

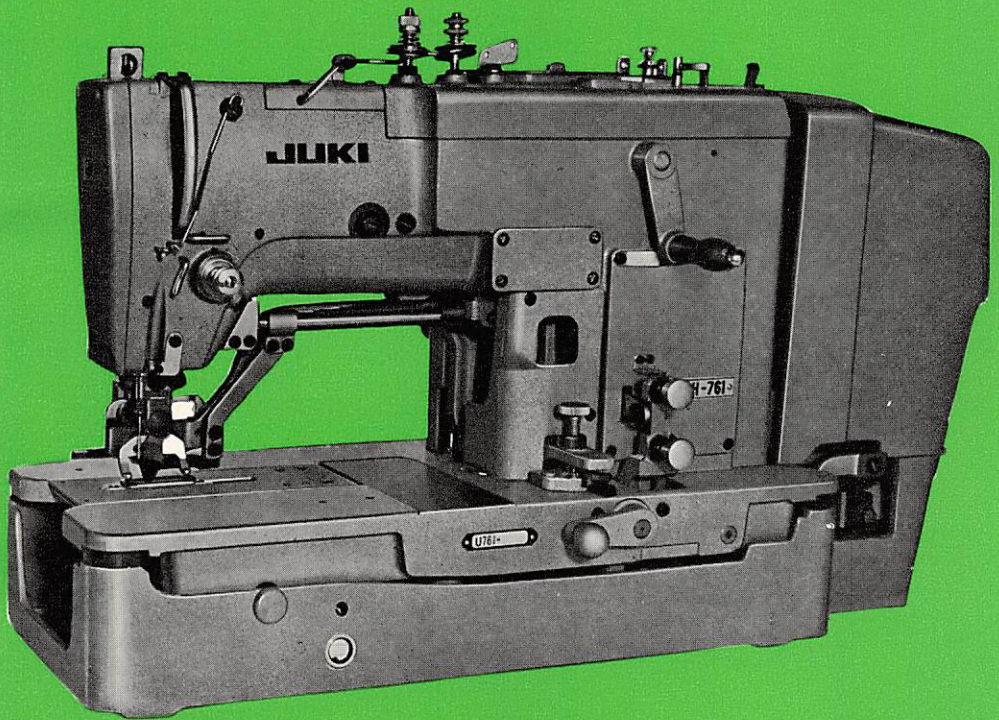
MODEL **LBH-761-762-763**

HIGH SPEED,  
STRAIGHT BUTTON HOLING  
INDUSTRIAL SEWING MACHINES

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# INSTRUCTION BOOK



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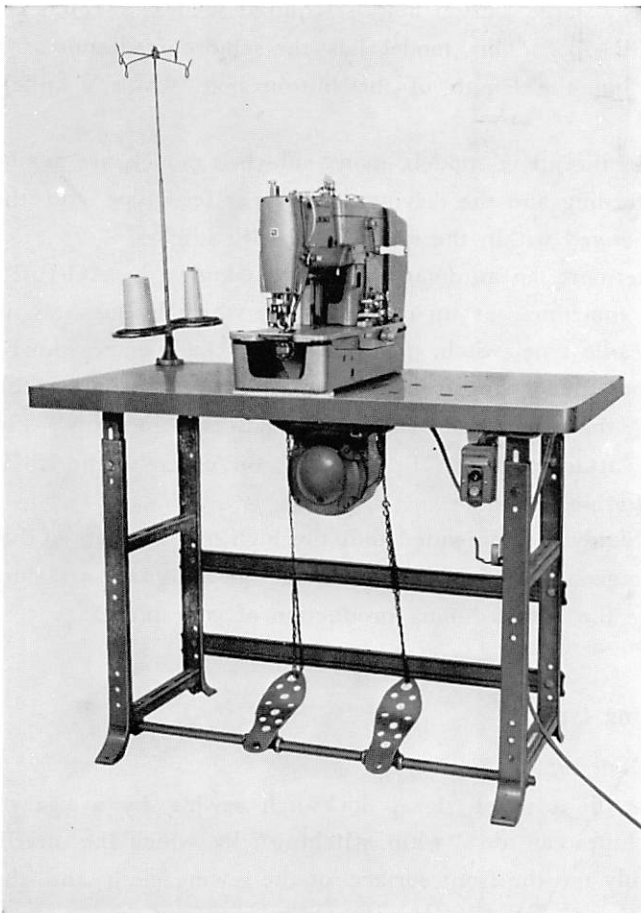
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# I. GENERAL DESCRIPTION OF THE MACHINE

## 1. Main specifications

JUKI Models LBH-761, 762 and 763 are high speed, straight button holing industrial sewing machines with a maximum sewing speed of 3,000 s.p.m. (standard speed 2,500 s.p.m.)



LBH-761 is designed to button hole men's shirts, blouses, undergarments and all other garments and the width of the barred ends is 2.5~4 mm ( $3/32'' \sim 5/32''$ ) while the length of the button hole (width of knife) is 6.5 mm~19 mm ( $1/4'' \sim 3/4''$ ). When, however, button hole length of up to 1" is required for gowns, pajamas or ladies' suits, use JUKI Model LBH-762. This model's barred ends width is 2.5~5 mm ( $3/32'' \sim 3/16''$ ) [one side is 1.2~2.5 mm ( $1/16'' \sim 3/32''$ )] and the length of the button hole is 6 mm~25.4 mm ( $1/4'' \sim 1''$ ).

When a large button hole is required such as sweaters etc. use the Model LBH-763. This model has the same barred ends as the Model LBH-762 but the length of the button hole (width of knife) is  $1/4'' \sim 1\ 1/4''$ .

Besides the above models, many sub-class models are available.

The feeding and the driving are of gear feed type and the stitches can be changed within the range of 54~340 stitches.

Furthermore, an automatic attachment known as AO-1 is available for these machines, at an extra cost, by which by just stepping lightly on the treadle type switch, the work clamp check comes down automatically and the sewing can be started and as soon as the sewing is completed, the work clamp check automatically goes up. This special automatic attachment can be installed, on order, to the LBH table by slightly altering the table.

It is highly recommended that the high speed feature of these models be advantageously utilized together with the automatic attachment AO-1 to increase the button holing production of your plant.

## 2. Stitching types

### 1) Names of stitching types

As in the case of zigzag lockstitch sewing by a zigzag machine, these machines can do "**whip stitching**" by which the needle thread appears only on the front surface of the sewing cloth and the bobbin thread appears in a zigzag form on the back of the sewing garment.



Another type of stitching is commonly called “**purl stitching**” by which the needle thread tension is strengthened and the needle thread passes straight through the upper center part of the stitch and to this the bobbin thread is interlocked, as in the case of button hole stitching of men’s shirts.

## 2) *Types of stitching*

“**Purl stitching**” is applied to general fabric except knit goods. With these machines, even in purl stitching, the barred ends are whip stitched to make the ends sturdier. However, if you so desire, the barred ends can be purl stitched also.

“**Whip stitching**” is generally used for knit goods but by changing the thread tension, the purl stitching can be converted to whip stitching.

## **II. INSTALLATION OF THE MACHINE AND PREPARATION FOR RUNNING**

### **1. Installing the motor and the idler pulley**

As shown in Fig. 1, turn the table up side down and connect all motor components ①. The head of the installing base bolt ⑤ should come out on the top surface of the table through the hole in the table.

Insert a motor cushion ⑥ between the installing base and the table.

Install the motor by loosening the motor adjusting nut ④ and pass the motor installing bolt ③ from the side of the motor base (lower) ②.

Appropriate power for this machine is a 300 W, 3-phase electric

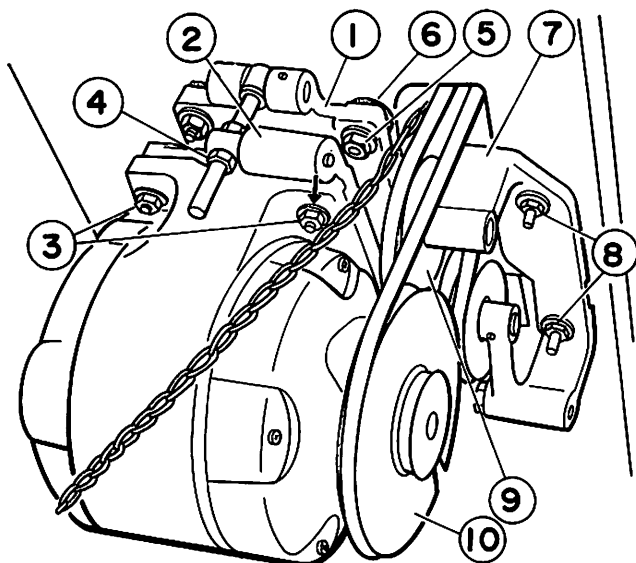


Fig. 1

induction motor (1,500 r.p.m./50~, 1,800 r.p.m./60~), but when only single phase current is available, use a 300 W or 250 W single phase electric motor (1,500 r.p.m./50~, 1,800 r.p.m./60~).

The motor installing hole at the bottom of the motor base ② is a long hole but if the motor pulley of 2,500 r.p.m. speed is to be used at 50~, the motor should be installed so that the installing bolt comes nearly to the center of the long hole under the motor base (lower). If the motor pulley of 2,500 r.p.m. is to be used at 60~, install the motor by pushing it fully toward the opposite direction from the arrow direction. Also, when motor pulley of 2,800 r.p.m. or 3,000 r.p.m. is to be used at 50~, install the motor by pushing it fully toward the arrow direction.

When 2,800 r.p.m. or 3,000 r.p.m. pulley is to be used at 60~, install so that the installing bolt comes to the center of the long hole.

The reasons for installing the motor to the different, respective positions as explained above are because when the size of the motor pulley

is changed, the belt should not contact either the head part or the stop-motion device. For this reason, follow the foregone method as the standard in installing the motor and adjust the respective positions accordingly.

Please note also that when cast frame motor is used with either 3-phase or single phase motor, use a motor base B-7101-761-AA0 and when a steel frame motor is to be used, use a motor base B-7101-761-BA0. When a National Brand single phase electric motor of 250 W is to be used, the motor installing position is different, so be careful.

The idler pulley components ⑦ should be installed to the bottom surface of the table by hexagonal bolts ⑧ of 15/64", Fig. 1. As the installing hole is rather large, be sure that the belt is not contacting the base of the head part and the positions of the idler pulley ⑨ and the motor pulley ⑩ should be so adjusted that they will not be touching each other.

## **2. Installing the machine arm and bed**

Turn the table over in an upright position and, as shown in Fig. 2 (A), place the felt pads ① in line with the 4~7 $\phi$  holes of the table and install the machine arm ② on top of it.

Hook up the S-shaped latch on the starting lever (Fig. 5 (A)②) which is attached to the back of the machine bed and to this connect the shorter chain and let it hang down.

As shown in Fig. 2 (A), place the machine head on top of the head base, insert the hinge arm ③ to the hole on the left side of the bed and interlock this with the hinge shaft bushing ④. Lastly, install the belt guard with the hinge at the rear end of the machine bed.

### **Caution**

After the machine arm is installed, adjust the starting lever set screw in the following manner: (Fig. 2 B)

Verify that the machine is in stop position, then push the starting lever ① toward the rear. Then, loosen nut ④ and adjust so that



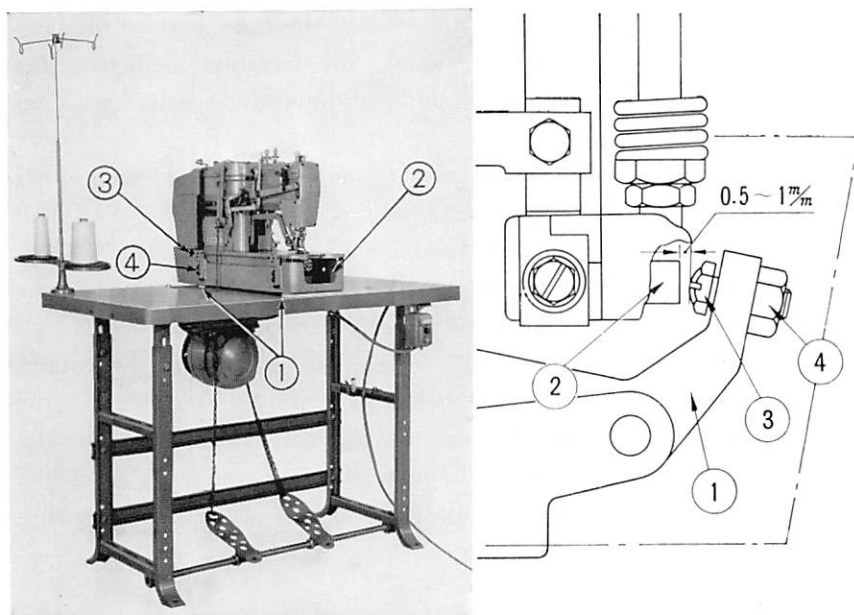


Fig. 2

the clearance between the bushing ② and set screw ③ of the starting lever becomes 0.5~1 mm.

### 3. Rotating direction of pulley

As viewed from the operator's side, the rotating direction of the pulley is clock-wise.

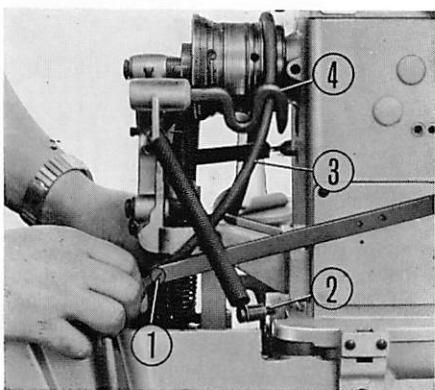
### 4. Installing the chain

See Fig. 2 (A) on how to put on the chain.

First, fix the height of the table so that the work can be performed easily. Then adjust the length of the chain and set the angle of the pedal to make the sewing easier.

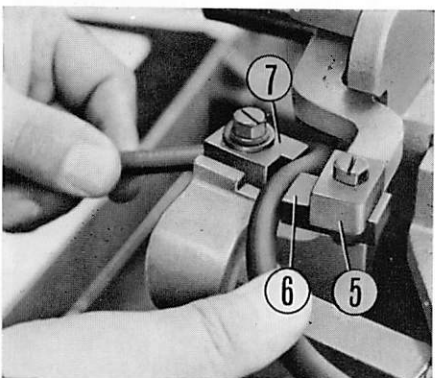
## 5. How to put on & remove the endless round belt

We have changed the belt for LBH-760 Series machines from the conventional round leather belt to that of endless round belt. This endless belt is far superior in durability as compared to the conventional leather belt and the running sound and dirtyness are much minimized. Place the machine head on the machine base and put this belt on in the following order: (It would be easier if the belt is put on before the motor pulley is installed to the motor)

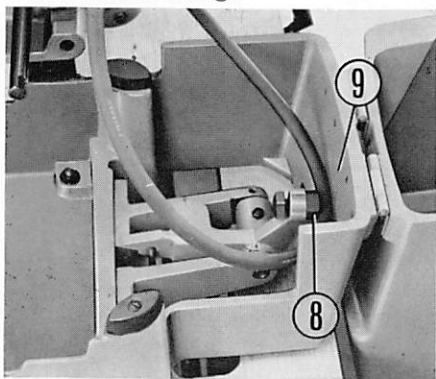


1. Remove the starting link driving rod set hinge screw ① and the stop motion lever tension spring suspension ②
2. First, put on the belt for low speed ③ as follows:
  - (1) Insert the belt for low speed ③ to the low speed part of the belt shifter ④.
  - (2) Raise up the machine head support rod and tilt the machine head.

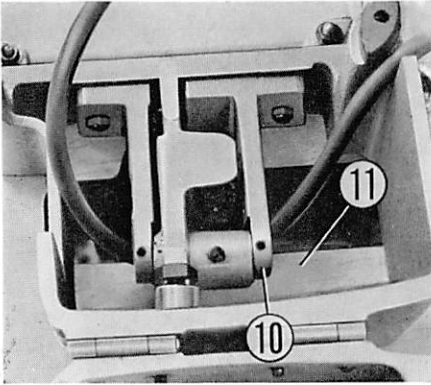
- (3) Lift up the latch tripping lever ⑤ and pass the belt between the latch A ⑥ and the latch B ⑦.



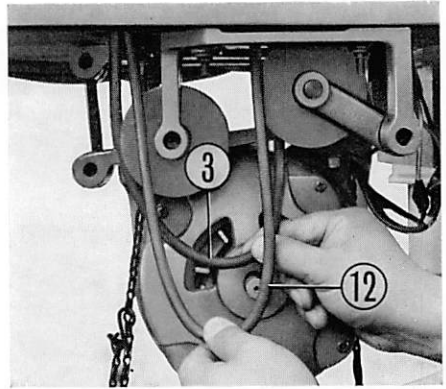
- (4) Pass the belt through the space between the starting lever adjusting screw ⑧ and the machine base ⑨.



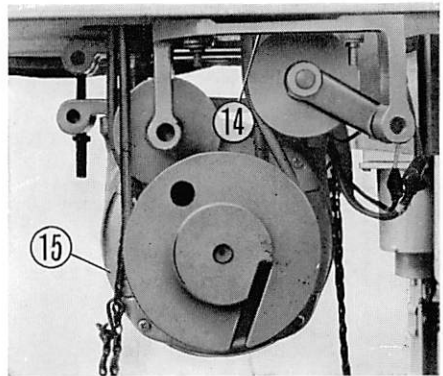
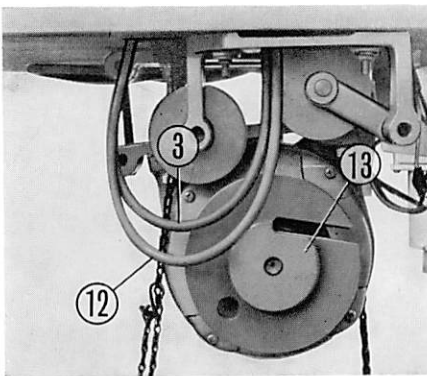
- (5) Pass the belt through the space between the bottom part of the starting lever bearing bracket (10) and top of the table (11).



3. Put on the belt for high speed (12) in the same manner as the belt for low speed (3).  
4. Pull out the belt from the table downwards.



5. Raise up the machine head and install back the starting link driving rod set hinge screw (1) and the stop motion lever tension spring suspension (2) in their original positions.  
6. Install the motor pulley (13) to the motor. Be certain that the two belts come to the front of the motor pulley.



Following are the part numbers of the endless belt:

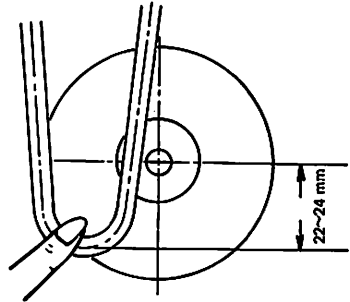
50 HZ For low speed B-7119-761-A00  
For high speed B-7119-761-C00

60 HZ For low speed B-7119-761-B00  
For high speed B-7119-761-D00

## TENSION OF THE ENDLESS ROUND BELT

The ideal tension of the endless round belt (urethane belt) would be to operate it with 3–4% stretched condition.

To adjust it to this condition, catch the belt (shorter one) for low speed running to the pulley of the machine head and as shown in the figure, when the bottom end is lightly pulled (without catching the belt to the idler pulley), determine the position of the motor so that the distance between the center of the extreme bottom end of the belt and the center of the motor comes to 22–24 mm (7/8"–61/64").



Then, put on the low speed and high speed belt correctly to the motor pulley and the idler pulley. In this condition, adjust the tension of the high speed belt so that it will be of same tension as the low speed belt. The tension of the high speed belt is adjusted by changing the position of the idler pulley.

When the machine does not run with high speed, strengthen the tension of the belt.

When the belt does not move from the driving pulley to the idler pulley at either starting time or at stop motion time, (or in vice-versa case) inspect and see if the tension of the belt is too strong or if the position of the belt shifter is correct or not.

To remove the belts, first, remove the rear side belt toward the outside of the motor pulley, then remove the inside belt from the idler pulley, pass it through the groove of the pulley and take it out toward the rear. At this position, if the motor pulley is rotated counter-clockwise (as viewed from the rear), the belt will come off.

To replace the belts to the pulley, reverse this procedure by turning the pulley clockwise.

## III. HOW TO OPERATE THE MACHINE

### 1. Cleaning the machine

When you run the machine for the first time, be sure to wipe away all dust and rust-proof oil from all parts.

To produce attractive stitching job, the sewing hook must always be cleaned and should be dust-free. Also see to it that no lint hards are sticking to it. Every day after the work is through, tilt the machine and

take out the bobbin case and with a pair of tweezers remove all dirt from the surface of the hook.

Also, remove all dust and dirt from in and around the work clamp check and the needle thread trimmer blades.

When tilting the machine, at first, remove the belt and by uprighting the head support block at the left side of the machine (Fig. 12 ㉔), tilt it to your left. Be sure to see that the machine arm support rod is standing up straight.

## 2. Sewing speed

For the first 4 months, sew with a speed of 2,500 s.p.m. When the machine is properly adjusted and oiled and the sewing cloth is not too thick, the machine can be run at 3,000 s.p.m. The pulley in the accessory box is for 2,500 s.p.m. but if you desire a pulley of 2,800 or 3,000 s.p.m., please order separately as they are all available.

## 3. Lubrication

### 1) *Oiling the sewing hook*

From the oiling hole (Fig. 4 ㉑) pour in new JUKI NEW Defrix Oil No. 1 (low viscosity) up to the red line of the oil sight gauge (Fig. 4 ㉒). *Do not use* high viscosity oil for these machines under any circumstances.

When the oil level drops below this red line, fill it up again to the red line. The amount of oil to the sewing hook is adjusted by the screw (Fig. 5 (A) ㉑). When this screw is screwed in, the oil supply becomes less. However, it will take about 10~20 minutes after adjusting before the proper amount of oil is supplied to the sewing hook. So, don't hurry, give it a plenty of time. If it's properly adjusted once, further adjustments would not be necessary. The sewing hook components should be oiled at least once a week.

### 2) *Oiling the needle bar and the thread take-up*

Every morning open the oiling hole (Fig. 4 ㉓) and drop in 2~3 cc of the new JUKI Defrix Oil No. 1. This is a special oil



for needle bar components only, so if you oil too much, it might cause oil leakage. Be careful.

3) *Oiling the needle throw components*

Every morning, open the oil hole (Fig. 4 ④) and pour in about 5~8cc of JUKI NEW Defrix Oil No. 1. The oil in this hole does not leak, so don't worry.

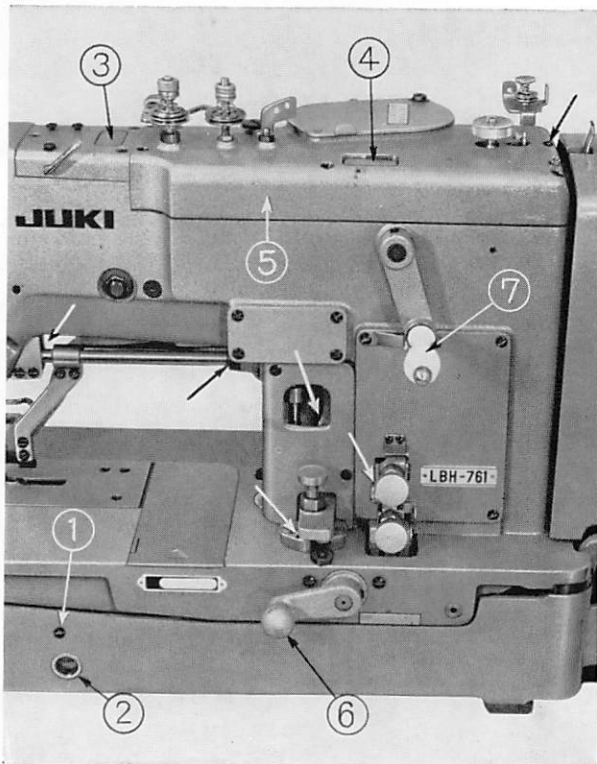


Fig. 4



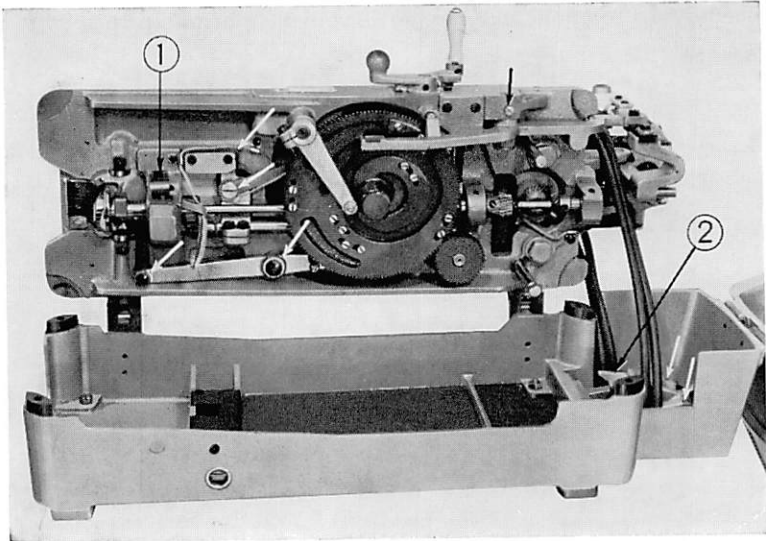


Fig. 5 (A)

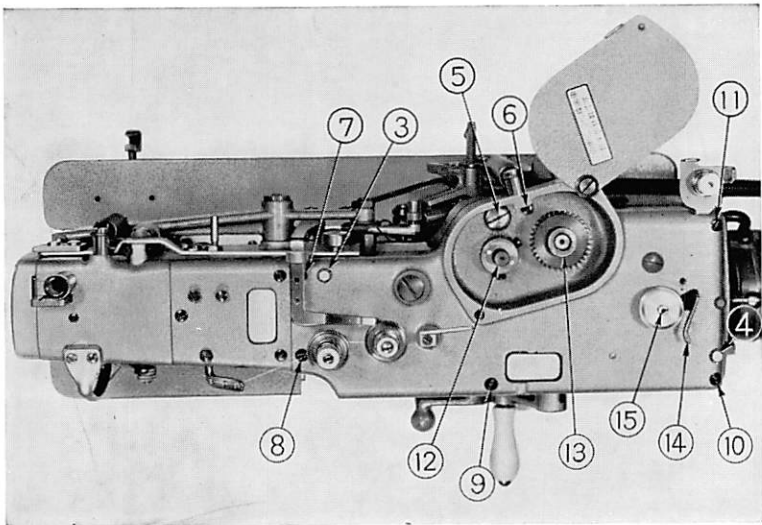


Fig. 5 (B)

#### 4. Oiling the worm gears

The worm gear components are lubricated by an oil reservoir, so just change the oil once a year. To change the oil, remove screw (Fig. 5 (B) ⑤), and if the machine is tilted, the oil will flow out from this hole. After the spent oil is completely drained out, pour in about 70 cc of New Defrix Oil No. 3 oil and retighten this screw ⑤.

#### 5. Oiling the bevel gears

If the top cover (Fig. 4 ⑤) is removed, the bevel gear case (Fig. 6 ①) will appear. Remove the oil plug screw (Fig. 6 ②) and pour in grease into this hole. The greasing of this hole should be done at least once a year.

To remove the cover, first, remove the tension release lever hinge screw (Fig. 12 ①) and tilt the tension release lever (Fig. 12 ②) towards the operator. Then, remove the top cover set screws (Fig. 5 ⑥~⑩) and also remove the spur gear bushings (one at Fig. 5 (B) ⑫ and one at ⑬ below the spur gear). Finally, insert a screw driver to the slit of Fig. 12 ③ and ④ of the top cover and if it's lifted up evenly, the cover will come off.

When installing the top cover, push back the bobbin winder trip latch (Fig. 5 ⑭) to the rear then by taking out the oil wick which is dangling at the bottom surface of the top cover (the wick which is oiling the shaft bushing of the bobbin winder pulley, Fig. 5 (B) ⑮) from the bottom side of the oil hole (Fig. 4 ④) to the top surface of the cover and by leveling the top cover, plug it into the worm wheel shaft (Fig. 6 ③) and the cam driving shaft (Fig. 6 ④) and put it on the top of the machine arm. Then, after pegging in the cover position pin (Fig. 5 (B) ③ ④), retighten the top cover set screws and install the spur gear bushing. Each of the 2 set screws of the spur gear bushing should be matched with the level surface of the shaft and tightened. Finally, insert the oil wick between the rear oil reservoir felt (Fig. 6 ⑥).

## 6. Hand oiling of other parts

Oil all other parts not mentioned above with the hand oiler. The oiling holes are all marked with red paint. The main holes are shown by arrows in Fig. 4, Fig. 5, Fig. 12 and Fig. 21. These holes should be hand-oiled at least once or twice a week, a little quantity at a time, with JUKI NEW Defrix Oil No. 1.

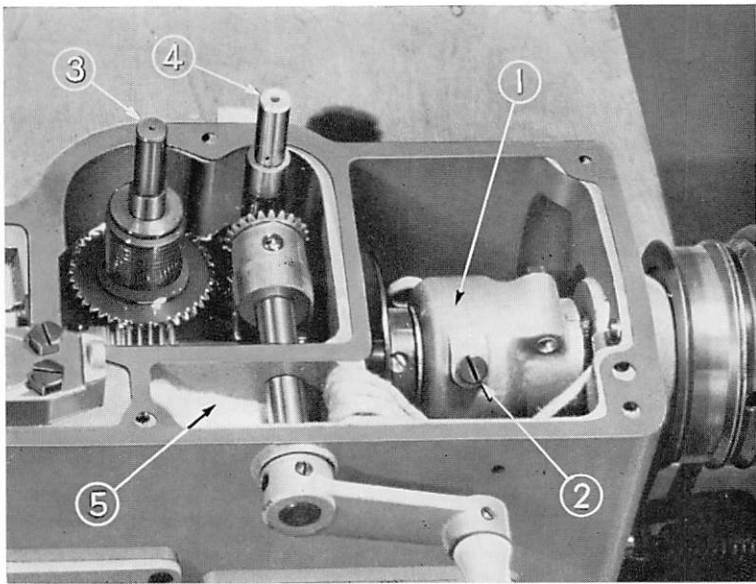


Fig. 6

## 7. How to insert the needle

Use DP×5 (135×5) needle. Normally, size #14 is used for men's shirts but depending on the size of the thread and the kind of sewing fabric, select the right size of needle. For tricot and jersies, however, better use "Super DP×5 J" which is a special needle for synthetic fabrics because it will not damage the fabric. Generally, size #11 is used for purl stitching but for whip stitching, sizes up to #9 may be safely used.

To insert the needle, put the grooved side of the needle toward the operator, insert the needle deep up the needle bar through the needle bar hole until it stops and then tighten it with the set screw. Better face the groove of the needle a little to the left to prevent skip-stitching.

8. Threading the machine

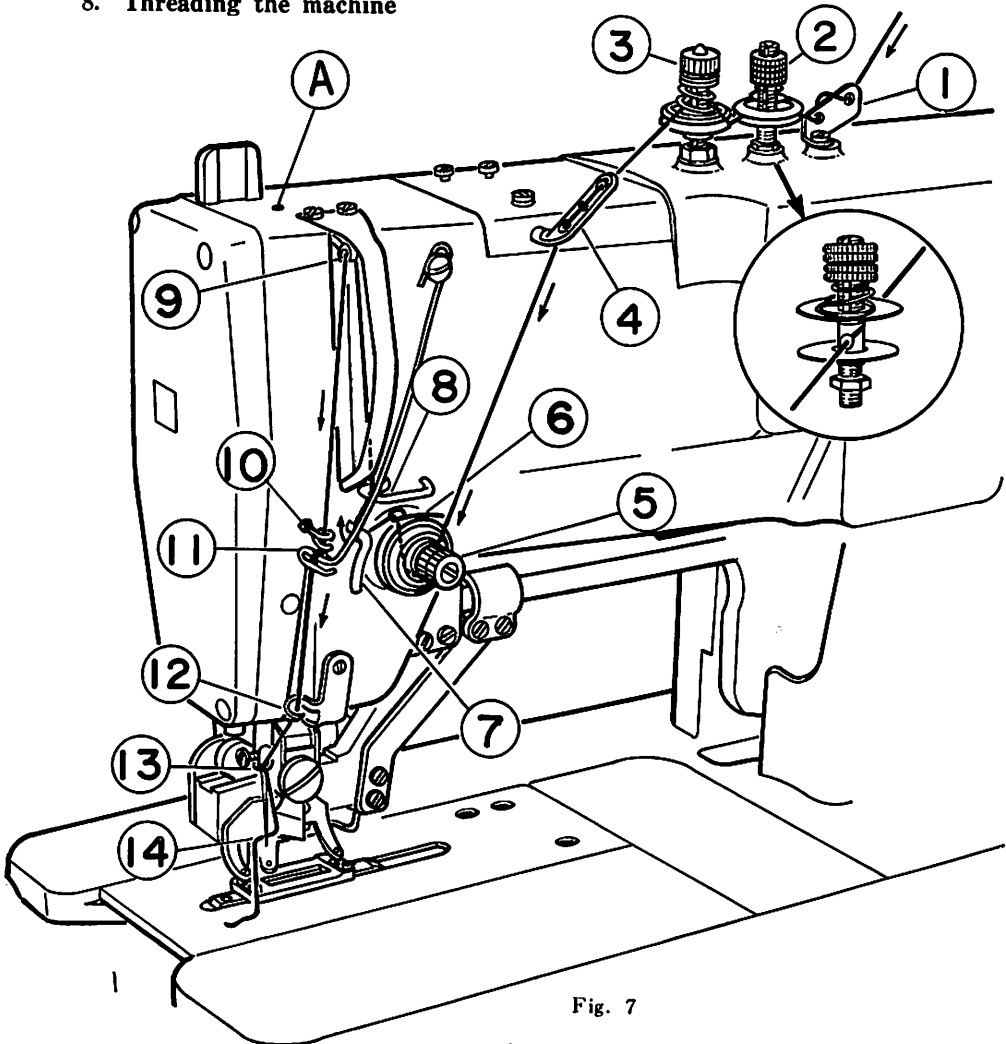


Fig. 7

For button holing, use best grade cotton thread of even size and even left twist for the needle thread. The sizes should be from #40~60 and the strands from 3~6 fiber twists. For the needle thread, polyester, nylon or super polyester threads can be used as well. However, when nylon thread is to be used, be sure to use a special sewing hook for synthetic fiber thread.

Right twist or inferior grade thread will, not only mar the beauty of stitched job, but will invite thread breakage, thus lowering the efficiency of the button holing operation. Nothing is gained by inferior grade thread, so be sure to select the best grade of thread for this operation.

Refer to Fig. 7 for the order of needle threading.

The needle thread, which came out of the thread spool, should be passed in the following order:

The thread guide pin ①→tension disc No. 1 ②→tension disc No. 2 ③→three-hole thread eyelet ④→ tension disc No. 3 ⑤→take-up spring ⑥ tension thread guide ⑦→ take up thread guide A ⑧→ thread take up ⑨→ take up thread guide B ⑩→ thread check wire ⑪→needle bar thread guide ⑫→needle thread guide ⑬→needle eye ⑭.

In passing the thread through the needle eye, be sure to pass it from the opposite side of the operator.

Please note also that, as shown in Fig. 7, the tension disc No. 1 ② has a hole with a slit, so pass the thread through the center hole of this slit by lifting the upper tension disc.

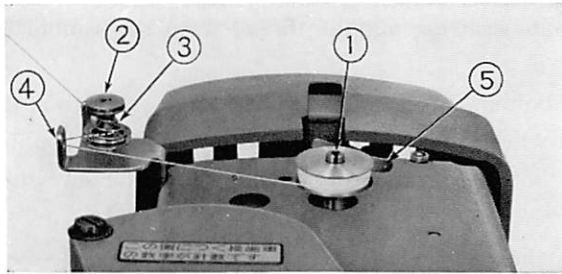


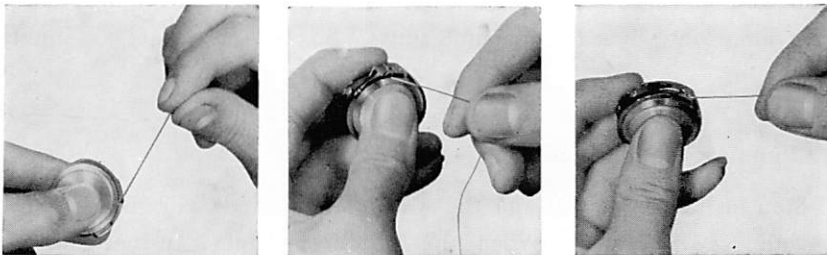
Fig. 9

### 9. Winding the bobbin thread

The optimal sizes of the bobbin thread are #50~100 and as in the case of needle thread, synthetic threads can also be used.

The bobbin thread should be passed in the order as shown in Fig. 9. First, insert the bobbin into the pulley shaft ① and pass the thread which came out of the shaft in the order of thread guide eyelet ②→ bobbin winder tension disc ③→ thread guide eyelet ④ and wind it to the bobbin in the counter-clockwise direction as viewed from above. If the bobbin winder trip latch ⑤ is pressed against the bobbin, the bobbin thread will be wound during the running of the machine and when the fixed amount is wound, the winding will stop automatically. The bobbin cannot be wound when the machine is not running.

### 10. Drawing out the thread from the bobbin case



(A)

(B)

(C)

Fig. 10



The order of drawing out the thread from the bobbin case is shown in Fig. 10 (a) (b) (c).

Hold the bobbin inside the bobbin case so you can see clearly from the front and when the thread is drawn out from the bobbin case, see to it that the bobbin turns in the counter-clockwise direction. (Fig. 10 c)

## 11. Inserting the bobbin case

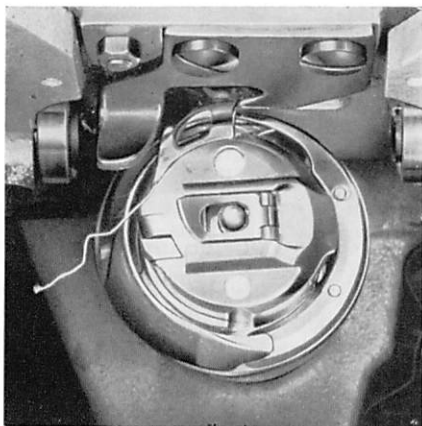


Fig. 11

See Fig. 11 for inserting the bobbin case into the sewing hook. When the bobbin case is correctly inserted to its position in the hook, a click sound can be heard. If the bobbin case is not properly inserted, it might jump out when the machine starts. So, be sure that it's snugly inserted in.

## 12. Running the machine

Step on the left pedal and the work clamp check will go up. Now insert the sewing cloth. When the left lifter pedal is raised and the work clamp check is lowered, the machine will start to run just as soon as the right pedal is stepped on fully. After the button holing is through and

the knife has cut a hole in the cloth, the machine will stop automatically. Then, raise up the work clamp check and pull out the sewn cloth.

This machine is equipped with a safety clutch which prevents the machine from starting while the work clamp check is raised or the work clamp check to go up before the machine stops and even if the starting pedal is stepped on while the lifter pedal is stepped down half way, the starting pedal will not start.

When the starting pedal is stepped on lightly, the machine will run at a slow speed but if the pedal is stepped on fully during this slow running, it will run faster.

### **Caution**

If the starting pedal is left in the stepped-in condition at the machine stopping time, the knife might cut at high speed without shifting to low speed or the stop-motion device may not function properly. Be careful.

### **13. How to prevent the cutting motion of knife**

When the needle thread is broken or when the bobbin thread is all gone, it is better to resew without the motion of the cutting knife to produce better sewn garment. This machine is so constructed that when the needle thread is broken, it automatically prevents the knife from cutting. However, when the needle thread is intact but the bobbin thread is all gone, the knife will cut at the finish of the sewing cycle.

When the bobbin thread is all gone or when you detect something wrong with the sewing condition, push down the finger (Fig. 12 ㊦) of the knife stop lever (Fig. 12 ㊦) with your hand and hold it there until the machine stops. This will prevent the machine from cutting.

### **14. Slow speed running and how to stop the machine in emergency**

#### *1) Low speed running*

When the machine is to be adjusted or when the stitching condition

is extremely bad, it can be run at a low speed. If the handle (Fig. 4 ⑥) is lowered and kept there, the machine will run at a slow speed even though the starting pedal is stepped on fully.

### 2) *Stopping the machine in emergency*

If the needle should break during the running of the machine and the sewing is continued in this condition, the sewing cloth may be ripped. In such a case, the machine can be stopped emergently. To do this, turn the hand stop crank 180° counter-clockwise until it hits the stop bolt. The machine will stop instantly. To return the work clamp check to the original sewing position, return the hand stop crank to the original position and by either turning the handle (Fig. 4 ⑦) or starting the machine, complete the sewing cycle.

## 15. How to use the handle

This handle is used for emergent stopping as mentioned above and also when it is desired to re sew from the point just before the thread breakage. If this handle is rotated in the clock-wise direction, the work clamp carrier (Fig. 12 ⑦) and the work clamp check will move in the same manner as in normal sewing. The carrier will not move even if this handle is reversed, so if you want to move the carrier a little, move the handle forward and backward, a little at a time, and the carrier will move.

### Caution

1) During the maintenance of this machine, if the stop-motion lever (Fig. 12 ⑧) is pulled to the rear by hand and the driving pulley (Fig. 12 ⑨) is rotated and if the machine is started by turning the handle before the groove of the stop cam (Fig. 12 ⑩) is tightly interlocked with the stop link (Fig. 12 ⑪), the knife often cuts at the instant when the machine starts.

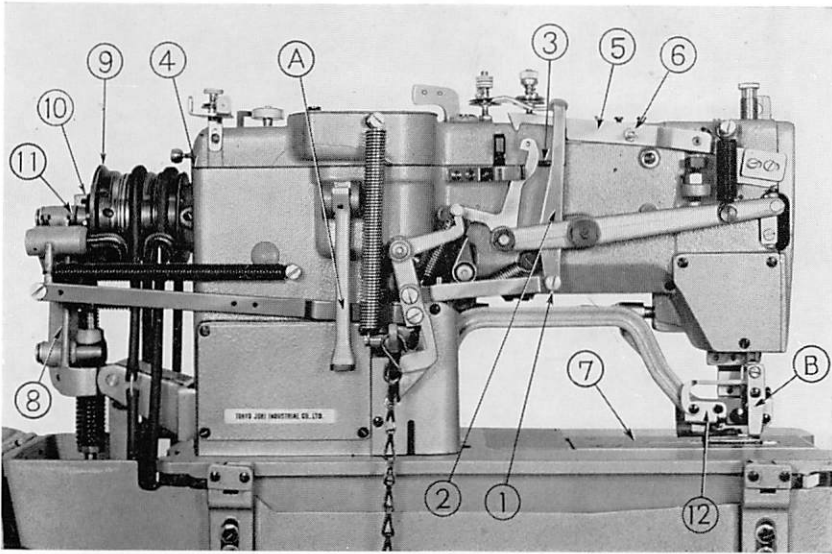


Fig. 12

This action results only when, as shown in Fig. 13, the ratchet pawl ② of the knife bar driving lever bell crank ① is not “riding” atop the ratchet pawl (B) ③, thus creating a space between the ratchet pawl (B) ③ and ratchet pawl (A) ④ and the claw part ② is trapped between them.

In such a case, pull the finger ⑦ of the knife bar driving lever bell crank ① towards you. The interlocking of the pawl ③ and the claw part ② will be released and the pawl ③ will return to the under side of the claw part ② and the above trouble will not occur again.

When the machine stops correctly and the stop motion cam and the interlocking link are interlocked each other, the claw part ⑤ of the starting lever will contact the knife bar driving lever bell crank hinge screw ⑥ and is pushing up the ② part of the knife bar driving lever bell crank. So the above mentioned trouble will not occur.

2) Use the handle only when the needle is not piercing the cloth. It will be safe if the handle is rotated when the driving pulley is stopping at the correct angle.

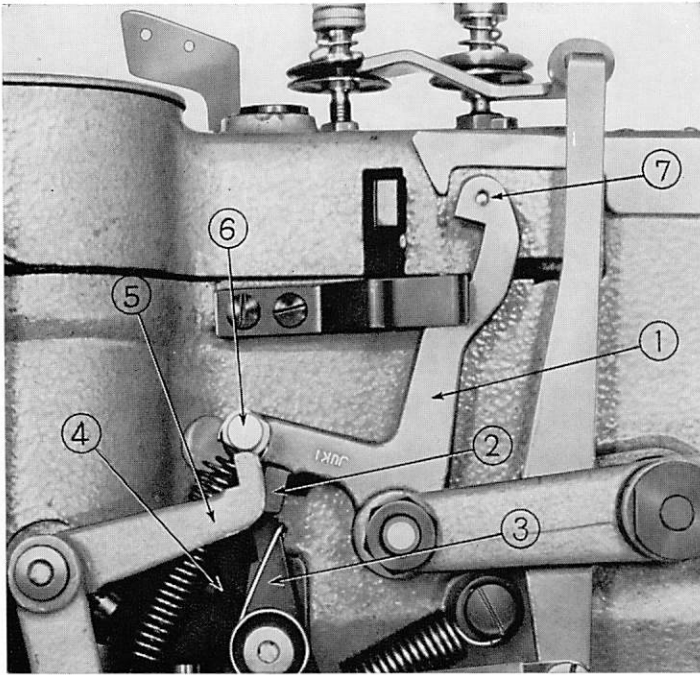


Fig. 13

## IV. ADJUSTING THE VARIOUS PARTS

### 1. The bobbin thread tension

The optimal bobbin thread tension is for the bobbin case to gradually slide downwards when the tip of the thread is held by your hand and lightly shaken up and down. (Fig. 14)

If the bobbin thread tension is too strong, wobbling stitching will result and further, it will invite thread breakage of the needle thread due to the strong needle thread tension caused by the strong tension of the bobbin thread, a detrimental factor to produce an attractive stitching job.

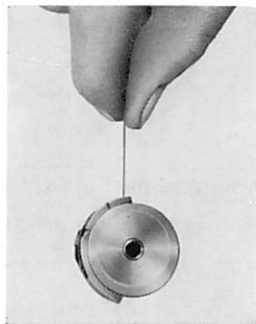


Fig. 14

On the other hand, if the bobbin thread tension is too weak, the bobbin thread will not stay taut and will “float” on top of the sewing cloth, making it impossible to do finish sewing of the starting sewing cycle, causing slipping out of the needle thread.

## 2. The needle thread tension

1) *The needle thread tension of this machine changes in the following manner to produce beautiful whip stitching of barred ends.*

When the machine is at rest, all the thread tension discs are “floating” up.

On the start and return sewing around the edge of the button hole, all three tension discs are working. At all barred ends, the tension disc No. 2 floats up and forms a whip stitching. Also when the machine is running at a low speed, the tension disc No. 3, too, is floating up.

At the second barred end, the speed of the machine is switched to a low speed, so at the second barred end, only the tension disc No. 1 will have been working and at the first barred end, the tension discs No. 1 and No. 3 will be working.

Accordingly, the three tension discs will adjust the following:

① Thread tension disc No. 1 adjusts the needle thread tension at the second barred end.



② Thread tension disc No. 2 adjusts the seaming thread tension of the needle throwing.

③ Thread tension disc No. 3 adjusts the needle thread tension of the first barred end.

2) *To produce good stitching tension for purl stitching*

Once the thread tension is properly adjusted, it is not necessary to adjust the tension of tension discs No. 1 and 3. Just adjust the tension disc No. 2 only.

To produce optimal stitching condition, do as follows:

① Adjust the bobbin thread tension according to Par. 1, above.

② Adjust the tension disc No. 1 so that a beautiful whip stitching is produced at the second barred end.

If the tension disc No. 1 is strengthened, the needle thread gets tighter and the bobbin thread is pulled out more.

③ Adjust the strength of the tension disc No. 3 so that the first barred end forms a beautiful whip stitching.

④ Finally, adjust the strength of the tension disc No. 2 so that the mounts of the starting and returning of the needle throwing stand up erect. If the tension disc No. 2 is strengthened, the wobbling of stitches will be prevented. However, if it's strengthened too much, the needle thread might break. Be careful.

### CAUTION

The first and the second barred ends are whip stitching but if the needle thread tension is too weak at the whip stitching places, a so-called "double locking" (hooking up of the stitch by the hook point of the second stitching thread before the first stitching thread is pulled up to the sewing surface) will result and may cut the needle thread. The tension of the needle thread should be so adjusted to the extent that the bobbin thread will not come up on the surface of the cloth.

3) *To produce good stitching tension for whip stitching*

Loosen the tension disc No. 2 fully for whip stitching. Also adjust the bobbin thread tension just so strong as to allow the bobbin case to

droop down slowly when the bobbin thread which came out from the bobbin case is held by the hand and waved strongly. Then, in consonance with the tension of the bobbin thread, adjust the second barred end tension by changing the tension of the tension disc No. 1 and adjust the tension of the starting and returning as well as the first barred end by the tension disc No. 3.

It is a common practice to use the same size of thread for the needle and bobbin threads for all whip stitching.

### 3. Adjusting the take-up spring

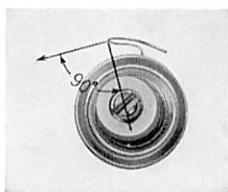


Fig. 15 (A)

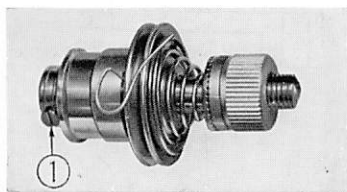


Fig. 15 (B)

The tension and the moving range of the take-up spring greatly affect the beauty of stitches as well as thread breaking due to the “double locking”.

The tension of the take-up spring at the start of sewing should be 25~30 g when it is pulled along the circumference of the tension discs. (Fig. 15 (A)). This can be adjusted by loosening the screw ② Fig. 24 and loosening the screw ① Fig. 15 (B) after removing the thread tension post No. 3 assembly (Fig. 15 (B)).

The moving range of the take-up spring should be 9~11 mm. ( $3/8''$  ~  $7/16''$ ).

Please note that the tension of the take-up spring of this machine must be 2 times stronger than the take-up spring of a conventional lock-stitch machine.

#### 4. Timing of the needle and the hook

##### 1) Height of the needle bar

When the needle bar is lowered to the lowest point, the space between the needle plate surface and the bottom part of the needle bar should be 10.3 mm (3/8"). If the height of the needle bar is not correct, use the timing gauge in the accessory box (Fig. 16 (1)) and by inserting a screw driver into the hole (Fig. 21 (㉑)) adjust the correct installing position of the needle bar connection (Fig. 27 (A)).

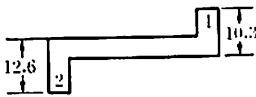


Fig. 16

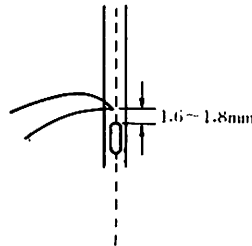


Fig. 17

##### 2) Timing the hook

The best timing of the needle with the sewing hook is when the needle stitches right in the center of the needle hole of the needle plate.

When the needle has begun to rise from its lowest point and the point of the hook point is timed with the center of the needle, the space between the upper part of the needle eye and the hook point is 1.6~1.8 mm (1/16"). (Fig. 17). For jerseys and knit goods, 1.6 mm (1/16") space is better.

For correct timing adjustment, use timing gauge of Fig. 16. Rotate the driving pulley in the regular direction, and when the needle has begun to rise up from the lowest point, insert the 2 part of timing gauge (Fig. 16) between the needle bar and the needle plate and with the needle bar contacting the gauge, time the point of the hook with the center of the needle. The clearance between the needle and the hook point is about 0.05 mm but when the needle is swung from right to left, or vice-versa, be sure that they don't touch each other.

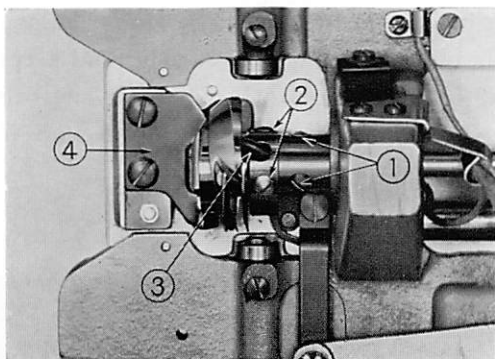


Fig. 18

To adjust the timing of the hook, loosen the set screw (Fig. 18 ①). To remove the sewing hook, loosen the set screws (Fig. 18 ②) and take them out. To replace the sewing hook, time the tip of the oiling tube ③ of the hook sleeve with that of the hole of the oil reservoir and install the hook back. In doing so, the bobbin case stop ④ must also be removed but to replace it, be sure to adjust the right and left installing positions of the bobbin case stop so that the thread will easily pass through the space of the corner between the bobbin case stop.

## 5. Adjusting the positions of seam and barring in relation to the button hole

### 1) *The throw of the needle*

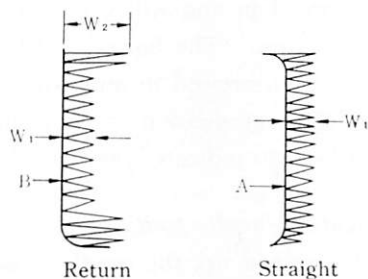


Fig. 19

For seaming or barring, this machine always keeps the left side as the guide and throws the needle to the right and keeps on stitching.

A of Fig. 19 is called the right needle position; B is called the left needle position;  $W_1$  is called the seam width and  $W_2$  is called the barred width.

### 2) Adjusting the $W_1$ and $W_2$

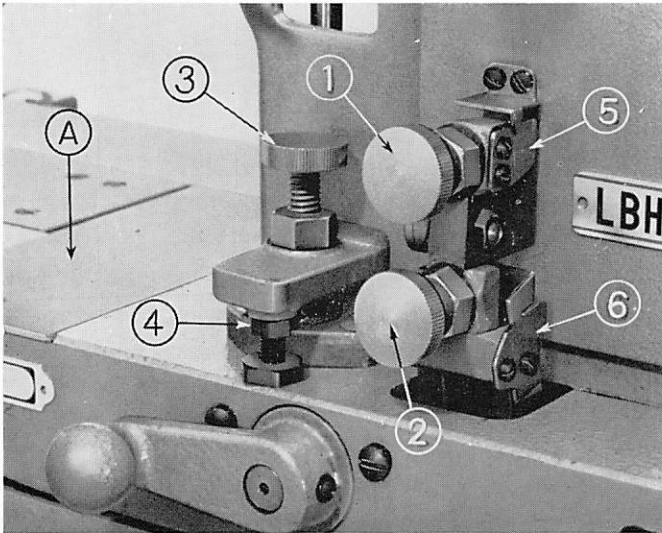


Fig. 20

Please refer to Fig. 20. The seam width  $W_1$  gets bigger when the adjusting screw ① is screwed in and will get smaller when this screw is returned toward the operator. The barred width  $W_2$  will get bigger when the adjusting screw ② is screwed in and will get narrower when this screw is returned. The graduation ⑤ indicates the seam width in *mm* and the graduation ⑥ indicates the barred width also in *mm*.

### 3) Adjusting the right-left needle positions

When the screw ④ is pushed up, the needle position A will move to left and if it's lowered, it will move to right. When the adjusting

screw ③ is screwed in, the needle position B moves to left and if it's returned, it will move to right.

#### 4) *Order of adjustment*

Adjust the right needle position and the seam width to prevent the knife from cutting into the seams. Next, adjust the left needle position so that the thread of the right side of the seam width will not be cut by the knife. Finally, adjust the barred width.

### **CAUTION**

- ① After all of the above adjustments are made, be sure that all the locking nuts are firmly tightened.
- ② Due to a certain amount of rattling by the throw of the needle and tightening of the cloth by the needle, there may be a slight tolerance between the graduation figure and the actual button holing length. So, make correct adjustments by actual sewing.
- ③ The needle is so constructed to throw more than the hole length of the work clamp check. So, after adjusting the barred width so that it is widened to over 3.8 mm (5/32") and moving the needle position, rotate the driving pulley with your hand and ascertain that during both start and return sewing, the needle will not contact the work clamp check. After the driving pulley is rotated by hand, be sure to return the pulley to the angle where the stop link is interlocking with the groove cam of the stop.

### **6. Adjusting the work clamp carrying motion**

Pull out the bed slide ④ Fig. 20 to your right, loosen nut ① Fig. 21 and by sliding the regulating hinge stud ② so that the scale ③ will show same graduation as the width of the knife, tighten the nut.

The graduation is set to the amount of carrier corresponding to the width of the knife, but if desired, this carrying amount may be increased.



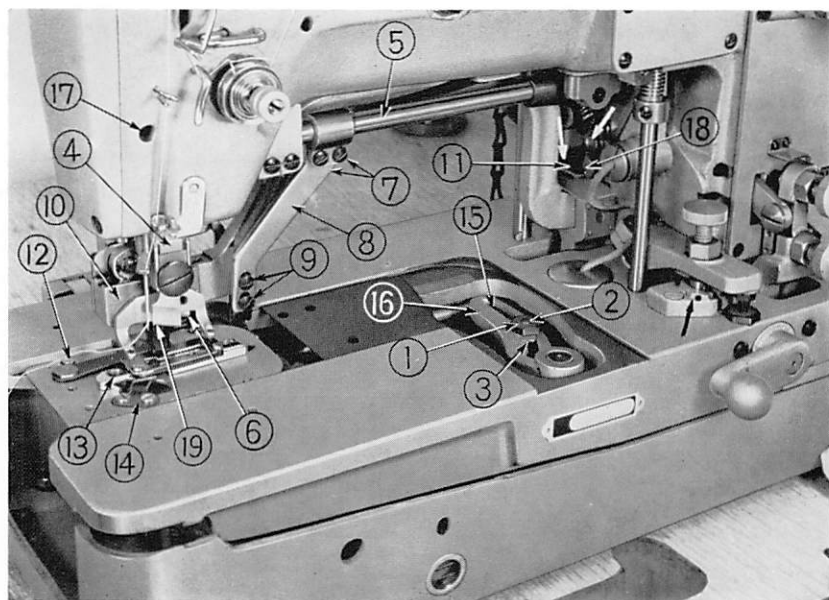


Fig. 21

### 7. Changing the number of stitches

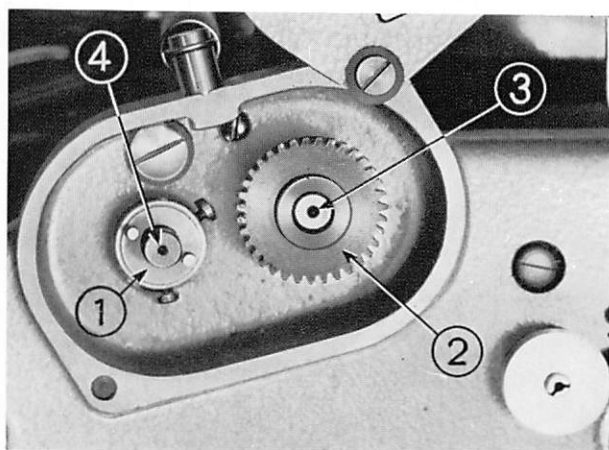


Fig. 22

By changing the spur gears, this machine can change the number of stitches in a wide range as shown in Table below.

When the number of stitches are desired to be changed, change the gear ② Fig. 22. All the spur gears have alphabet marks such as A, B, C etc. or numbers such as 123, 152 etc. branded on them. The alphabets show the pairing number of each gear, so be sure to interlock the same alphabet gears. The figures branded on the gear ② Fig. 22, which is on the rear side, indicate the number of stitches required.

When installing the gear, insert the pin holes firmly into the 2 pins of the spur gear bushing ①, Fig. 22.

As the shaft ③ and the shaft ④ (Fig. 22) rotate freely to opposite directions, respectively, insert the gear into the shaft and after interlocking, rotate the gear by pressing it downwards and it will go in easily.

This machine is provided with the following 15 gear sets, as accessory parts, besides the sets in the machine, but if other gear sets are desired besides these sets, please order them separately.

TABLE

Set	Small gear		Large gear		Set	Small gear		Large gear	
	Teeth No.	Stitch No.	Teeth No.	Stitch No.		Teeth No.	Stitch No.	Teeth No.	Stitch No.
A	21	54	53	345	I	30	93	44	200
B	23	62	51	300	Ⓐ	31	100	43	190
C	24	66	50	285	K	32	150	42	180
D	25	70	49	238	Ⓛ	33	110	41	170
E	26	74	48	252	M	34	115	40	160
F	27	79	47	238	Ⓜ	35	123	39	152
G	28	83	46	225	Ⓝ	36	130	38	145
H	29	88	45	212					

\* The ones circled with ○ are standard accessory sets

The beauty and durability of all button holes depend largely upon the pitch of the stitches, so select the correct number of stitches.

## 8. Adjusting the positions of the knife

As the positions of the knife bar cannot be adjusted, when the right or left positions of the needle plate knife groove is out of alignment due to loosening of screws etc., loosen screws ⑫ ⑬ Fig. 21 and make slight adjustment on the installing positions of the needle plate or work clamp carrier plate.

Adjust the front and rear positions of the knife by moving the installing positions of the knife holder ④ Fig. 21 back and forth. When the knife is installed, the clearance between the knife and needle bar should be at least 0.2 mm (1/160").

The installing height of the knife should be such that when the knife is lowered, the highest point of the knife ⑱ Fig. 21 should be 3 mm (1/8") below the surface of the needle plate.

## 9. Adjusting the needle thread trimmer blades

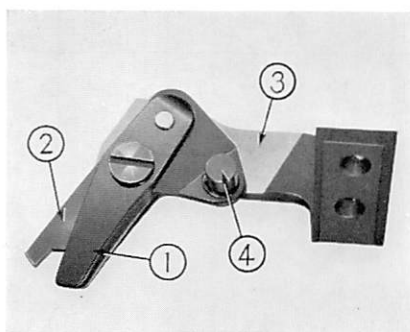


Fig. 23

1) *Adjusting the gripping power of the needle thread trimmer blade*

When the gripping power of the needle thread trimmer blades

becomes unsteady, the needle thread begins to fall out at the start of sewing.

When the gripping power of the needle thread trimmer blades becomes weak, remove the set screws ⑨ Fig. 21, take out the trimmer blades and by bending the tip of the thread tension spring ① Fig. 23, the entire length of the blade trimming part should closely contact the blade ② without any space in between. Finally, adjust so that no matter where the blades trim the needle thread, the blades will have a strong gripping power.

### 2) *Honing the needle thread trimmer blades*

When the trimming power of the blades become dull, change them with spare blades or sharpen the thread trimming tips of the blade ② and ③ with an oiled whetstone.

### 3) *Adjusting the installing positions of the upper blade*

When the sewing is finished and the lifter pedal is stepped on, the trimmer blades will advance forward before the work clamp check starts to rise and at the same time it will rotate to right with the needle thread trimmer shaft ⑤, Fig. 21 as its center and the pin ④, Fig. 23, will contact the edge of the needle thread trimmer guide ⑥, Fig. 21 and the blades will close.

To adjust the front-rear or right-left positions of the blades at the thread trimming time, first loosen the blade clamp screw ⑦ Fig. 21, change the positions and angles of the needle thread trimmer holder ⑧, Fig. 21 and be sure to see that the thread is grasped. When the blades completed the movement to right, the right end of the lower blade should come out 3.8~4.3 mm ( $1/8'' \sim 5/32''$ ) to the right of the center of the needle plate.

When the blades will not trim even though blades have moved to the above measured distance, the chances are either the blades are too far in the rear or they close up before the blades grip the thread. When the blades close too soon, loosen the set screw ⑫ Fig. 12 of the trimmer guide and move the blades toward the operator. The closing time

of the blades will be delayed and they will grip the thread firmly. Conversely, if the trimmer guide is moved to the rear, the blades will close up much faster.

Accordingly, make proper adjustment of the forward and rear positions of the blades as well as the trimmer guide to be sure that the blades will close when they have completed the movement to right and after cutting the thread, they firmly grip the tip of the thread.

The installing height of the needle thread trimmer blades can be adjusted by loosening the set screws ⑨ Fig. 21, and the space between the blades and the work clamp carrier should be as narrow as possible so that when the cloth is inserted between them, they will not contact each other.

After the trimmer blades are adjusted, be sure to move the handle one stitching cycle and, before the actual sewing operation, verify that the blades will not hit the lower surface of the work clamp arm ⑩ Fig. 21. Also see to it that the closed blades will open up during the carrying.

The height of the needle thread trimmer finger ⑪ Fig. 12 should be so adjusted that when the needle thread cutting blades begin to move, there should be a space of 0.2~0.4 mm (1/500") between the hook and the lower surface of the blades.

#### 4) *Adjusting the locking bracket latch of the needle thread trimmer shaft crank*

After the needle thread is cut, the right and left positions of the blade pull-up are determined by the installing positions of the trimmer shaft crank locking bracket latch (Fig. 21 ⑫). This position greatly affects the enfolding action of the needle thread into the stitching at the start of sewing.

When the work clamp carrier is lowered, the tip of the needle thread trimmer shaft crank (rear) Fig. 21 ⑬ will gradually return to left by the trimmer shaft crank locking bracket latch. Accordingly, the needle thread trimmer blades, too, will return to left (1.5 mm~3 mm) (1/16~1/8") after trimming and at that position, it will grasp the needle thread and

start to sew.

When the locking bracket latch is leaned too much to the right, the needle thread will stick out to the right side and conversely, when it is too much to the left, the thread will stick out to the left. (Even if it's sticking out to the left, when it's cut by the knife at the last stage, there is no problem).

The adjustment of the left and right positions should be done by either increasing or decreasing the number of spacers to be inserted to the installing part of the locking bracket latch.

The reason why the installing hole of the locking bracket latch is so long is for the purpose of adjusting the interval from the start of sewing to the gripping of the needle thread.

If the locking bracket latch is pulled out toward the operator, the gripping interval of the needle thread becomes short and if it's withdrawn to the opposite side, this interval becomes longer. In other words, if the thread is released quickly, the needle thread might fall out at the start of sewing or the enfolding of the needle thread might not be adequate. Be careful.

## **10. Adjusting the bobbin thread trimmer blade**

### *1) Exchanging the bobbin thread trimmer blade*

When the cutting power of the bobbin thread trimmer blade has become dull, remove the work clamp carrier (Fig. 24 ㉞) and exchange it with a spare blade. Pull in the counter knife (Fig. 21 ㉟) tip 0.3~0.5 mm (about 1/50") away from the needle plate needle hole so that it will not contact the needle or bobbin thread.

### *2) Honing the blade*

When sharpening the blade, be careful and don't change the original angle of the blade tip.



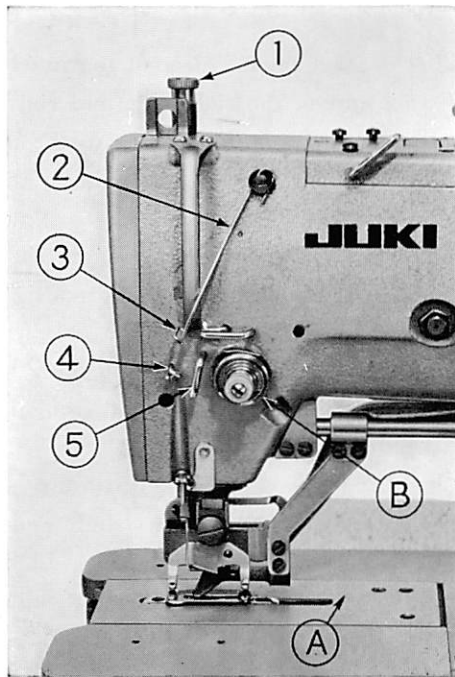


Fig. 24

### 11. Adjusting the pressure of the work clamp check

The pressure of the work clamp check is adjusted by the presser spring regulator (Fig. 24 ①). If this is screwed in tight, the clamping pressure becomes stronger and makes it harder for the wrinkles to form on the cloth.

### 12. Adjusting the installing angle of the buttonhole length regulating shaft bell crank (Fig. 26 ⑦)

If the handle is rotated while the knife has not completed the upward motion or if the blades and the work clamp check are contacting each other during the adjustment of the needle thread trimmer blades, the installing angle of the bell crank becomes out of alignment, sometimes.

In such cases, loosen the clamping screw (Fig. 26 ⑧), turn the handle and after timing the center of the sliding roller (Fig. 26 ⑨) with that of the indicating line (Fig. 26 ⑩) of the feed cam and by matching the work clamp arm at about the same place as the start of sewing, move the work clamp arm back and forth and find the position where the scale (Fig. 21 ⑥) will not move even if the scale adjusting hinge stud (Fig. 21 ②) is fully moved from left to right inside the groove (Fig. 21 ⑤). At this position, tighten the clamping screw of the bell crank.

### 13. Adjusting the device to prevent the knife from cutting when the needle thread breaks

When the knife stop lever (Fig. 25 ①) and the thread check wire (Fig. 24 ②) are installed wrong, the knife might cut even if the thread is broken or the knife will not cut even when the needle thread is not broken.

To correct these defects, first, set the height of the thread eyelet (Fig. 24 ③) of the thread check wire as high as permissible as long as it doesn't touch the take-up thread guide A (Fig. 24 ④). The space in-between should be around 1 mm (1/25").

Next, pass the needle thread through the regular passing channel and fix the tension so that there will be no sagging of the thread between the take-up guide (A) and the tension thread guide No. 3 (Fig. 24 ⑤).

Then loosen the screw ⑨ Fig. 25 so that the space between the edge of knife stop lever (Fig. 25 ①) and the knife stop lever stop roller (rubber ring) (Fig. 25 ⑩) will be 1.5~2 mm (about 1/16") and then adjust the angle of the knife stop lever.

Even after the above adjustment is made, the knife does not cut when it's supposed to cut, then move the bracket (Fig. 25 ③) of the knife stop lever to the right. Conversely, if the knife cuts even when the needle thread is cut, move the bracket of the knife stop lever to the left. When this balance is not maintained, the knife stop lever

might waver up and down during the running of the machine and the knife does not cut, sometimes.

Next, step on the starting pedal, push down the knife stop lever Fig. 25 ① and when the knife stop lever and the knife stop lever screw washer contact each other, adjust the height of the knife stop lever stop screw washer so that the space between the tip ④ of the stop lever and the driving bell crank finger Fig. 25 ② will become 1~1.5 mm.

When the set screw is tightened, the knife stop lever screw washer will move, so be careful and tighten the screw firmly.

#### **14. How to change the number of stitches at barred ends**

The number of stitches at the barred ends of this machine is a fixed ratio between the number of stitches and the total number of stitches.

In most cases it will not be necessary to change this ratio but when it is desired to increase the number of stitches at the barred ends, change the bar tripping segment No. 1 (Fig. 26 ①) and the bar tripping segment No. 2 (Fig. 26 ②). The supply of bar tripping segment No. 1 and No. 2 which are 20% less stitches and also 45% less stitches are available. So, if desired, please order them separately.

If other bar tripping segments are wanted, besides the ones cited, please consult our representatives and ask them in case of so many total stitches, how many stitches should be increased or decreased at barred ends.

In exchanging the segments, do not remove the feed cam (Fig. 26 ⑤) but just tilt the machine arm. First, remove the cover of the carrier adjusting part, place the exchanging segment atop the feed cam and screw in from the bottom of the feed cam. There are many indicating lines by the segment installing holes, so match the center of screws with these lines.

#### **15. Adjustment of the tension releasing movement**

1) *Tension releasing of the thread tension disc No. 1*

When the machine is idle, adjustment should be made so that the edge ⑤ of the tension release lever (Fig. 25 ④) goes in between the two thread tension discs, as shown in Fig. 25 by loosening the nut (Fig. 25 ⑥) and putting in and taking out the tension post No. 1 (Fig. 25 ⑦). In doing so, be sure that the thread eyelet of the tension post No. 1 matches with the direction of the thread path.

2) *Tension releasing of the thread tension disc No. 2*

The thread tension disc No. 2 floats up at every barred end but the amount of this floating should be 1 mm (1/25"). To adjust this floating amount, the height of the tension post No. 2 should be raised or lowered just as in the case of the thread tension disc No. 1.

To adjust the floating timing of the thread tension disc No. 2 for the first barred end, loosen the set screw (Fig. 26 ③) and if it's moved around the circumference, it will change the position of the tension release

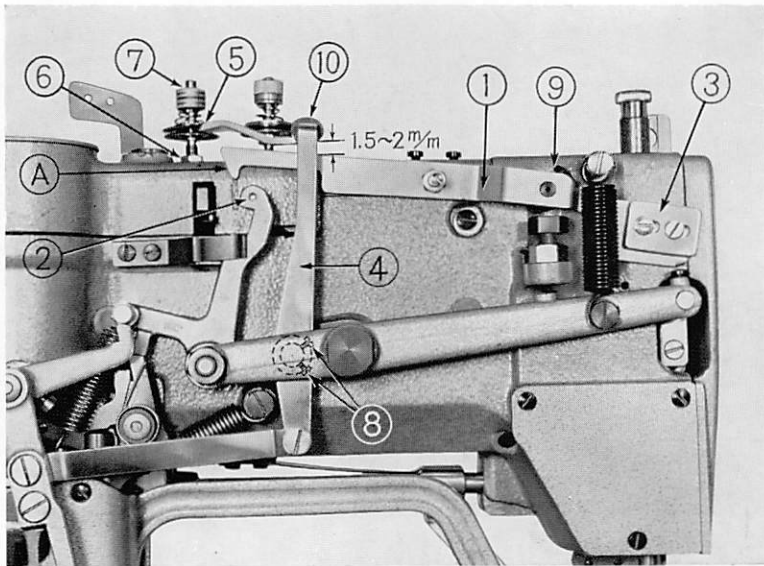


Fig. 25

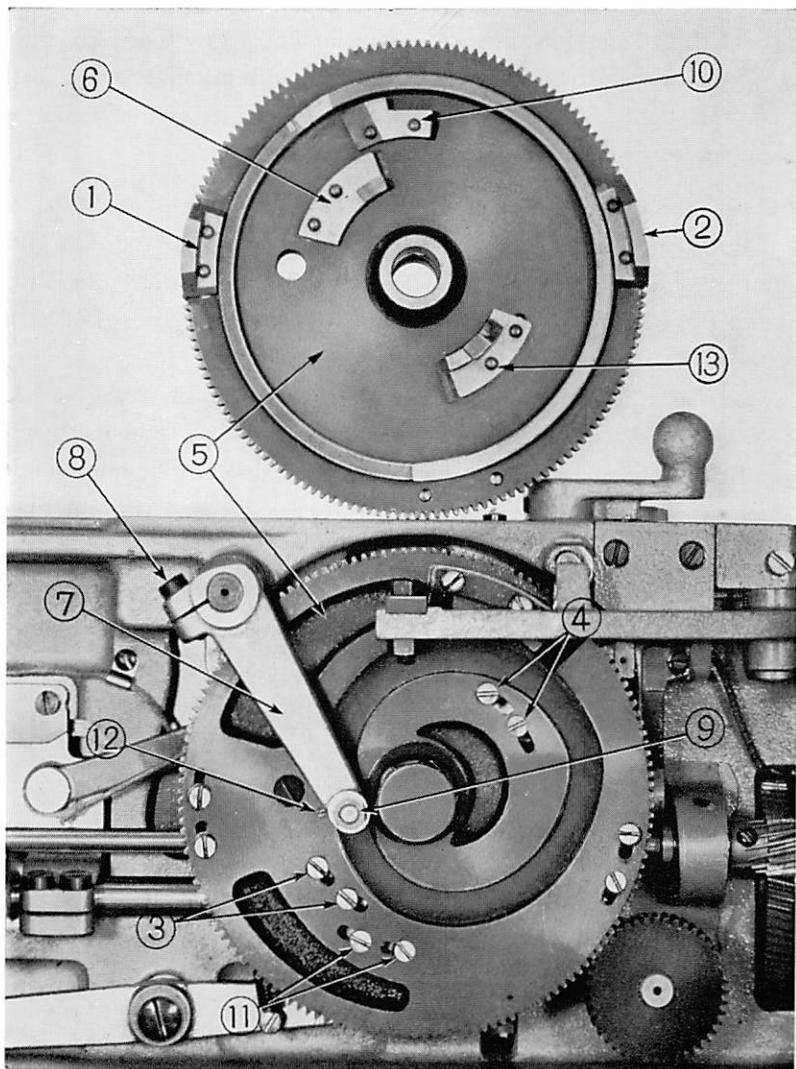


Fig. 26

tripping segment No. 1 Fig. 2 (6) which is on the upper surface of the feed cam. Thus, the position of the tension release tripping segment

No. 1 will change and the tension release timing at the first barred end will change. The normal tension release timing is to match the center of the set screw with the indicating line of the feed cam but adjust it so that the tension release starts immediately after the end of the first barred end or little earlier.

The standard adjustment of the tension release tripping segment No. 2 (Fig. 26 ⑬) is to time the center of the screw (Fig. 26 ④) with the indicating line of the feed cam but adjust it so that the tension releasing ends at about 3~4 stitches from the start of sewing.

### 3) *Tension releasing of thread tension disc No. 3*

When the sewing speed has slowed down and the thread tension disc No. 3 does not float up, adjust as follows:

First, set the hand stop crank at low speed and step on the starting pedal. (Stop the motor also)

Remove the head cover and after releasing the lever set screws (Fig. 25 ⑨) (2 each), adjust the front and rear positions of the lever crank connecting rod so that the tip of the tension release pin (Fig. 27 ③) will contact the step part ② of the lever crank connecting rod (Fig. 27 ①). (Grab it by a pointed pincer and it will move forward and backward).

With this position, tighten the tension release lever set screw, carefully watching that the tension release lever's direction toward the lever shaft is not crooked.

Next, loosen the set screw of the tension post socket (Fig. 24 ⑧), move the tension post socket (Fig. 27 ④) to right and left and adjust so that the thread tension disc No. 3 will float up about 1 mm (1/25"). (Be careful and see that the moving range of the take-up spring does not change).

When all above adjustments are completed and the pedal is stepped on, the thread tension disc No. 3 will go into action and will float up when the pedal is released. When all of this is verified, return the hand stop crank to the high speed position.



## Note

① As explained above, it is possible to adjust the forward and rear positions of the connecting rod, and it is also possible to retard the timing of the thread tension disc No. 3. Thus, the third tension can be loosened only when the machine stops. In such a case, there is a tendency for the second barred end to be little too tight.

② The barred ends can be purl stitched instead of whip stitching. To purl stitch the barred ends, remove the tension release tripping segments No. 1 and No. 2 and replace the hole of the segment No. 2 with the segment No. 1. The replacing position should be same as the normal purl stitching, i.e. the tension releasing should cease after about 3~4 stitches from the start of stitching.

## 16. Adjusting the cutting timing of the knife

The cutting timing of the knife can be adjusted by moving the installed position of the knife tripping segment (Fig. 26 ⑩) which is installed on the upper surface of the feed cam (Fig. 26 ⑤). When the set screw (Fig. 26 ⑪) is loosened and moved toward the direction of the arrow, the cutting timing of the knife will be retarded. Adjust it so that the knife will cut 2~3 stitches before the machine stops. After adjusting, tighten the screw firmly.

## 17. Adjusting the amount of the presser bar lift

When the pedal is stepped on fully, the amount of presser bar lift is set at 7.5 mm (9/32"). When this amount has decreased, adjust the installed height of the presser bar position bracket (Fig. 27 ⑤).

After removing the presser spring regulator (Fig. 27 ⑥), insert a square spacer (width 6 mm, height 7.5 mm, length 30~35 mm) between the work clamp check and the needle plate. Loosen the presser bar position bracket and as you step on the presser bar lifting pedal to its limit, push down the presser bar position bracket and the work clamp

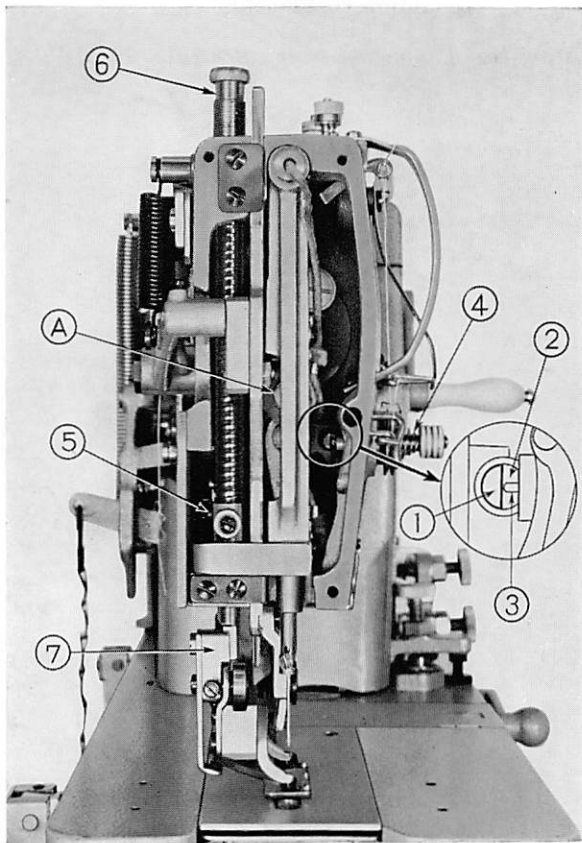


Fig 27

arm slide rollerbracket (Fig. 27 ⑦) and tighten the presser bar position bracket clamp screw tightly. Lastly, attach the presser spring regulator and release the spacer.

As previously mentioned, the presser bar lifting amount can be adjusted by the position of the presser bar position bracket in relation to the presser bar but if the lifting is increased too much, the needle and the needle thread trimmer blades might collide each other when the work clamp check is raised. So, be careful.

## 18. Adjusting the stop-motion components

### 1) Adjusting the stop-motion lever catch (Fig. 28 ①)

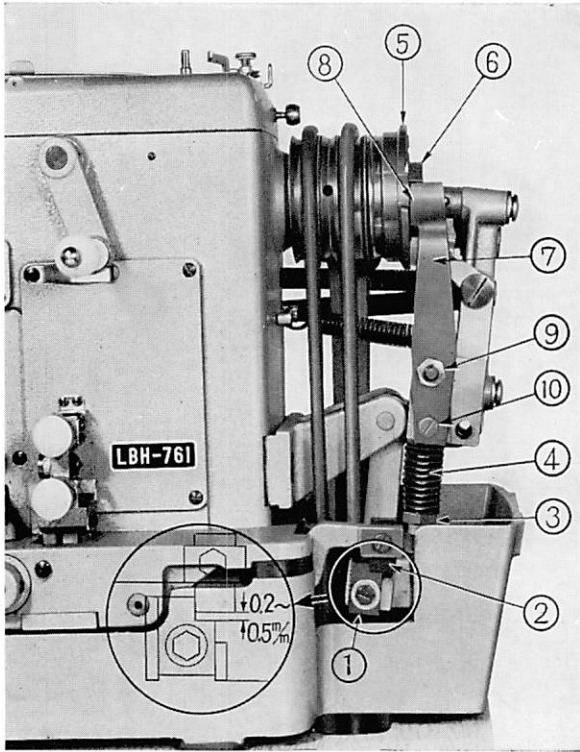


Fig. 28

The installing position of the stop-motion lever catch should be such that when the stop-motion lever is pulled by hand to the rear to assume the same condition as the high speed sewing, the machine will assume a low speed status by turning the handle and the connection of the catch and the latch (Fig. 28 ① and ②) is released by one mount. At this position, the space between the center mount of the catch ① and the lower part of latch ② should be 0.2~0.5 mm (about 1/50").

### *2) Adjusting the stop link rod pressure spring (Fig. 28 ④)*

This spring is securely tightened by a double nut but when this nut becomes loose and droops down, the height of the needle becomes irregular when the machine stops. Tighten this nut until the screw protrudes 10~15 mm (3/8~9/16") from the lower surface of the nut (Fig. 28 ③).

### *3) How to exchange the stop link rod pressure spring*

When the crescent-shaped pressure spring inside the driving pulley is broken, remove the 2 tension springs attached to the stop-motion lever, remove the stop-motion lever, and then by removing the brake cam Fig. 28 ⑤ and the stop cam Fig. 28 ⑥ and change these cams with new ones. If you want to install a new spring, please consult our representatives and use company tools.

### *4) How to change the brake lever plate spring*

The brake lever plate spring (Fig. 28 ⑦) contacts the brake cam (Fig. 28 ⑤) every time the machine stops and functions as a friction brake. If it's used for a long time, it will wear out. To replace this spring when it's worn out, remove the set screws (Fig. 28 ⑨ and ⑩) and change it with a new spare spring. Set the stop-motion lever to the slow running position and make the space between the forward tip of the spring (Fig. 28 ⑧) and the brake cam to 0.5~0.8 mm (about 1/50").

The inclined angle of the spring can be adjusted by changing the height of the installed position of the brake lever plate spring and pushing the upper tip toward the rear.

## **19. Adjusting the belt tension**

Adjust the tension of the high speed belt (outside) so that the tension of the low speed belt (inside) and the high speed belt will be equal. This can be done by adjusting the installing angle of the idler pulley crank (Fig. 3 ③). After that, loosen the adjusting screw nut of Fig. 3 ① and then set the motor base to the adjusting screw in a locked con-

dition with a nut so that the motor is held only by the tension of the belt.

Generally speaking, the belt stretches more when it is in a high speed condition and when the high speed belt becomes loose, adjust the angle of the idler pulley.

## **20. Adjusting the bobbin winder**

In case of cotton thread, the proper amount of wound bobbin is to wind the thread about 2 mm less than the outer diameter of the bobbin. Adjust to this amount by bending the bobbin winder trip latch (Fig. 9 ⑤).

For all synthetic threads, about 60~70% winding is proper but when these threads are to be used, attach the bobbin spring (plate spring) in the accessories box to the bobbin.

# **V. MALFUNCTIONS AND CORRECTIVE MEASURES**

## **1. Defective stitching conditions and reasons due to mal-adjustment of thread tensions**

All improper stitching conditions such as thread breakage, thread slippage or wobbling stitches are due chiefly to the mal-adjustment of thread tension. However, the strengthening or weakening the thread tension may invite opposite defects on thread breakage, thread slippage or wobbling stitches.

Therefore, before adjusting, first determine an overall plan of adjustment as to which tension disc should be adjusted how and then actually do the adjusting. If all malfunctions are due to a common cause, then all you have to do will be to adjust the tension of the threads which may be the only basic trouble in which case that will solve all the troubles.

No.	DEFECTS	REASONS
1	As the finish of stitching, if needle thread is pulled, ravelling appears Thread breaks at second barred end	Tension disc No. 1 too weak Tension disc No. 1 too weak, so double hooking at the tip of the hook point
2	At the finish of stitching, if bobbin thread is pulled, ravelling appears At second barred end, bobbin thread appears on upper surface of cloth	Tension disc No. 3 too strong Bobbin thread tension too weak
3	At first barred end, needle thread comes out to back of cloth At first barred end, needle thread breaks	Tension disc No. 3 too weak Bobbin thread tension too strong
4	At first barred end, bobbin thread appears an upper surface of cloth	Tension disc No. 3 too strong Bobbin thread tension too weak
5	Stitching wobbles at seaming	Tension disc No. 2 too weak If defects No. 1, No. 3, appear their tension disc too strong Thread take-up spring not strong enough and moving range inadequate Bobbin thread tension too strong
6	Needle thread breaks at seaming	Tension disc No. 2 too strong Tension of thread tension disc and moving range of take-up spring too strong and too wide, respectively
7	Thread slips at start of sewing	Insufficient drawing out of thread Bobbin thread tension too weak Tension of tension disc No. 3 too strong
8	Thread wobbles at start of sewing	Too much thread drawing out Tension disc No. 3 too weak



## 2. Malfunctions other than tension: reasons and corrective measures

### 1) *Reasons for wobbling stitches*

- ① Too much oil in bobbin and actual tension of the bobbin thread too strong
- ② Dust or lint hards plug up the race surface of hook
- ③ Bobbin thread not neatly wound or thread tension of bobbin thread winder too strong
- ④ Needle not touching the extreme depth of the needle bar hole
- ⑤ Wrong threading (Refer to Chapter III-5 Fig. 7)
- ⑥ Wrong timing of the hook (Refer to Chapter IV-4 Fig. 17)
- ⑦ Lint hards plugging up the needle hole of needle plate
- ⑧ Needle and the point of hook are bruised

### 2) *Reasons for breaking of the needle thread*

- ① The thread path is bruised
- ② High grade thread is not used for needle thread
- ③ Wrong threading: threading through the thread take-up spring neglected
- ④ Needle size too fine
- ⑤ Wrong timing of the sewing hook (Refer to Chapter IV-4 Fig. 17)

### **NOTE:**

When the humidity is high and the air is damp, the resistance of thread against friction becomes too high. In such a case, loosen the tension of the needle thread, somewhat.

### 3) *Reasons for the stitches to "float" and measures to prevent the thread from slipping out of bobbin case*

The main reason is either the tension of the bobbin thread is too weak or the bobbin thread slips out from the bobbin case.

When polyester or nylon threads are used, the bobbin thread often slips out. In such a case, lessen the amount of winding thread on the bobbin. Also, if some lubricant such as vaseline is applied between the bobbin case shaft and the bobbin case slit, this defect will be eliminated.

4) *Reasons for wobbling stitches immediately after the first barred end is finished*

This defect appears when the starting action of the tension disc No. 2 is a bit too late at the first barred end and also when the "floating" amount of the tension disc No. 2 is too great. (Refer to Chapter 15-2).

5) *Slipping out of the needle thread*

This defect occurs when the grasping power of the needle thread trimmer blades is inadequate. (Refer to Chapter IV-9-1)

6) *Reasons for wobbling stitches at the start*

- ① The height of the needle thread trimmer blades too high
- ② Angle of the tension release tripping segment No. 2 (Fig. 26 ⑬) installed wrong.

Adjust it so that the tension releasing time at the start of sewing is shortened.

**3. Reasons for malfunctions other than stitching conditions and corrective measures**

No.	DEFECTS	REASONS	CORRECTIVE MEASURES
1	After the machine has stopped, the pedal does not move even when stepped on	Stop-motion lever not working right, stop link (Fig. 12 ⑪) is slipping out from stop cam (Fig. 12 ⑩)	Remove the belt guard and lock the stop link into the groove of the stop cam
2	Even when the starting pedal is stepped on, the pedal does not move	The needle thread which caused the double locking, is plugging up the needle eye, thus blade lever is stuck and the presser bar lifting lever not fully returned	If there are any lint hards in the needle eye, remove them Push up the presser bar lifting lever to its limit

No.	DEFECTS	REASONS	CORRECTIVE MEASURES
3	Even when the starting pedal is stepped on fully, machine does not run with high speed ; also cannot decrease speed	<ol style="list-style-type: none"> <li>1. The installed nut of the stop motion lever catch (Fig. 28 ①) (Fig. 28 ①) is loose</li> <li>2. Belt too loose</li> <li>3. Defective position of the belt shifter</li> <li>4. Adjusting bolt of starting lever loose</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust in accordance with Chapter IV-18-1</li> <li>2. Adjust the belt length (Chapter IV-19)</li> <li>3. Adjust the forward and backward positions of the belt</li> <li>4. Adjust the bolt so that when the pedal is stepped on, the catch will interlock for high speed</li> </ol>
4	Sometimes the knife does not cut or even though the needle thread is cut, the knife still cuts	Inadequate installing of the knife stop lever (Fig. 25 ①) and thread check wire (Fig. 24 ②). Knife stop lever (Fig. 25) balance inadequate	Refer to Chapter IV-13
5	When the machine is stopping, the height of needle too low, causing the needle thread cutting blades to nip the needle	<ol style="list-style-type: none"> <li>1. Loosening of the stop-motion lever pressure spring set nut</li> <li>2. Too much cloth lifting by the work clamp check</li> </ol>	<p>Refer to Chapter IV-2</p> <p>Refer Chapter IV-17</p>
6	Too much rattling of needle bar Face plate sound too high	<ol style="list-style-type: none"> <li>1. Loosening of the clamp screw of the needle bar frame hinge stud (Fig. 7 ④)</li> <li>2. Loosening of the needle bar frame position bracket clamp screw</li> </ol>	<ol style="list-style-type: none"> <li>1. Push the needle bar frame hinge stud to the rear to stop the rattle then tighten the clamp screw</li> <li>2. Re-install the needle bar frame hinge stud so that no more rattling of the stud</li> </ol>
7	Needle breaks	<ol style="list-style-type: none"> <li>1. Needle may be curved</li> <li>2. Needle is hitting the tip of the hook point</li> <li>3. Rattling of the needle bar frame</li> </ol>	<ol style="list-style-type: none"> <li>1. Refer to Chapter IV-4-2</li> <li>2. Refer to Chapter IV-4-2</li> </ol>
8	The knife cuts at the start of sewing	<ol style="list-style-type: none"> <li>1. The stop cam not stop link locked up with the before the machine starts</li> <li>2. Lack of oiling of the stop-motion components</li> </ol>	After rotating the driving pulley with hand, be sure to firmly lock the stop cam with the stop link

## **IV. MAINTENANCE OF THE MACHINE**

1. In order to maintain a constant, good stitching condition, the work clamp check and parts around the sewing hook must be constantly cleaned and lubricated.

2. At least once in every 2 months, carefully inspect the stop motion components, the needle bar and all knife components where the vibration is felt most.

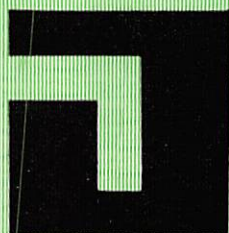
3. Give the machine an overall inspection at least once a year and operate the machine under a thoroughly maintained condition, always.



## CONVERSION TABLE

Milli Meter to Inch	Inch to Mill
1 mm.....5/128"	1" .....
1.5mm.....1/16" less 1/256"	1/2".....
2 mm.....1/16" plus 1/64"	1/4"..... 6.35 mm
2.5mm.....3/32" plus 1/256"	3/4"..... 19.05 mm
3 mm.....1/8" less 1/128"	1/8"..... 3.175 mm
3.5mm.....1/8" plus 3/256"	3/8"..... 9.525 mm
4 mm.....5/32"	5/8"..... 15.875mm
4.5mm.....5/32" plus 5/256"	7/8"..... 22.225mm
5 mm.....3/16" plus 1/128"	1/16" ..... 1.5785mm
5.5mm.....7/32" less 1/256"	3/16" ..... 4.7625mm
6 mm.....1/4" less 1/64"	5/16" ..... 7.9375mm
6.5mm.....1/4" plus 1/256"	7/16" ..... 11.1125mm
7 mm.....1/4" plus 3/128"	9/16" ..... 14.2875mm
7.5mm.....9/32" plus 3/256"	11/16"..... 17.4625mm
8 mm.....5/16"	13/16"..... 20.6375mm
8.5mm.....5/16" plus 5/256"	15/16"..... 23.8125mm
9 mm.....3/8" less 3/128"	1/32" ..... 0.79375mm
9.5mm.....3/8" less 1/256"	1/64"..... 0.396875mm
10 mm.....3/8" plus 1/64"	1/128"..... 0.19844mm
11 mm.....7/16" less 1/128"	
12 mm... 15/32" plus 1/256"	
13 mm... 33/64" less 1/256"	
14 mm... 35/64" plus 3/640"	
15 mm... 9/16" plus 3/128"	
16 mm... 5/8" plus 3/640"	
17 mm... 43/64" less 1/256"	
18 mm... 11/16" plus 1/64"	
19 mm... 3/4" plus 3/128"	
20 mm... 25/32"	





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