) Depress the right pedal to start the machine. When the machine starts running, release the right pedal.
- (4) The machine will sew a fixed number of stitches and then stop.
- (5) Depress the left pedal and take out the work.

◎ How to use the emergency stop lever



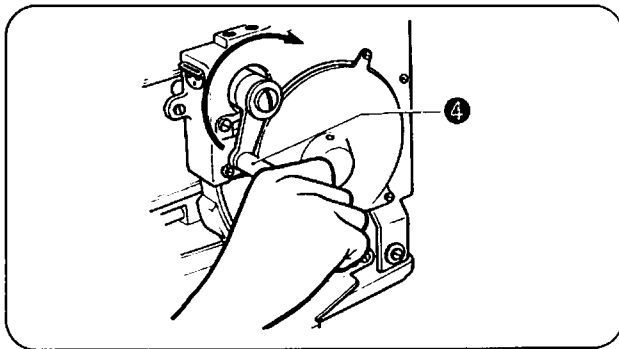
Push emergency stop lever ② down and immediately release it. The machine will stop.

◎ How to use the cutter locking device



Keep cutter lock lever ③ lightly depressed with your finger until the machine stops. The cutter will not drop.

◎ How to use the handle

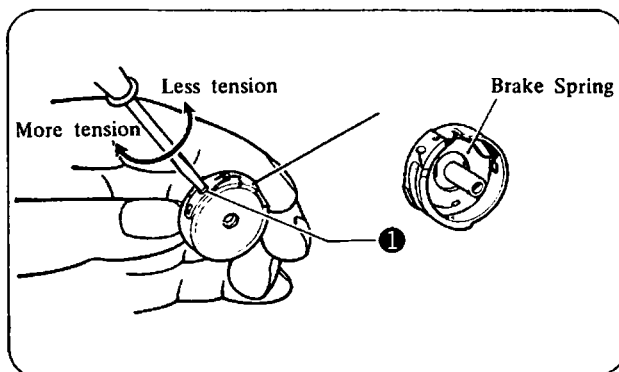


Turn handle ④ after confirming that the needle is not in the work.

6. Thread Tension

★ Thread tensions vary with sewing conditions. Refer to the following when selecting suitable tensions.

1. Lower thread tension



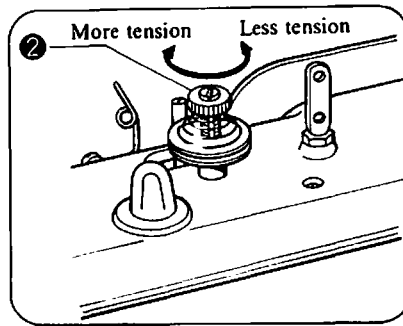
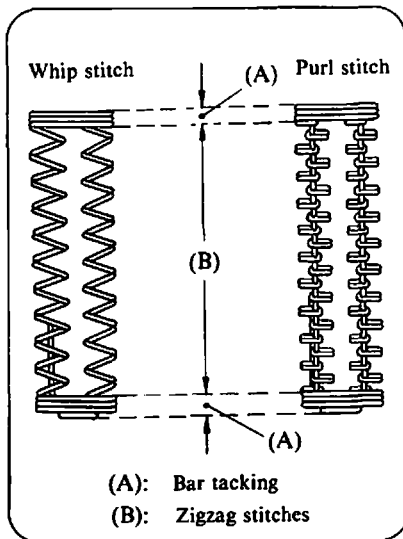
Turn adjusting screw ① to such an extent that you will feel a little resistance when pulling the thread out of the bobbin case.

Standard tensions

| Sub-class | Stitch | Purl | Whip |
|-----------|--------|-----------------|------------|
| —2 | | About. 15 ~ 20g | About. 30g |
| —3 | | About. 15 ~ 20g | About. 30g |
| —5 | | About. 15 ~ 20g | About. 30g |

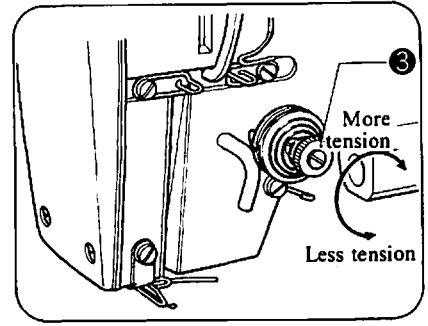
Brake spring in the bobbin case reduces bobbin racing.

2. Upper thread tension



Upper tension regulator adjustment

Turn tension regulator nut ② to adjust thread tension for bar tacking (A).

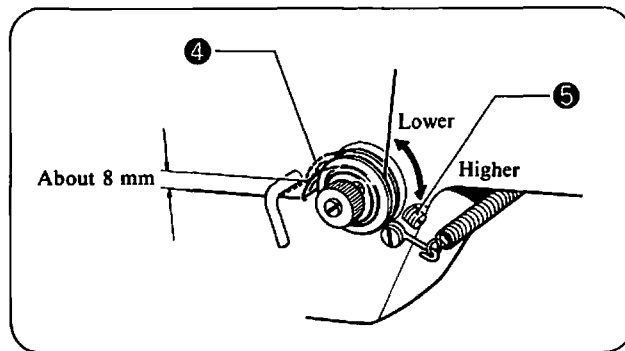


Lower tension regulator adjustment

Turn tension regulator nut ③ to adjust thread tension for zigzag stitches (B). (Decrease tension for whip stitches; and Increase tension for purl stitches.)

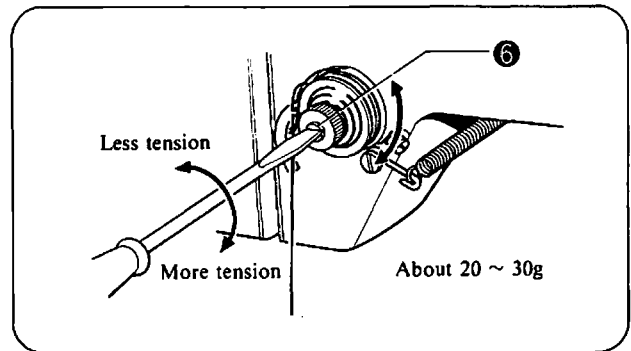
7. Thread Take-up Spring Adjustment

(1) Thread take-up spring height



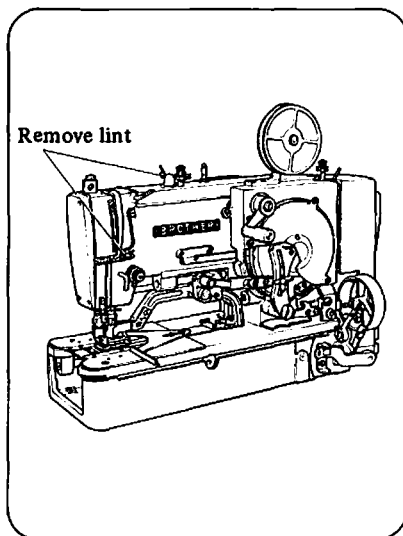
Adjust the working scope of thread take-up spring ④ by loosening set screw ⑤ and turning the upper thread tension regulator itself. (Standard range is about 8 mm)

(2) Thread take-up spring tension

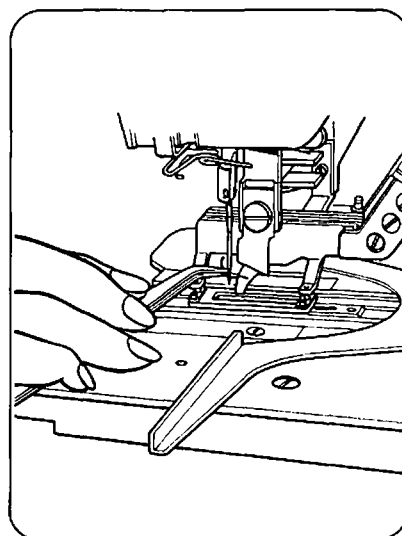


Adjust the thread take-up spring tension by turning tension stud ⑥. (Standard tension is about 20 to 30g.)

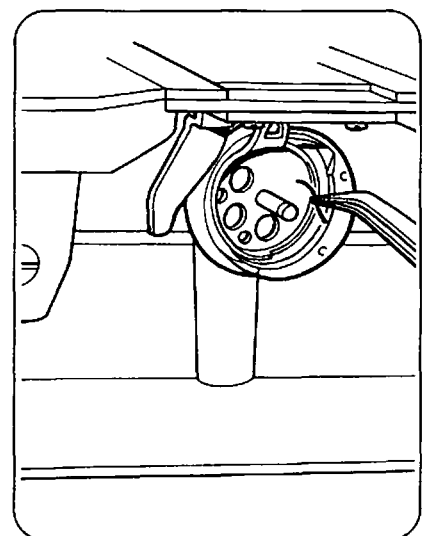
8. Cleaning



Remove lint and dust from thread passages.



Remove lint and dust from around the work clamp.



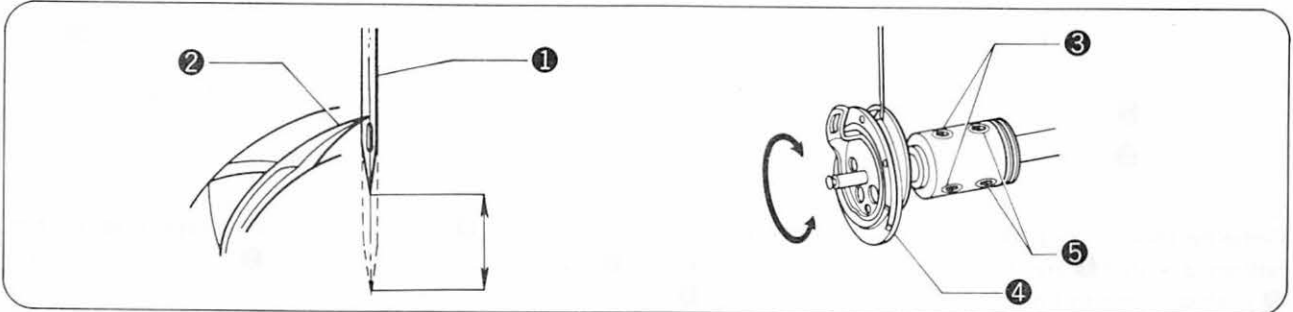
Remove the bobbin case, and remove lint and dust from around the shuttle. And wipe the bobbin to remove oil.

D. STANDARD ADJUSTMENTS

1. Needle and Hook Timing Adjustment

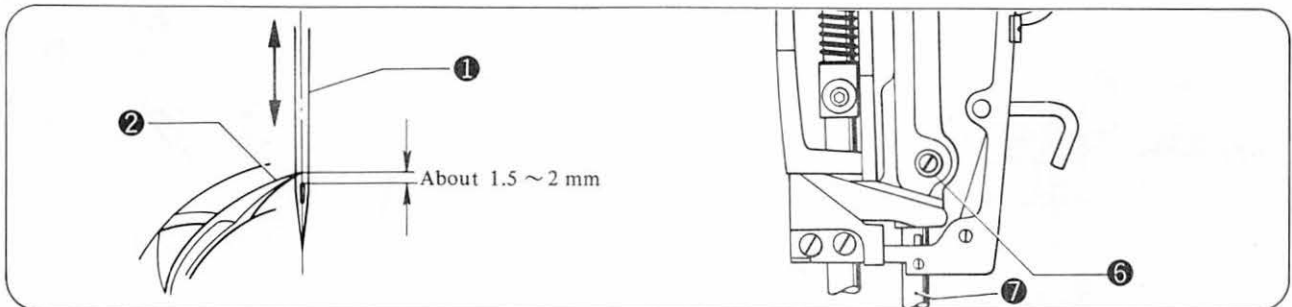
- ★ The correct timing of the needle and the hook is necessary for the hook point to scoop an upper thread loop as the needle rises from the lowest position
- ★ When adjusting the needle bar upward stroke, needle bar height and the clearance between the needle and hook point make sure that the needle is at the center of the needle hole plate.

1. Needle bar upward stroke



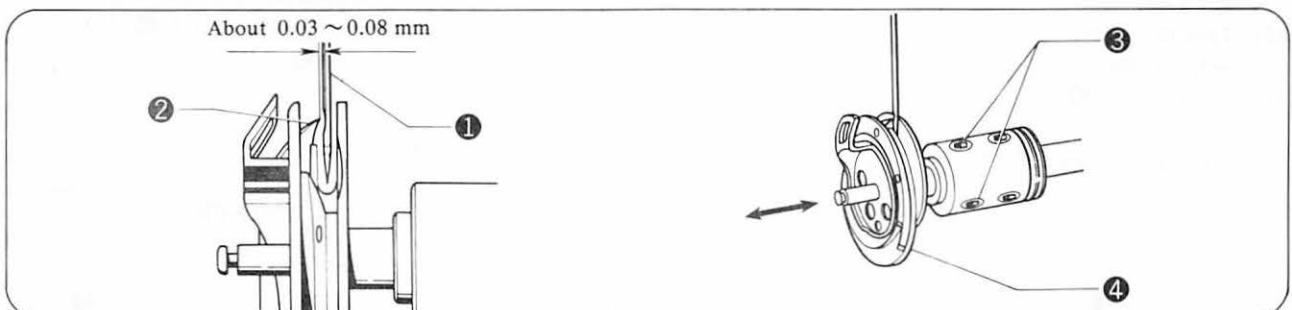
Loosen screws ③ and turn shuttle ④ until hook point ② meets the center line of the needle when needle ① rises by 2.5 mm (for Model B814—2 · —5) or 3.5 mm (for Model B814—3) from the lowest position. *Never loosen screws ⑤ in any case.

2. Needle bar height



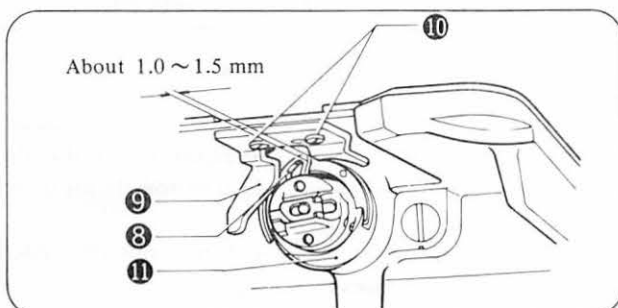
Loosen screw ⑥ and raise or lower needle bar ⑦ until there is a clearance of about 1.5 to 2 mm between the hook point and the top end of the needle eye when hook point ② meet the center line of needle ①.

3. Clearance between needle and hook point



Loosen screws ③ and move hook ④ forward or back until there is a clearance of about 0.03 to 0.08 mm between needle ① and hook point ②.

4. Clearance between bobbin case holder and bobbin case holder bracket

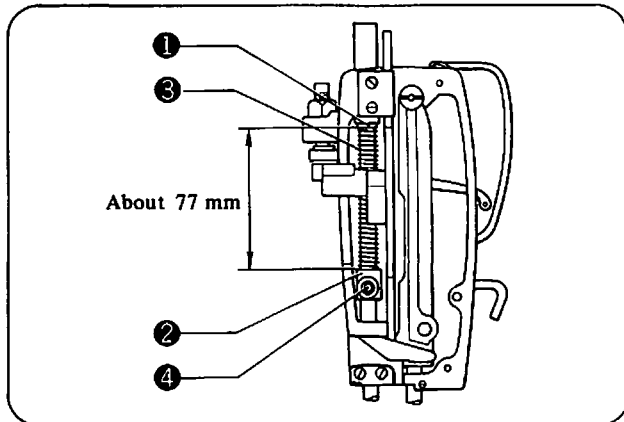


Loosen screws ⑩ and adjust the clearance between bobbin case holder ⑧ and bobbin case holder bracket ⑨ to about 1.0 to 1.5 mm.

Make sure that hook ⑪ will not touch bobbin case holder bracket ⑨ when it rotates.

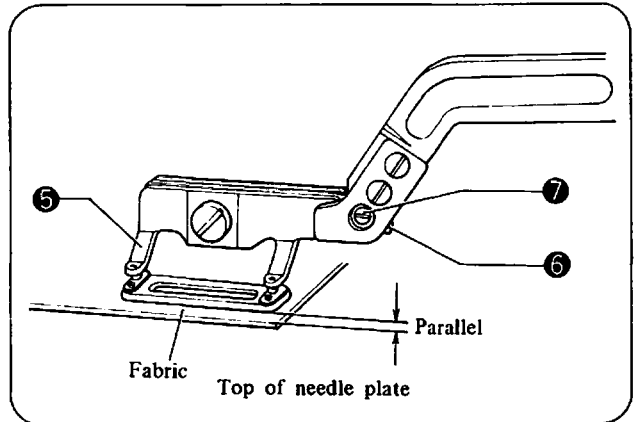
2. Presser Spring Pressure Adjustment

1. Presser spring adjustment



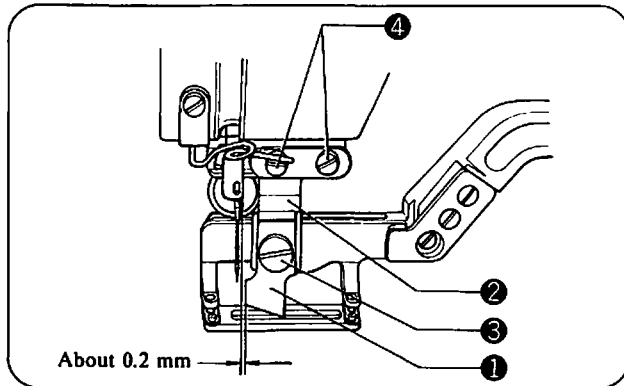
Compress presser spring 3, adjust the distance between the bottom of washer 1 and the top of presser bar guide bracket 2 to about 77 mm with presser bar guide bracket set screw 4, and retighten screw 4.

2. Work clamp tilt adjustment

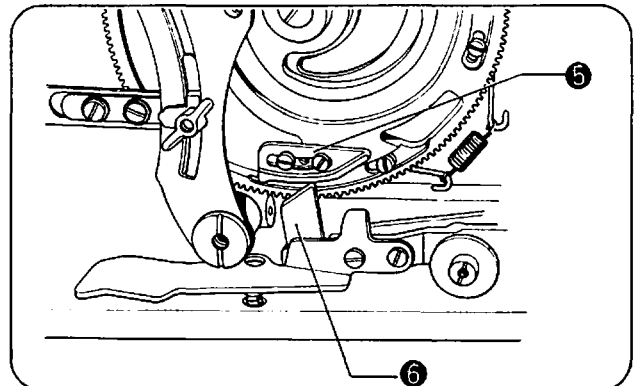


Loosen screw 6, and turn work clamp support spring shaft 7 until the bottom of work clamp 5 is parallel to the top of the work.

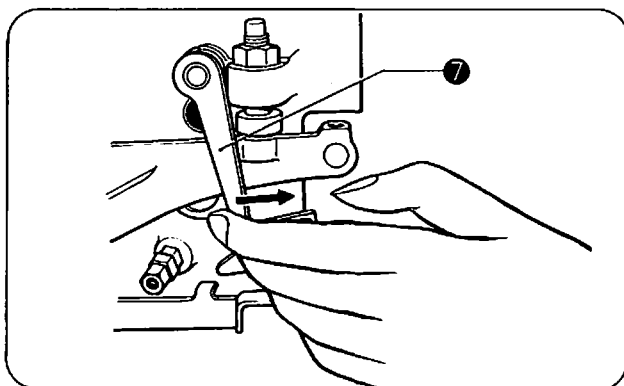
3. Cutter Installation and Adjustment



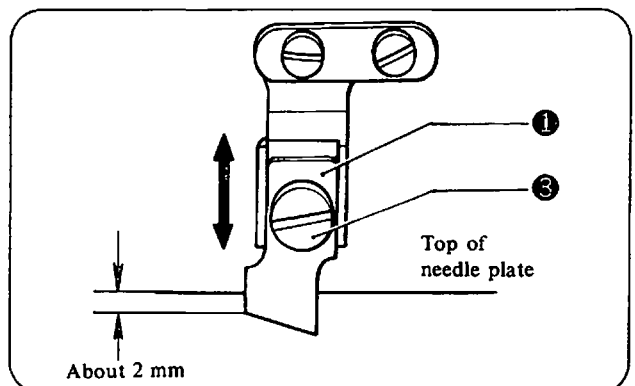
- (1) Temporarily fasten cutter 1 to cutter holder 2 with screw 3.
- (2) Turn the machine pulley by hand until the needle bar is nearly at the lowest position.
- (3) Loosen screw 4, and move cutter holder 2 forward or back until the clearance between cutter 1 and the needle bar is approximately 0.2 mm.



- (4) Turn the machine pulley by hand until the needle bar comes up to nearly the highest position.
- (5) Turn the handle until stop cam piece B 6 rides on the center of stop cam piece 5.

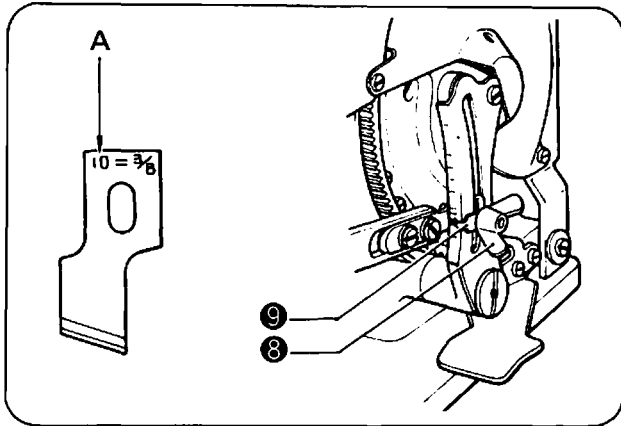


- (6) Keep cutter lock arm 7 pulled with one hand, and turn the machine pulley with the other hand until cutter 1 falls to the lowest position.

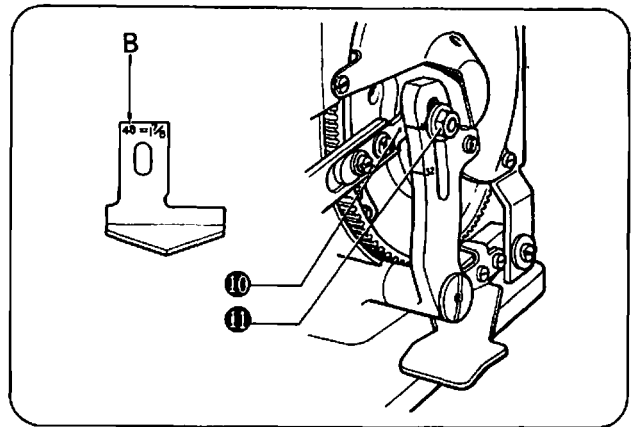


- (7) Loosen screw 3 and make an adjustment so that the blade edge will enter about 2 mm deep from the top of the needle plate.
- (8) Turn the machine pulley by hand until the clutch automatically engages.

© Feed adjustment



Loosen adjusting nut ⑧ and move pointer ⑨ to the line directly under the same number as the cutter number A.



Loosen adjusting nut ⑪ and move token ⑩ to the line directly under the same number as the cutter number B.

4. Changing Number of Stitches per Buttonhole

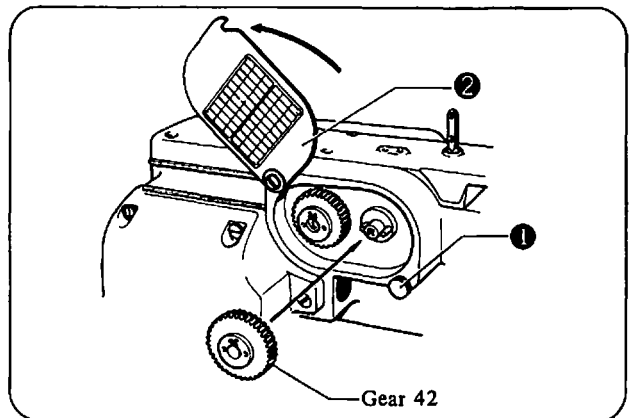
The number of stitches varies with buttonhole size. Select a suitable number.

Any of the numbers of stitches shown in the below table (gear case cover) can be selected by change gear combinations.

1. Change gear replacement

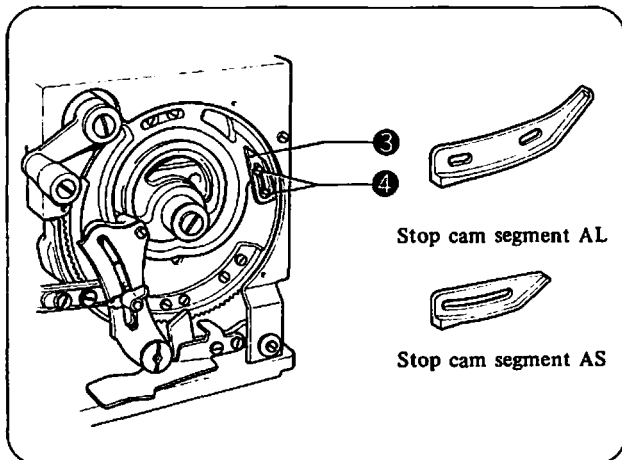
(Example: Selecting 119 stitches)

| L | STITCH | R | L | STITCH | R |
|----|--------|----|----|--------|----|
| 54 | 360 | 22 | 38 | 147 | 38 |
| 52 | 319 | 24 | 36 | 133 | 40 |
| 51 | 300 | 25 | 34 | 119 | 42 |
| 50 | 283 | 26 | 32 | 107 | 44 |
| 48 | 252 | 28 | 30 | 96 | 46 |
| 46 | 226 | 30 | 28 | 86 | 48 |
| 44 | 203 | 32 | 26 | 77 | 50 |
| 42 | 182 | 34 | 24 | 68 | 52 |
| 40 | 164 | 36 | 22 | 60 | 54 |



- (1) See the above table for 119 stitches, and look at the L and R columns.
- (2) Loosen thumb screw ① and raise gear case cover ②.
- (3) Fit change gear 34 onto shaft L.
- (4) Fit change gear 42 onto shaft R in such away that it will engage the other gear.
- (5) After replacing the gears, be sure to close gear case cover ②.

2. Stop cam replacement (in case of sub-class —2 and —3)

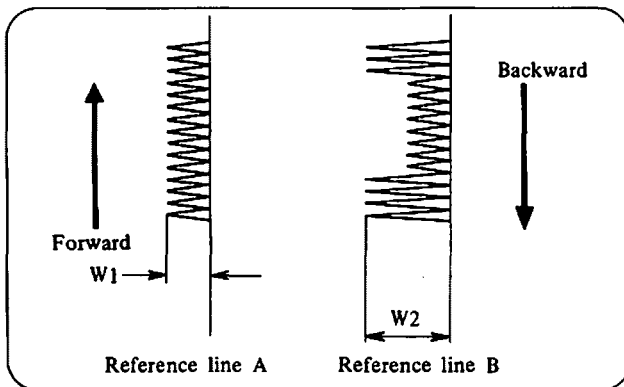


- (1) Remove the cam cover.
- (2) Turn the handle until stop cam piece ③ comes to a point where it can be easily taken off.
- (3) Loosen screws ④ and replace stop cam piece ③.

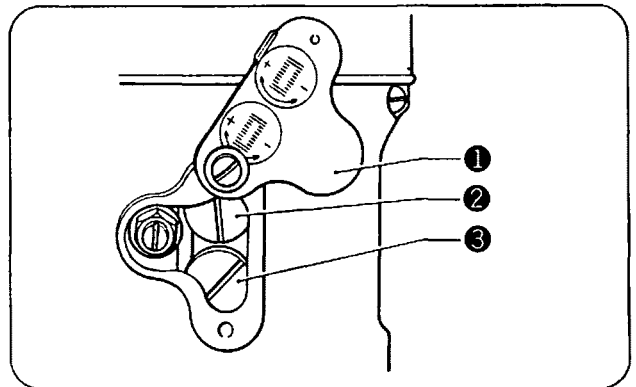
If the number of stitches is 96 or less, use stop cam piece AL.
If it is 107 stitches or more, use stop cam piece AS.

5. Buttonhole Stitch Width and Reference Position Adjustment

1. Buttonhole stitch width adjustment

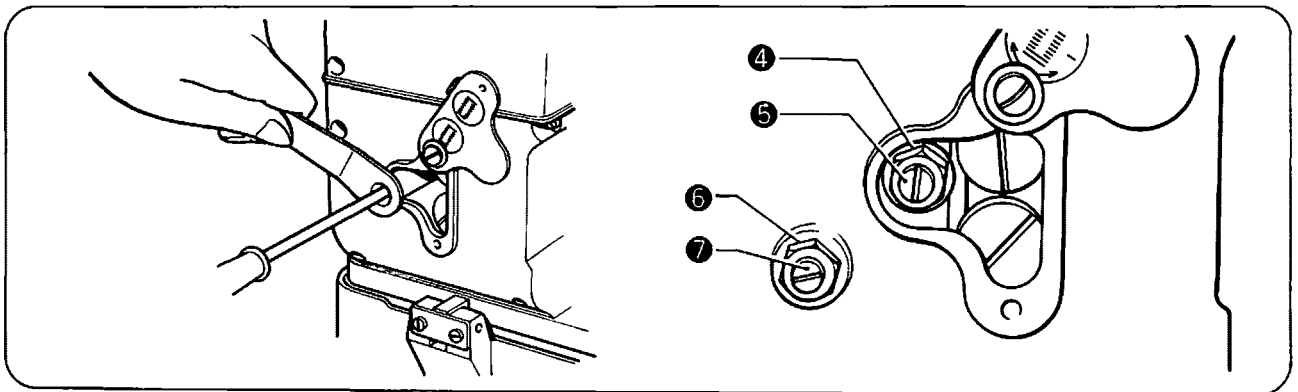


The machine swings the needle to the left from the right reference position in sewing forward and back.



Adjust after raising the small cover ①. Turning W1 adjusting screw ② or W2 adjusting screw ③ clockwise increases the needle swing motion and turning it counter-clockwise decrease it.

2. Reference position adjustment



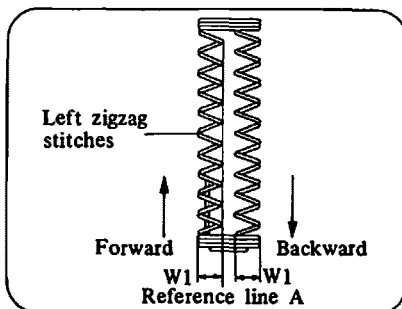
Reference line A adjustment

Adjust reference line A by loosening nut ④ with a box wrench and turning screw ⑤.

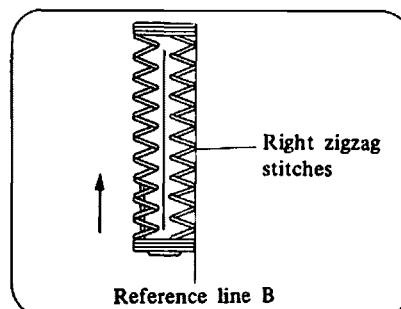
Reference line B adjustment

Adjust reference line B by loosening nut ⑥ with box wrench and turning screw ⑦ in a similar way.

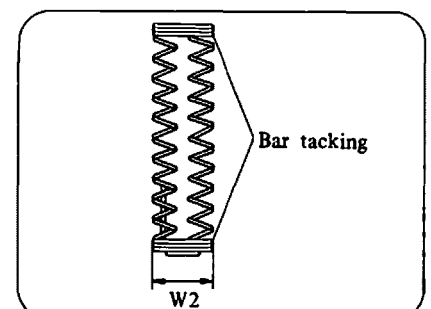
◎ Follow the under mentioned procedure when changing the stitch width and stitch reference position.



- (1) Adjust reference line A so that the stitches will not be cut by a falling cutter.
- (2) Adjust zigzag stitch width W1 with adjusting screw ②.



- (3) Adjust reference line B so that the right zigzag stitches will not be cut by a falling cutter.

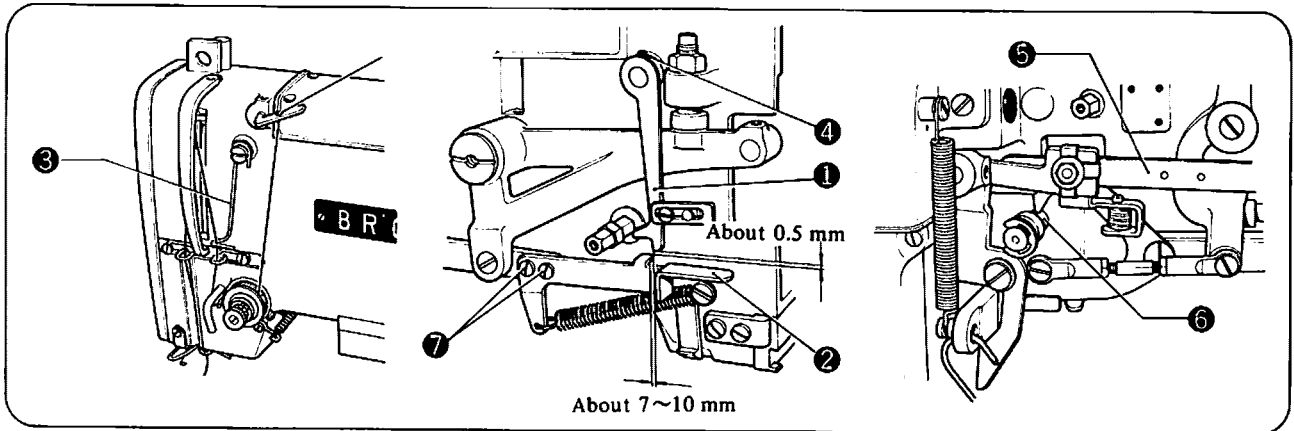


- (4) Adjust bar tacking width W2 with adjusting screw ③. Bar tacking width varies with manual turning and high-speed operation due to different thread tensions. Adjust it by actually sewing.

* The needle swing width is adjustable in excess of the work clamp width. If bar tacking width is adjusted to more than 4 mm, or if a reference line is moved, turn the machine pulley by hand and make sure that the needle will not touch the work clamp in sewing forward or back.

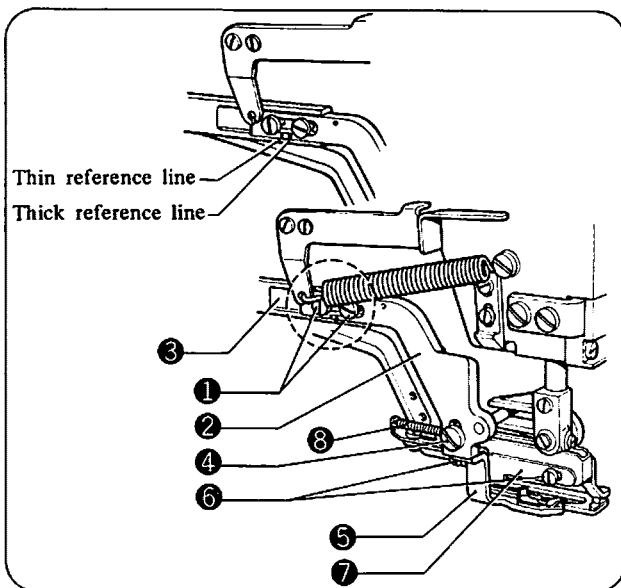
After turning the machine pulley by hand, be sure to use the emergency stop lever to insert the clutch stopper into the stop cam. Then you may start the machine.

6. Cutter Locking Device Adjustment



Loosen screw ④ and adjust the clearance between cutter lock arm ① and cutter lock lever ② to about 7 to 10 mm when that part of the upper thread which is at the tip of thread break sensor ③ is taut. Also, loosen screw ⑦ and adjust the clearance between cutter lock arm ① and cutter lock lever ② to about 0.5 mm when cutter lever ⑤ shifts onto cutter clutch bar ⑥.

7. Upper Thread Scissors Adjustment



- (1) Loosen screw ①, and align upper thread cutter level S ② with one of the reference lines of upper thread cutter level L ③.

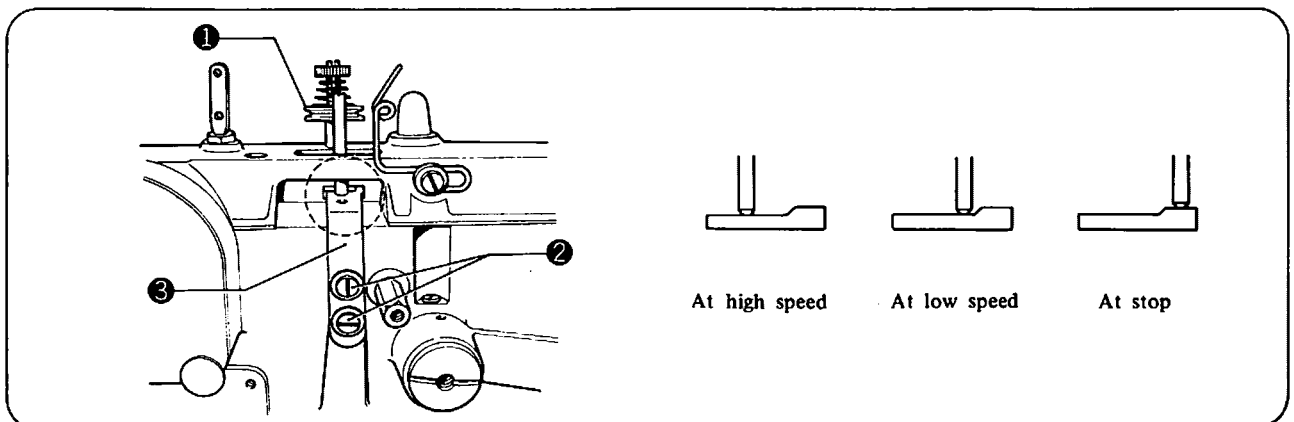
| Sub-class | Thickness of cloth | Reference line |
|-----------|--------------------|----------------------|
| -2 | Less than 3 mm | Thin reference line |
| | 3 mm to 4 mm | Thick reference line |
| -3 | Less than 3 mm | Thin reference line |
| | 3 mm to 3.5 mm | Thick reference line |
| -5 | Less than 3 mm | Thin reference line |
| | 3 mm to 5 mm | Thick reference line |

Loosen screw ④ and install scissors D ⑤ as close to the work clamp as possible. (If the scissors are positioned too high, the thread end remains on the work after the thread is cut.)

- * If the thread end is not sewn into stitches, it is because the scissors open either too soon or too late. Loosen screw ⑥ and move scissors guide ⑦ forward to open the scissors sooner, or backward to open the scissors later.
- * In case of sub-class -5, no return spring ⑧ is available.

8. Upper and Lower Tension Regulator Thread Release Adjustment

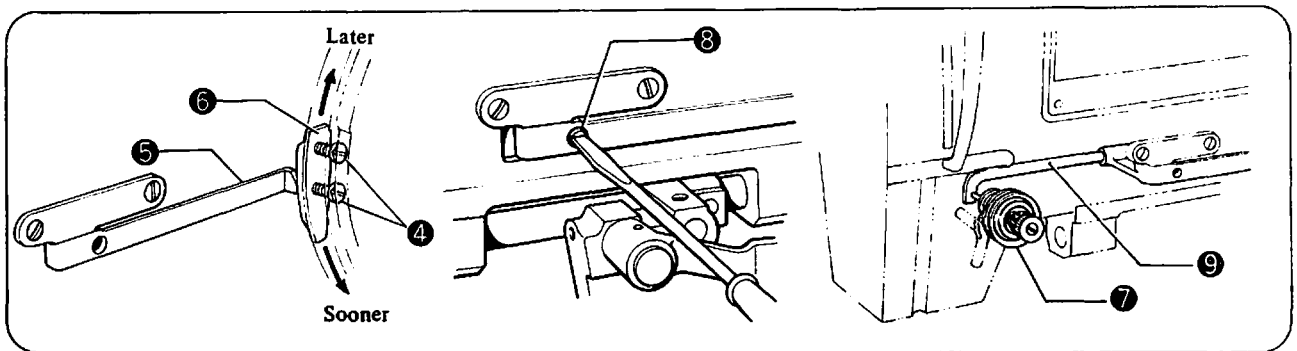
1. Upper tension regulator adjustment



Upper tension discs ① tighten at high speed sewing, and rise as the machine stops.

Loosen screws ② and move upper tension releaser ③ up or down, to the right or left to adjust the discs.

2. Lower tension regulator adjustment



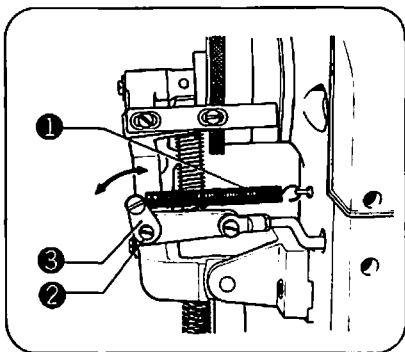
Loosen screws ④ at the machine stop position, and make an adjustment so thread release lever ⑤ will be on top of thread release cam piece ⑥.

Loosen screw ⑧ and move thread release bar ⑨ to the right or left so that discs ⑦ will rise about 0.5 mm at this time.

9. Clutch Brake Adjustment

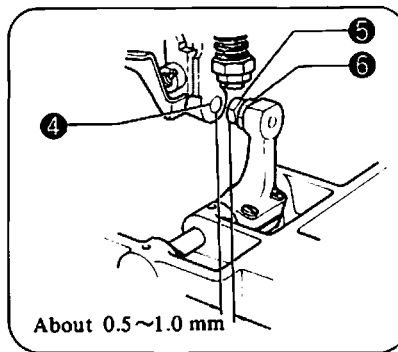
Unless the clutch brake is properly adjusted, the machine will stop half way or fail to start; and extra power may be required for operation, and machine durability may be adversely affected

1. Clutch return spring tension



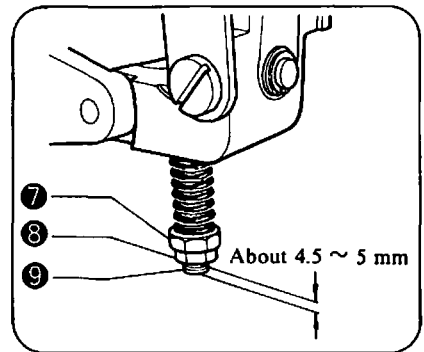
Loosen screw ② and move spring adjuster ③ to adjust clutch return spring ① to as weak a tension as possible which, however, is sufficient to stop the clutch stopper positively.

2. Clutch start lever clearance



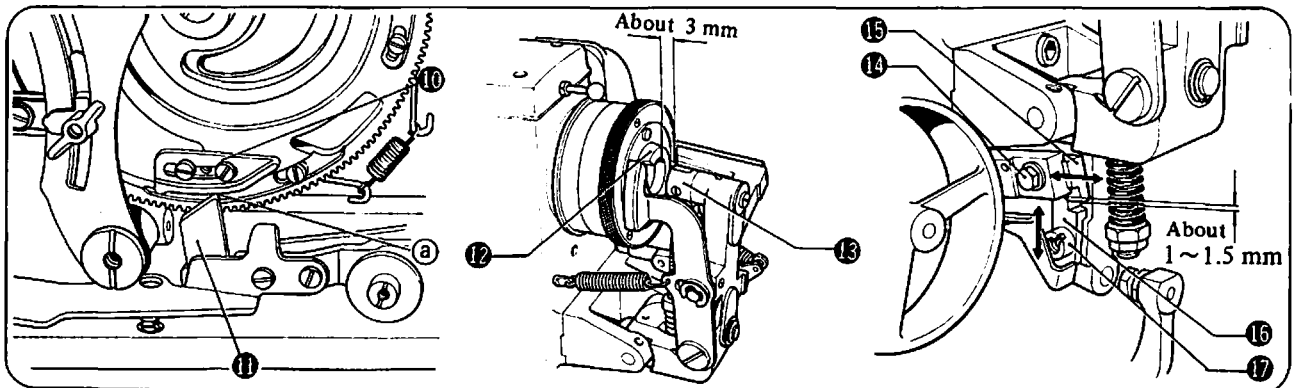
Loosen nut ⑥ and turn bolt ⑤ to adjust the clearance between clutch lever pin ④ and bolt ⑤ to about 0.5 to 1.0 mm at the machine stop position.

3. Stop spring A tension



Turn nuts ⑦ and ⑧ until the lower end of stop spring shaft ⑨ is about 4.5 to 5 mm out of the bottom of nut ⑧.

4. Clutch pawl A and B adjustments



Clutch pawl A adjustment

Loosen bolt ⑬ and move clutch pawl A ⑮ to the right or left so that the shortest distance between stop cam ⑫ and clutch stopper ⑬ will be about 3 mm when the tip stop cam segment B ⑪ comes to part ② of stop cam segment A ⑩.

Clutch pawl B adjustment

Loosen bolt ⑰ and move clutch pawl B ⑯ up or down so that clutch pawl B ⑯ will engage clutch pawl A ⑮ about 1 to 1.5 mm deep when the tip of stop cam segment B ⑪ comes to part ② of stop cam segment A ⑩.

TROUBLESHOOTING

| Trouble | Cause | Check point | Remedy | Page |
|--|----------------------------------|--|---|------|
| Upper thread breaks. | Needle bent or blunt. | Needle. | Replace needle. | 7 |
| | Needle installed improperly. | Needle direction. | Install needle in the right direction. | 7 |
| | Wrong threading. | Threading. | Refer to instruction for upper threading. | 7 |
| | Upper thread tension too strong. | Upper and lower tension regulator tensions. | Adjust to correct tension. | 10 |
| Lower thread breaks. | Needle and shuttle timing wrong. | Needle and shuttle. | Refer to instructions for needle and shuttle timing. | 11 |
| | Lower thread tension too strong. | Tension of lower thread tension adjusting screw. | Adjust lower thread tension correctly. | 9 |
| Thread end remains at start of sewing. | Oil and lint around bobbin case. | Bobbin case. | Remove lint and wipe off oil. | 10 |
| | Upper thread scissors too high. | Height of scissors D. | Refer to instructions for upper thread scissors adjustment. | 15 |
| Stitches skip. | Needle bent or blunt. | Needle | Replace needle. | 7 |
| | Needle installed improperly. | Needle direction, height. | Put needle in the correct direction and height | 7 |
| | Wrong upper threading. | Upper threading. | Pass upper thread correctly. | 7 |
| Thread loose. | Lower thread tension too strong. | Lower thread tension. | Adjust lower thread tension. | 9 |
| | Bar tack stitches loose. | Upper tension discs tension. | Adjust upper tension regulator. | 10 |
| | Zigzag stitches loose. | Lower tension discs tension. | Adjust lower tension regulator. | 9 |
| Needle breaks. | Needle installed improperly. | Needle direction height. | Put needle in the correct direction and height. | 7 |
| | Needle and shuttle timing wrong. | Needle and shuttle. | Adjust timing of needle and rotary hook. | 11 |
| | Stitch width wrong. | Needle swing. | Adjust stitch width and stitch reference position. | 14 |



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