

# Instructions For Servicing The Necchi Supernova Sewing Machine

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## FOREWORD

This service manual shall be used together with the instruction book for the SUPERNOVA Sewing Machine and with the parts catalogue for this machine.

The maintenance of the SUPERNOVA Sewing Machine requires no special skill or knowledge. All that is needed is a certain mechanical aptitude and the availability of the necessary tools.

This manual is intended only for those mechanics that make routine repairs and replace single defective parts. Major repairs should not be carried out by persons of limited experience.

Therefore, if major repairs are required, it is suggested that the complete head be returned to the distributor, after prior authorization has been received from that distributor.

The SUPERNOVA Sewing Machine, like practically all sewing machines designed for household use, works on the principle of the Lockstitch. This type of stitch is obtained by interlocking the upper and lower thread inside the fabric, while the needle, going down to its lowest position, penetrates the fabric and rises again to its highest position. The two threads of the seam are thus tightly interlocked at every stitch, adhere closely to the fabric and hold the plies of the fabric firmly together. If either of the two threads breaks, or if the threads are cut off after the sewing operation is completed, the seam will not unravel, but only two or three stitches may get loose and open up. The illustrations Figures " a " to " d " indicate the formation of a single lockstitch and the interlocking of both threads in the fabric.

All machines consist of two major portions, the arm and the bed. Arm and bed are firmly held together by means of screws and pins. In the horizontal portion of the arm is inserted the arm shaft (upper

Shaft) which obtains its rotary movement from the revolving balance wheel. The balance wheel, which is securely fastened to the right hand end of the arm shaft, is driven by a belt from an electric motor. The various movable parts of the sewing machine obtain their respective movements from the rotary of the arm shaft with the aid of connecting rods, cranks, levers etc. . . . Below the bed of the machine is mounted the oscillating shaft (driver shaft), to the left end of which is firmly attached the shuttle carrier. By means of a crank connecting rod, and oscillating rock shaft, a slide block and a shaft crank, the rotary movement of the arm shaft is transformed into the oscillating movement of the carrier shaft. The shuttle carrier, in turn, imparts the oscillating movement to the oscillating shuttle which moves back and forth inside of the shuttle race. The forward and backward, as well as the up and down movements of the feed dog, are also obtained from the rotary movement of the arm shaft by means of connecting rods, rock shafts and a feed bar below the bed of the machine. The up and down movement of the needle bar, as well as that of the thread take-up lever, is also derived from the rotary movement of the arm shaft by means of cranks and a connecting link.

The bobbin case is placed on the post inside the oscillating shuttle and then pressed into the oscillating shuttle. The oscillating shuttle, after its point has entered the loop of the needle thread, makes a partial revolution, just sufficient to carry the enlarged loop of the needle thread over and around the bobbin case and then lets it slide off easily from the oscillating shuttle. After the rising thread take-up lever has pulled the needle thread away from the oscillating shuttle, the shuttle returns to its starting position. This oscillating movement of the shuttle is repeated at every stitch.

To the arm of the machine are also attached the tension mechanism for the needle thread (upper tension), and the various thread guides which lead the thread from the spool to the needle.

In the upper portion of the arm, the Automatic Device is installed, consisting of a mounting plate on which the cam-carrying bushing and the other component parts are assembled. The Automatic mechanism is driven by a suitable cam mounted on the upper shaft. The SUPERNOVA machine is provided with a built-in motor inside the arm, as well as a transformer which feeds the sewing light at 12 V and the motor at two different voltages giving two different speeds.

### *Tools and necessary accessories*

To service and repair any type of sewing machine efficiently, the mechanic should have available proper tools and several accessories, essential for a good maintenance job. He must know how to operate the machine and be familiar with the various mechanisms of the machine and the manner in which they are adjusted (timed). Finally, he must be scrupulous about cleaning the machine and oiling all the parts which require lubrication. For the mechanics we have available a tool kit containing all wrenches screw drivers and gauges for any repair and timing of the SUPERNOVA machine.

### *Suggestions for the mechanics*

After a short examination of the machine, a good mechanic will be able to state with certainty whether the machine sews correctly or not and, consequently, whether repairs are required. Many times a customer calls in a mechanic to have a machine repaired which supposedly is out of order. Quite often the customer attributes the poor performance of the machine to imaginary defects of some of the sewing machine parts, while in reality the trouble lies in the customer's own lack of experience in using the machine.

There are four fundamental questions every mechanic should ask in investigating the customer's knowledge with regard to the machine:

Does the customer know what type and size of needle to use and

how to insert the needle in the machine?

Does the customer know how to thread the machine correctly?

Does the customer know how to clean the shuttle race?

Does the customer know how to judge the tensions of upper and lower thread and how to adjust these tensions, if necessary?



## INSTRUCTIONS TO BE GIVEN TO THE CUSTOMER

### *Using the correct needle.*

The needle must be selected in accordance with the type of material to be sewn, the kind of work to be performed and the thickness of the thread to be used (see « Needle and Thread Chart » in Instruction Booklet).

To insert the needle, proceed as follows:

Turn the balance wheel by hand toward you until the needle bar reaches its highest position, then insert the needle so that the flat portion

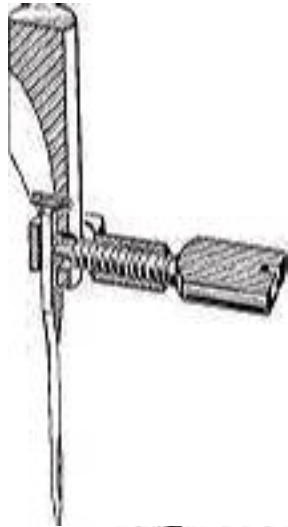


Fig. 1

Fig. 2

of its shank faces the groove in the needle bar. Push the needle up into the needle bar as far as it will go, then firmly tighten the screw in the needle clamp so that the needle is held securely in the needle bar (see Figs. 1 and 2).

*Correct threading of the SUPERNOVA when using one needle.*  
Proceed as follows:

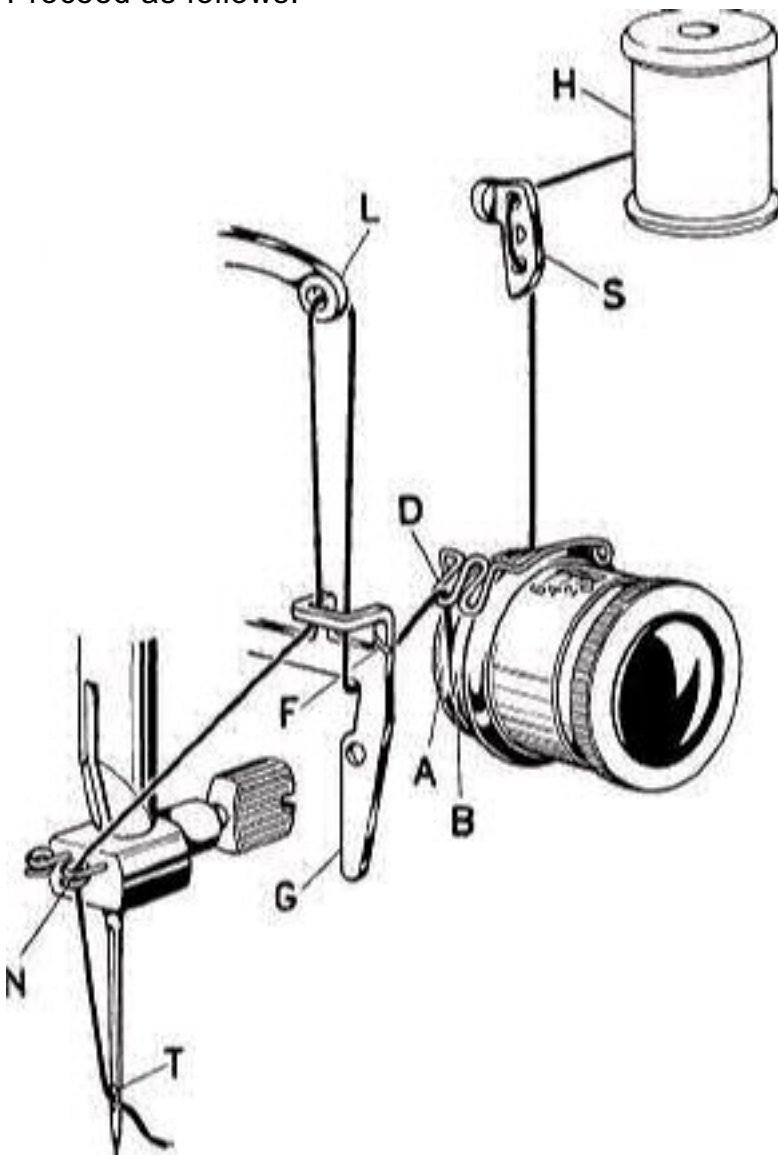


Fig. 3  
Bring the needle to its highest position by tiring the balance wheel towards you.

Place spool of thread "H " on spool pin and draw thread through thread guide " S ", as shown in Fig. 3.

Pull thread downward, then insert it from right to left between both tension discs and bring it upward again over the check spring

" D" (Fig. 3).

Bring the thread downward under the thread guide tension arm

" G ", pass it through the slot " F" and then upward through the guide hook " K ".

Pull the thread upward and pass it, from right to left, through the eyelet " L " of the thread take-up lever.

Draw the thread downward, passing again through the slot " F "

and into the guide hook " K ".

Pull the thread downward and, by means of a twisting motion, bring it into the thread guide " N " on the needle clamp.

*h) Finally, guide the thread, from left to right, through the eye of the needle "T ", pull the thread through the needle eye, leaving about four inches of free thread hanging down from the needle. Threading of the SUPERNOVA when using two needles (twin needle).*

The threading of the SUPERNOVA with double needle is illustrated in Fig. 4.

The unwinding of the thread from the two spools must take place as shown in Fig. 4 to keep the two threads separated.

The two threads must pass separately through the upper and the

lower holes of the thread guide " S ".

To keep the two threads separated, pass one thread between the

tension discs " A " and " B ", and the other one between the ten-

sion discs " B " and " C ". The thread, running between the ten-

sion discs " A " and " B ", must pass through the loop " D " of the check-spring, whereas the other thread must pass through the

loop " E " of the same spring.

The two threads must be inserted separately, one in each of the two thread guides " M " and " N " on the needle clamp.

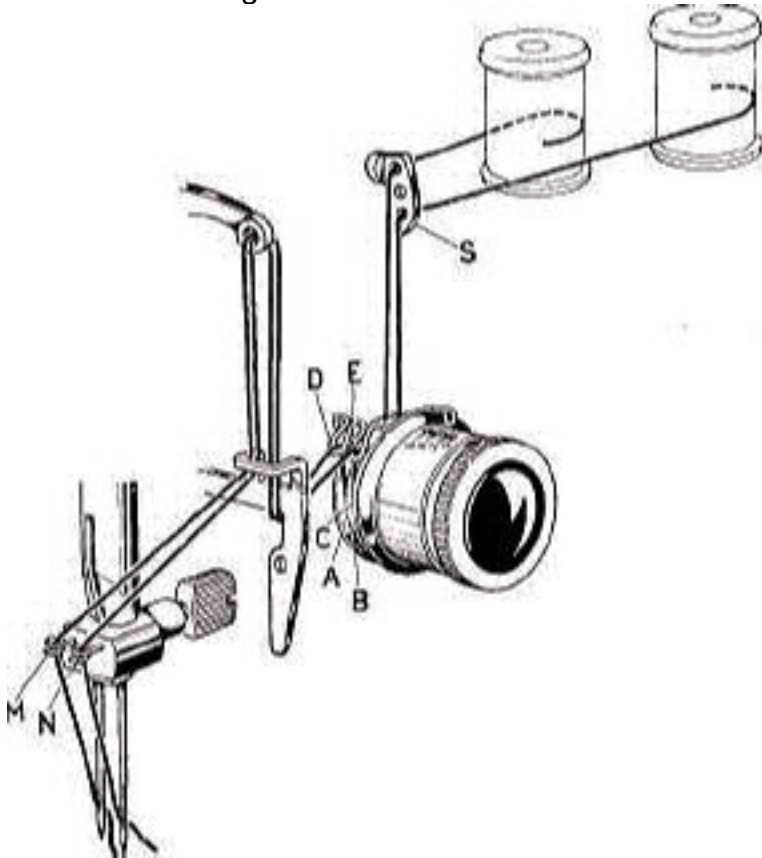


Fig. 4

*To disconnect the "Automatic".*

This operation has to be done when the machine is at a standstill.

Turn the design regulating knob clockwise until the square mark (\*) is in line with the mark above this knob.

Turn the balance wheel for one full turn, toward you.

Turn the design regulating knob clockwise again, until the triangle sign and the mark above the knob are in line (Stop).

The "Automatic " is now completely disconnected.

*Changing from automatic sewing to straight sewing.*

Disconnect the "Automatic" as already explained on page 4.  
Remove the cams from the machine by proceeding as follows:

Swing the Cam Disengaging Lever (at the rear of the arm) entirely to the left as far as it will go.

Open the small cover on top of the arm and take out the cams.  
Close small cover again.

Swing back the Cam Disengaging Lever entirely to the right as far as it will go.

The machine is now ready for straight sewing.

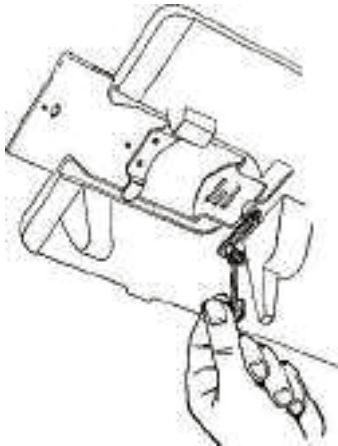


Fig. 5

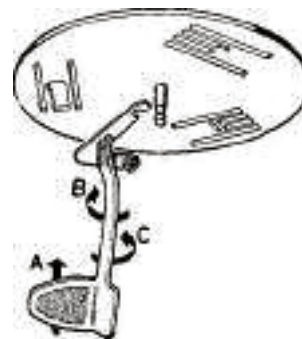


Fig. 6

*Cleaning of shuttle race and feed dog.*

Bring the needle up to its highest position by turning the balance Wheel toward you. Move slide plate to extreme left. *h)* Tilt the machine back on its hinges, so that the underside is in Full view. *c)* Rotate the needle plate release lever (Fig. 6) in the direction of Arrow "C" until the center stud in the needle plate becomes free, Then remove the needle plate.

*Note:* To fasten the needle plate after having placed it in its receptacle, push the lever shown in Fig. 6 in the direction of the arrow "A " and, at the same time, rotate it in the direction of the arrow " B " .

Clean teeth of feed dog with a small brush (Fig. 7). Clean also underside of needle plate around vicinity of feed dog.

Lift latch of bobbin case with thumb and forefinger of left hand (Fig. 8), and remove bobbin case by pulling it toward the left and out of the machine.

/) Snap out pins " Z " (Fig. 9) by swinging them sideways, and, with

left hand, remove the race cover plate " T " by turning it away from the race. g) Remove shuttle (hook) "R" by gripping its center stud with thumb

and forefinger of left hand and pulling it to the left and out of the Machine. This leaves the shuttle race free for cleaning. h)

Remove lint and pieces of thread with a piece of rag, or brush. With a small brush. Put a drop of oil into the race and oil *rim only* of shuttle (hook). i) To replace shuttle (hook), insert it into the race with thumb and

Forefinger of left hand, fitting it into place opposite the shuttle

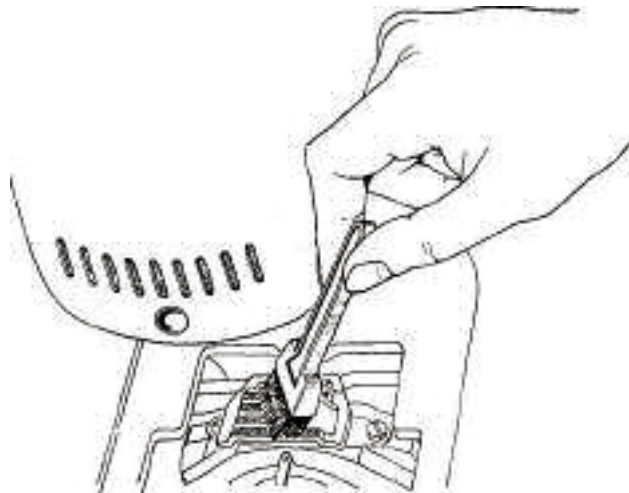


Fig. 7

Carrier without using force (Fig. 10). k) Place the race cover plate "T " onto the two small studs " G "

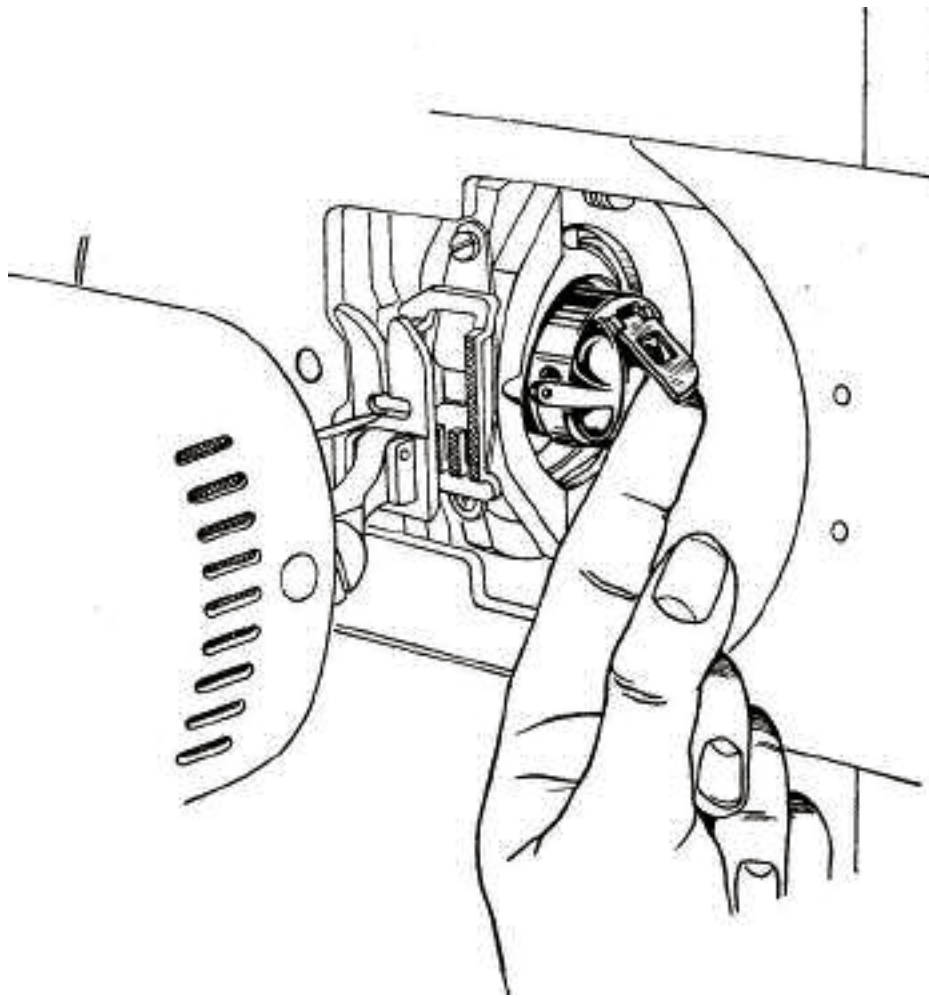
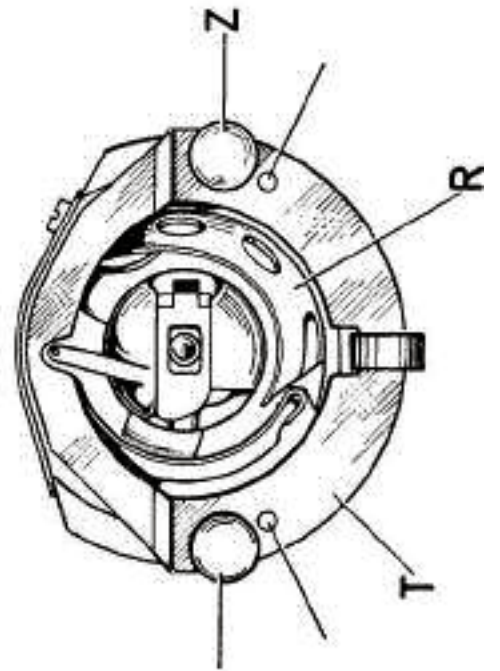


Fig. 8



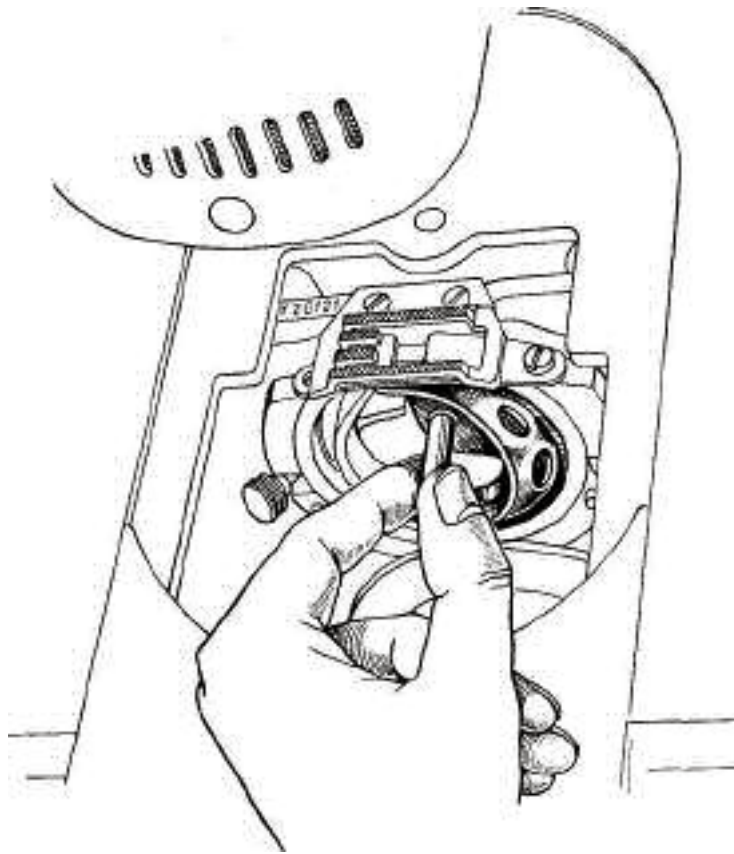


Fig. 10

and snap pins " Z " back into place (Fig. 9).

Insert bobbin case, replace needle plate (as shown in Figs. 5 and 6) and lower the machine to its working position.

*Adjusting the thread tensions.*

The tensions of upper and lower thread are correctly balanced if both threads interlock in the center of the fabric, as shown in Fig. 12.

If the tension of the upper thread is too strong in relation to that of the lower thread, the lower thread will be pulled up to the top surface of the fabric and appear there in the form of small knots or loops (see Fig. 13).



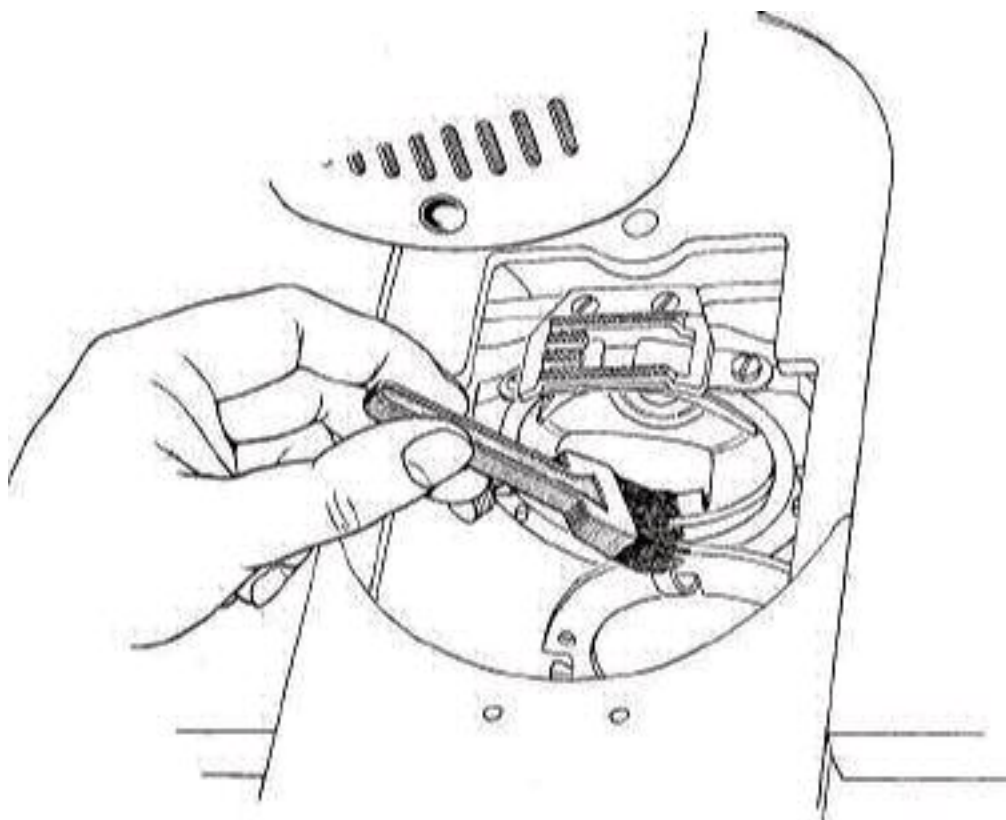


Fig. 11



Fig. 12

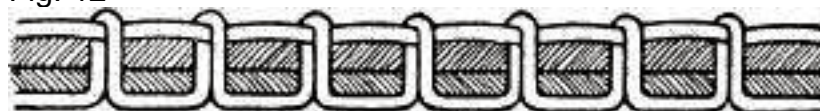


Fig. 13

To correct this condition, make certain that the presser foot is down, then turn Tension Regulating Knob to the left. If tension of needle thread is too loose, or tension of bobbin thread is too tight, bobbin thread will lie straight along underside of fabric and needle thread will be pulled down to underside, being visible there in, the form of loops or small knots (Fig. 14). To correct this condition, make certain that the presser foot is down, then turn Regulating Knob to the right. Make several stitches to check whether needle thread tension is correct, and, if necessary, adjust further by turning Regulating Knob.

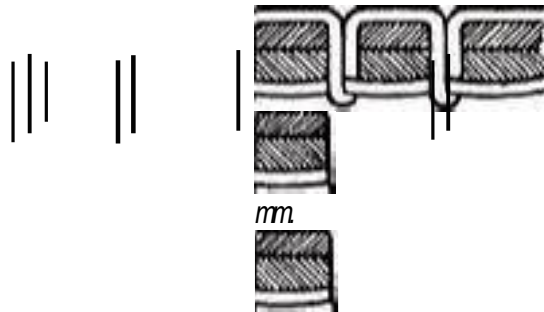


Fig. 14  
*Cleaning.*

To clean the machine, prepare a mixture of 90 % kerosene and 10 % lubrication oil. Fill an oil can with the cleaning fluid, and also pour a sufficient quantity of this liquid into a pan.

If the machine, due do dirt and gummed oil, runs heavily, force with the oil can, plenty of the cleaning fluid into all oil holes and on to all movable parts. Then run the machine at high speed until all dirt and hardened oil is washed out.

Should some parts of the various mechanisms of the machine have become badly clogged with dirt and gummed oil, remove these parts from the machine and place them for a while in the pan filled with cleaning fluid. After the dirt and gummed oil have become loose, clean the parts with a small brush dipped in the cleaning fluid. Then wipe them dry with a soft clean rag.

The electric motor must always be kept dry. Only the motor shaft requires a few drops of oil from time to time.

### *Lubrication.*

After the machine has been wiped clean with a rag, apply a drop of good oil to every movable part, to the bearings of the lower shaft (to which the shuttle carrier is attached) and to all other shaft bearings of the machine. The various oil holes in the machine indicate where the oil must be applied.

Apply 20 to 30 drops of oil into hole " A " (on top cover, Fig. 15). Open the small cover and apply one or two drops of oil to the vertical gear indicated at " B " in Fig. 15. Apply also a drop of oil to the point indicated by " C " in Fig. 15. Finally, after having taken out the cams, apply also one or two drops of oil to the point indicated by " E " (Fig. 15).

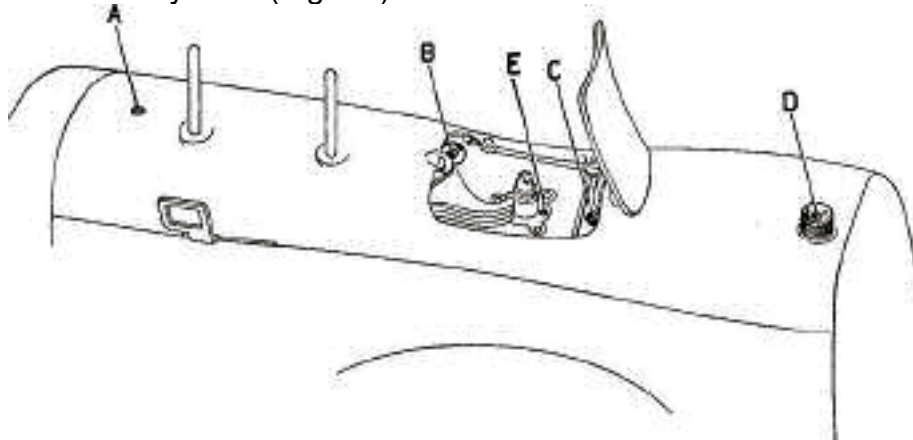


Fig. 15  
Use only Necchi oil.

## ADJUSTING THE MOVEMENTS OF THE VARIOUS GROUPS OF PARTS IN RELATION TO EACH OTHER (TIMING THE MACHINE)

To obtain a continuous and satisfactory performance from the machine, the movements of the various groups of parts in relation to each other must be adjusted (timed) in such a manner that the actions of these parts repeat themselves regularly at certain fixed time intervals. In the following are explained the most important timing procedures, omitting operations which are solely performed on the assembly line in the factory where the machines are made.

For each timing procedure is also mentioned the corresponding timing gauge which should be part of the mechanic's equipment. Furthermore, whenever possible, a general rule for the timing procedure in question is given, in case the corresponding timing gauge should not be available to the mechanic.

Timing, performed in accordance with the rules set down in the following chapters, is indispensable when:

One or several elements of a group of parts have been replaced

whose actions depend on those of another group of parts, or when

entire groups of parts, depending on each other, must be removed and replaced.

It is necessary to check the proper function of a group of parts in relation to another group of parts, the movements of these groups depending on each other.

Certain disturbances must be eliminated which interfere with the proper progress of sewing.

The following five interdependent adjustments are essential:

The timing of the movements of shuttle and needle bar.

The timing of the movements of feed dog and needle bar.

The timing of the movements of the zig-zag mechanism and the needle bar.

The timing of the Stitch Regulating Worm.

The timing of the eccentric for the "Automatic ".

*Note:* All these timings have been done and thoroughly checked in our factory during the assembly. We, therefore, can guarantee their perfection.

In some cases, as for example the timing of shuttle and needle bar, the parts are fixed together by pins and, therefore, the timing will never change.

- *Timing of shuttle and needle bar in the SUPERNOVA.*

Adjustment - Height of the Needle Bar.

Turn the balance wheel by hand toward you until the point of the shuttle is just at the center of the rising needle.

At this moment the point of the shuttle should be about 1/16" above the upper part of the needle eye (Fig. 16).

If the distance " a " is more or less than 1/16", an adjustment is necessary. Loosen slightly screw No. 24 (Fig. 17) in the needle bar connecting stud No. 26025 so that the needle bar No. D 20037 is still held in position by friction.

Now, without turning the balance wheel, push the needle bar up or down by hand until the distance " a " is equal to about 1/16".

Tighten screw No. 24 firmly after this adjustment.

This adjustment can also be achieved with the aid of the TIMING GAUGE No. 10-5. The gauge is composed of a body, similar to the shuttle, and of a false needle (gauge pin), contained in the upright of

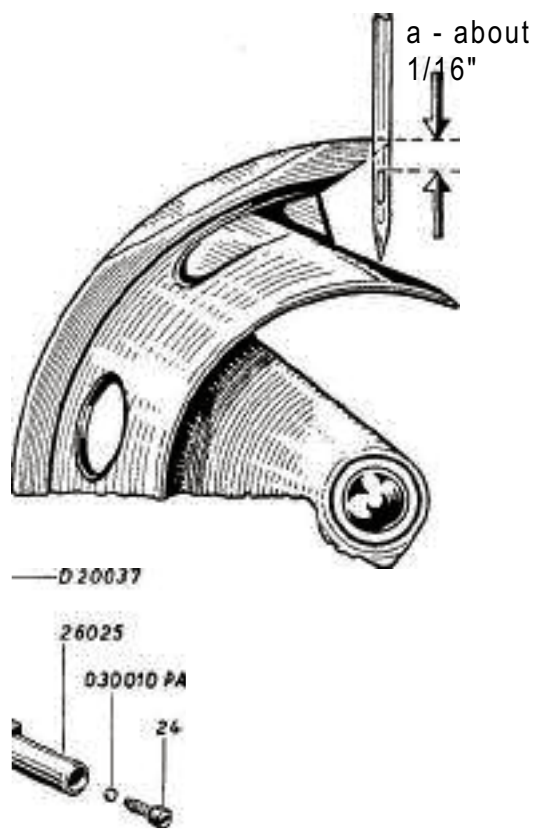


Fig. 16

Fig. 17

the gauge so that it will not be misplaced. In the following, a description of the use of this gauge is given:

Insertion of the TIMING GAUGE No. 10-5.

Turn the balance wheel by hand and bring the needle bar to its highest position (Fig. 18).

Replace the normal needle of the needle bar with the false one of

the gauge. The false needle is inserted in the same way as a nor

mal one.

Remove the shuttle race cover plate No. 26333 and the shuttle

No. 26327.

Insert the shuttle-shaped gauge into the shuttle race (Fig. 18).

False needle

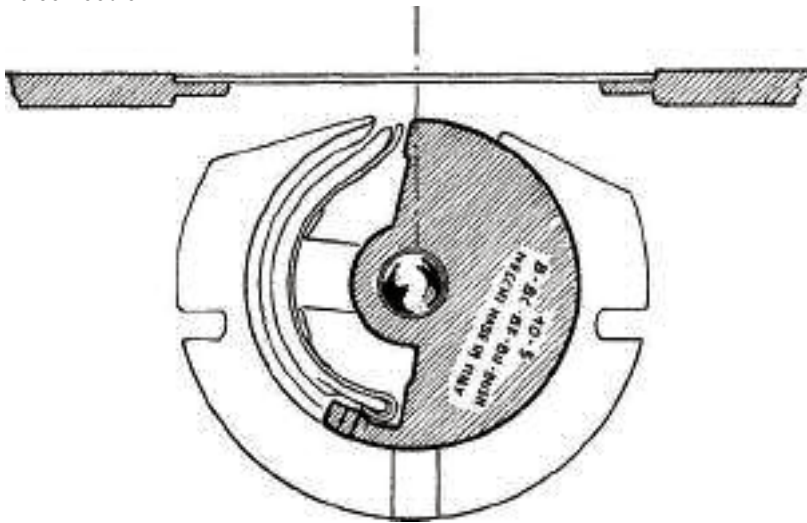
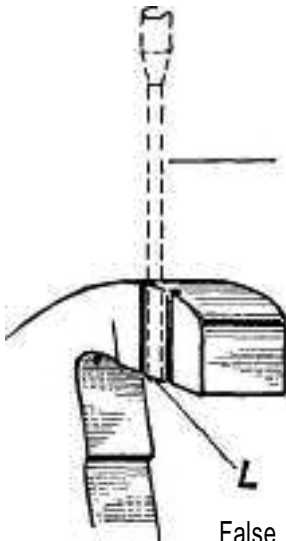


Fig. 18

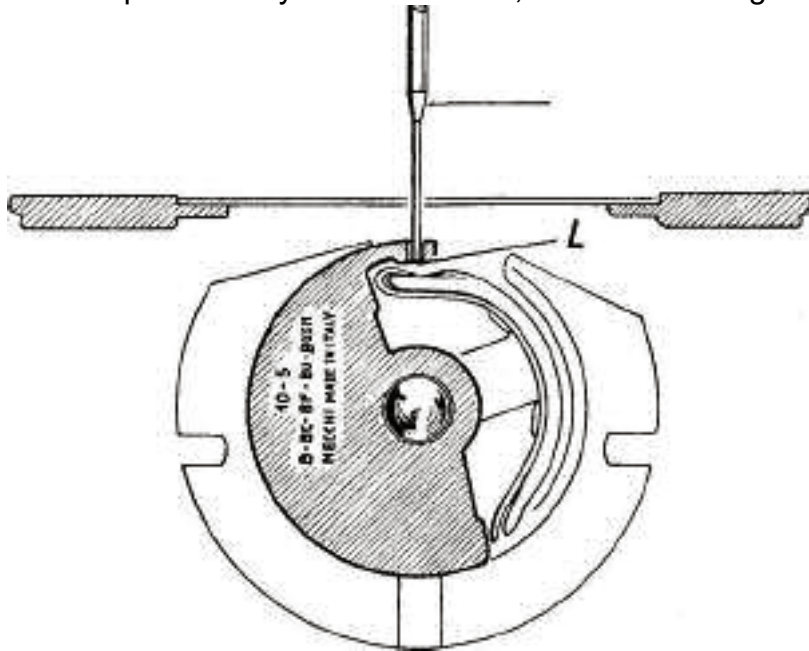


False  
needle  
Fig. 19

Timing procedure.

a

Bring the needle bar to its lowest position. In this position, the lower end of false needle should be just in line with the lower edge " L " of the prong of this gauge, as shown in Figs. 19 and 20. If an adjustment of the height of the needle bar is necessary, loosen slightly screw No. 4 (Fig. 17) so that the needle bar is still held in position by friction. Then, without turning the balance



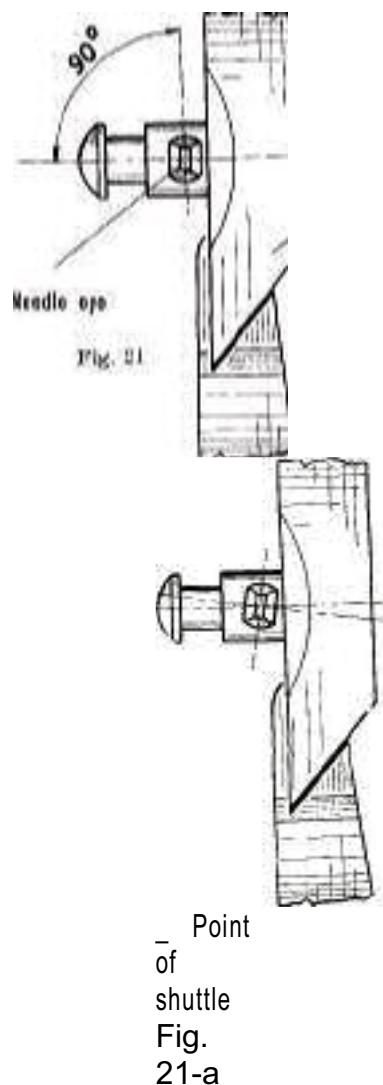
False needle

Fig. 20

wheel, move the needle bar up or down by hand until the condition, shown in Figs. 19 and 20, is met. Tighten screw No. 24 firmly.

*Adjustment* - Position of the needle eye in relation to the shuttle. The needle bar must be lined up in such a way that the center line of the needle eye is perpendicular to the shuttle (Fig. 21), i.e. the needle eye must not be lined up obliquely in relation to the shuttle (Fig. 21a). The correct alignment of the needle causes the loop of the thread to be arranged in such a way that it can be easily caught by





Needle eye in correct  
position

Needle eye in incorrect  
position

The point of the shuttle. This is especially necessary when the machine sews with two needles.

In order to obtain the above mentioned condition, it is necessary that the needle bar clamp No. D 26295 (Fig. 22) be firmly tightened and that axis " a " of the needle clamp No. D 26295 be directed parallel to axis " b " of the upper shaft No. C 85201 (Fig. 22) or, what amounts to the same thing, that the axis " a " of the needle bar clamp No. D 26295 is in the direction of the longitudinal axis of the machine.

If it is necessary to make an adjustment, proceed as follows:

Loosen slightly screw No. 24 of the needle bar connecting stud No. 26025 (Fig. 17).

Without moving it up or down, rotate the needle bar about its own axis in the required direction until it is in the position shown in Fig. 22.

Tighten screw No. 24 firmly.

HI. *Adjustment* - Distance between the needle and the shuttle. Without touching the needle, the point of the shuttle should be

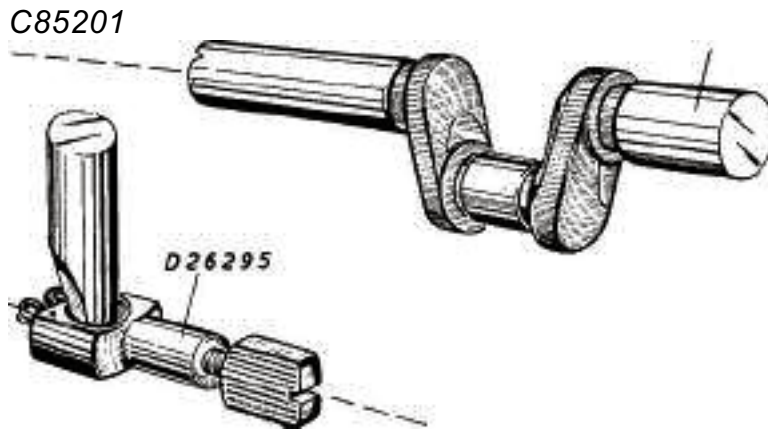
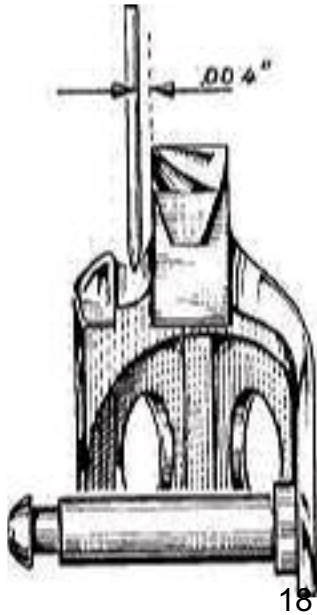
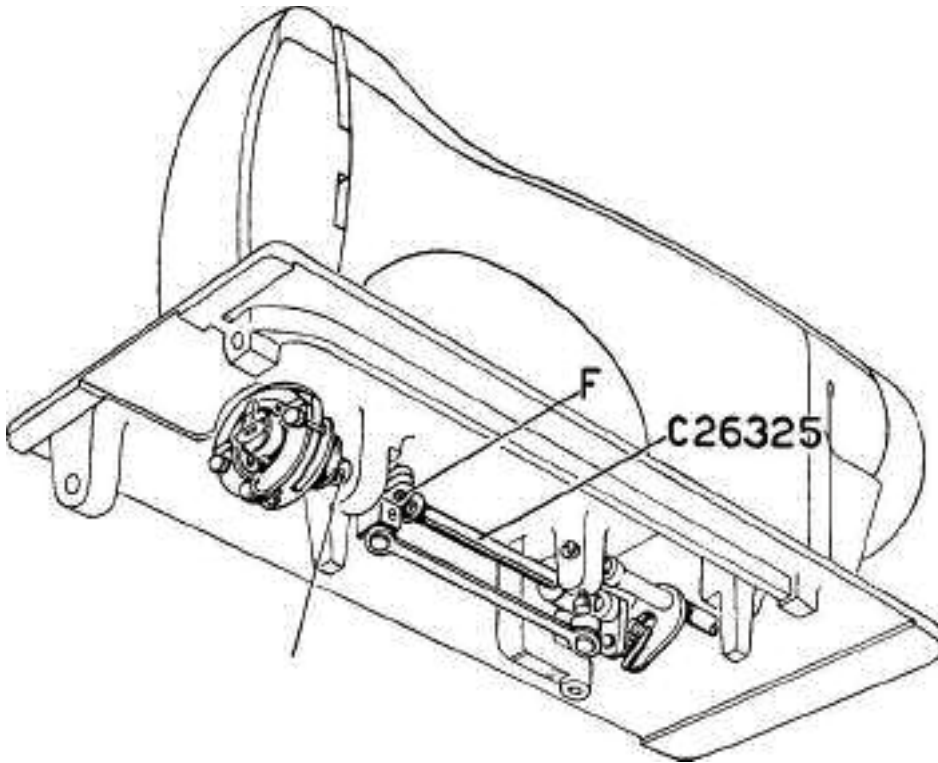


Fig. 22

Fig. 23

is too far away from the needle, loosen the screw " F " (Fig. 24) below the bed of the machine. Then, move the race body No. D 26330 with the carrier shaft No, C 26325 in (axial) direction until the shuttle comes as close as possible to the needle without touching it. Before tightening the screw " F ", adjustment IV should be checked.



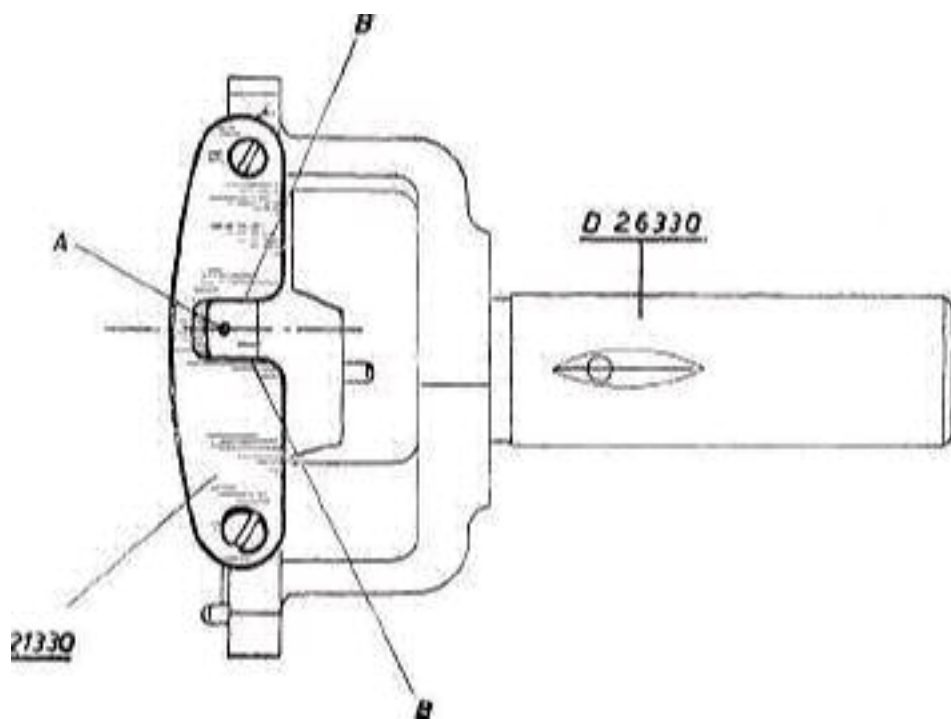


D26330

Fig. 24

*Adjustment* - Centering the needle in relation to the race cover plate.

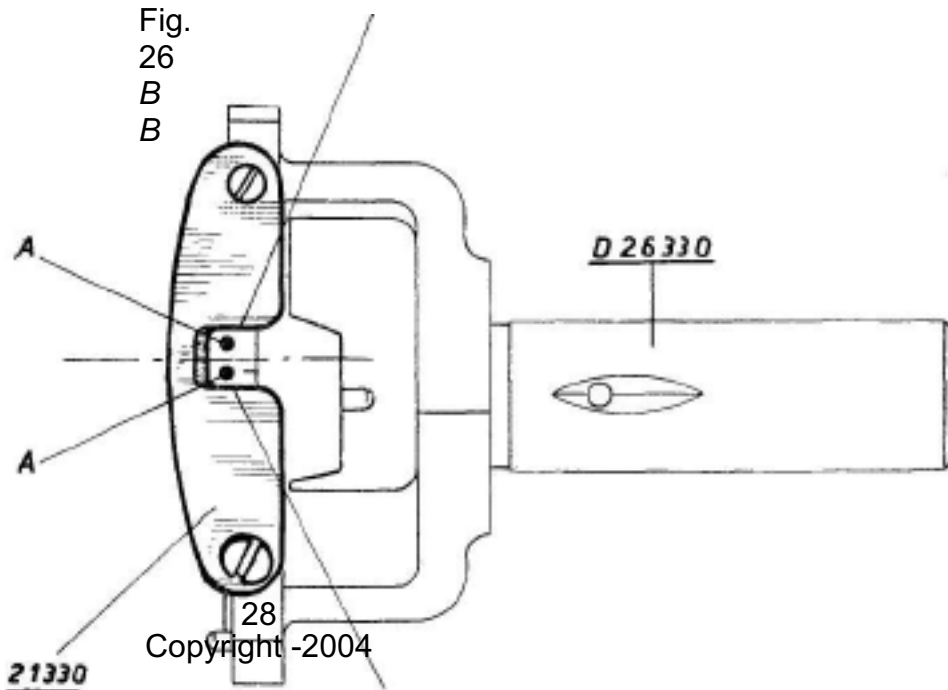
The single needle " A " (Fig. 25) should pass exactly through the center of the slot in the shuttle race cap No. 21330. In the twin-needle machine, the correct position of the needle is that shown in Fig. 26. To perform this adjustment, rotate the race body, No. D 26330, without moving it in an axial direction, around the carrier shaft No. C 26325. Now, the screw " F " can be firmly tightened (Fig. 24). All four adjustments mentioned can also be achieved with the aid of the TIMING GAUGE No. 10-9.



The needle "A" is at equal distance from both edges "B"  
Fig. 25

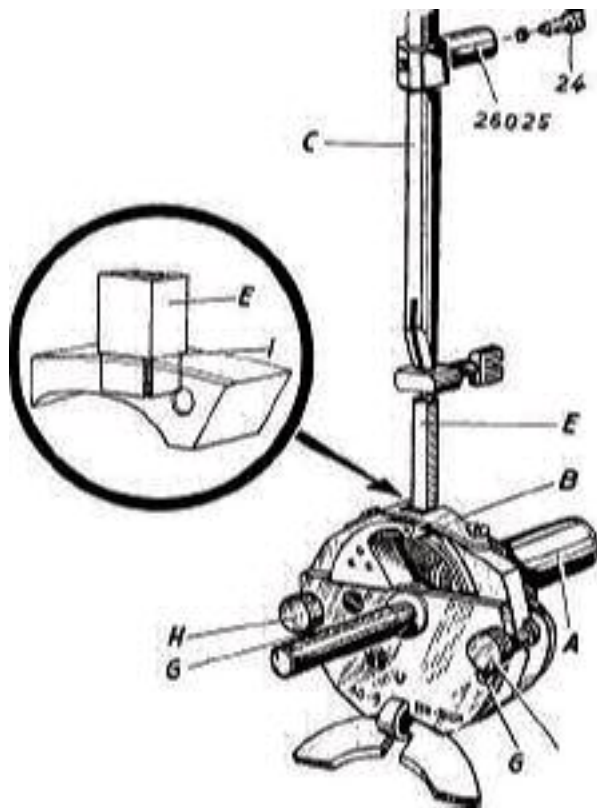
Both  
needles  
"A" are  
at equal  
distanc  
es from  
the  
edges  
"B"

Fig.  
26  
B  
B



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- b) Insertion of the Timing Gauge No. 10-9 and of the
- c) Square-angled Bar E. (Fig. 27).
- d) Remove the presser foot and the needle plate. Remove the needle and the shuttle.  
Insert bar " E " (Fig. 27) of the gauge into the needle bar, following the same instructions as for the insertion of a needle. Loosen screw No. 24 of the needle bar connecting stud No. 26025 so that the needle bar is still held in position by friction. Hold the balance wheel firmly and push the needle bar upwards about  $7/32$ ".



H

Fig. 27

- /) By turning the balance wheel toward you by hand, bring the needle bar " C " to its lowest position.  
From this point onward and during the timing operation, DO NOT turn the machine.

Insert the gauge No. 10-9 into the race body and attach it by means of the two knobs " H " and the two locating pins " G ".

Timing procedure.

If, by pushing down the needle bar by hand while the balance wheel

is held firmly, the lower end of the bar " E " enters exactly into the

Rectangular hole in the prong of the gauge No. 10-9 (Fig. 27), then

the requirements of paragraphs II, III, and IV have been satisfied.

In

Order to comply also with the requirements of paragraph I, push the

Step "I " of the bar " E " further downward until it stops against the

Outside of the gauge No. 10-9 (Fig. 27).

Now, tighten screw No. 24 and remove the gauge.

If, by pushing down the needle bar by hand, the lower end of the

Bar "E " does not enter the rectangular hole in the prong of the

Gauge No. 10-9, and then adjust as follows:

Loosen the screw " F " below the bed of the machine (Fig. 24) in order to allow the race body No. D 26330 to be moved freely.

Move the race body No. D 26330 and the needle bar " C "

stimuli

tenuously until the lower end of the bar " E " enters the rectangu-

lar hole in the prong of the gauge.

Push down the step " I " of the bar " E " by hand (Fig. 27) until it stops against the outside of the gauge.

Firmly tighten the screw No. 24 of the needle bar connecting stud. No. 26025.

Firmly tighten the screw " F " (Fig. 24) below the bed of the machine.

/) Remove the gauge.

How to remove the gauge 10-9.

Rotate the balance wheel slightly, just enough to bring the lower end of the bar " E " out of the hole in the gauge.

Remove the gauge No. 10-9 from the shuttle race.

Remove the bar " E ".

Reassemble the machine.

*Important - Adjustment of the Shuttle Carrier Shaft in the SUPERNOVA.*

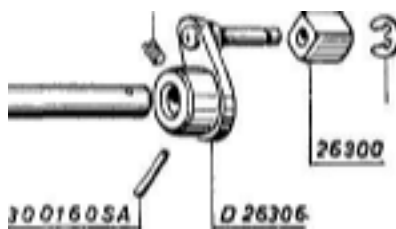
In the NECCHI SUPERNOVA machines, the oscillating crank shaft No. D 26306 is pinned to the carrier shaft No. C 26325 (Fig. 28). In these machines, therefore, the angular position of the shuttle carrier at one end of the carrier shaft in relation to the oscillating crank shaft D 26306 at the other end of this shaft remains always the same. If, in these machines, it should be necessary to replace the old carrier shaft No. C 26325 with a new one, the shuttle carrier and the oscillating crank shaft No. D 26306 must be placed in the proper angular position in relation to each other. Proceed as follows:

Place the carrier shaft No. C 26325 (Fig. 28) on the machine. Place the oscillating crank shaft No. D 26306 on the other end of carrier shaft in such a position that carrier shaft No. C 26325 and oscillating crank shaft include an angle of about 90 degrees (as



400090 BZ  
C2632S  
Q48OS0GEB

Fig.  
28



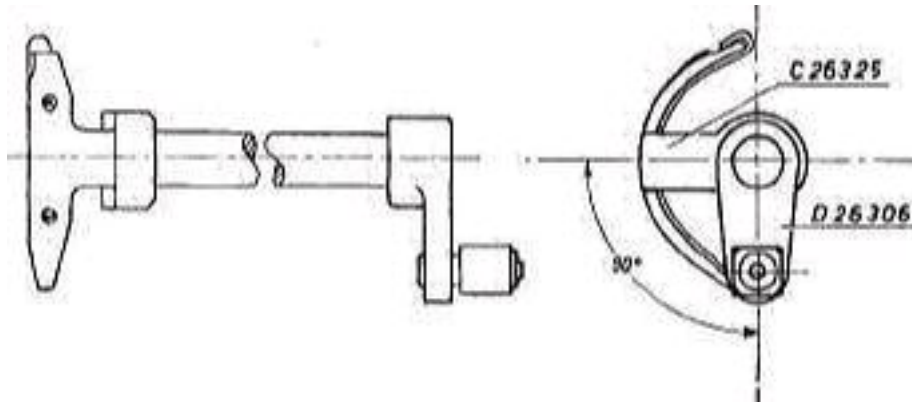


Fig. 29

indicated in Fig. 29). This angular position is approximately correct but in must be checked (see item 2 below). Now, tighten firmly the set screw No. 04850 GEB in the oscillating crank shaft (Fig. 28). Assemble the machine completely.

Check the timing of the shuttle and the needle in the following manner:

Turn the balance wheel by hand slowly toward you until the needle has risen about  $\frac{3}{32}$ " above its lowest position. At this moment, the point of the shuttle should be exactly at the center of the rising needle (Fig. 30). If this requirement is not met, loosen the set screw No. 048050 GEB in the oscillating crank shaft (Fig. 28) and turn the carrier shaft No. C 26325 in the required direction until the point of the shuttle has reached the center of the needle which has remained stationary. Tighten firmly set screw No. 048050 GEB.

Operation No. 2 can also be performed with the aid of the TIMING GAUGE No. 10-5 in the following manner: Insert the gauge No. 10-5 as explained in the paragraph: "Timing of shuttle and needle bar in the SUPERNOVA". Bring the needle bar to its lowest position. In this position, the false needle, if correctly adjusted, will lie between the two timing lines "A" (Fig. 31). If the needle does not lie between the two timing lines "A", loosen the screw No. 048050 GEB (Fig. 28). Now, without moving the balance wheel, turn the carrier shaft in the



required direction until the false needle lies between the two lines "A". Tighten screw No. 048050 GEB firmly and remove the gauge. Carry out the adjustments I, II, III, IV of the instruction: " Timing of shuttle and needle bar " (page 13).

Now, sew with the machine.

a) If the machine sews correctly:

Place a sharply pointed pin into the tapered pin hole of the oscillating crank shaft and mark on the carrier shaft the position of the hole to be drilled and reamed in the carrier shaft. Remove the carrier shaft assembly, then drill and ream the tapered pin hole in the carrier shaft. Next, assemble with machine, using the ta-

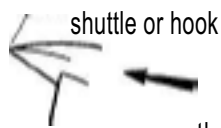
t

Point of  
shuttle or  
hook -  
Moveme  
nt  
Needle  
Needle  
eye

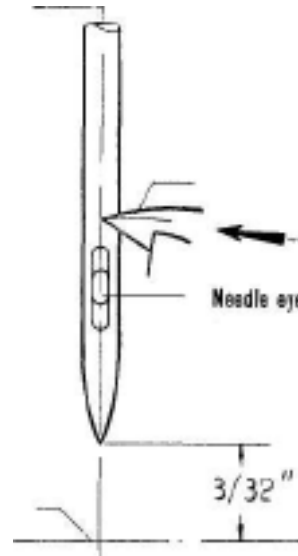
Center of needle

Point of  
Movement

\J/  
position of  
Fig. 30



Lowest  
the needle



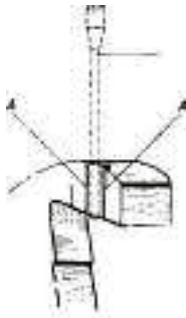


Fig. 31

False needle

pered pins No. 300160 SA. For reaming tapered holes use tapered reamer N. 3/0. After this operation, it is advisable to again perform the adjustments II, III, IV of the section " Timing of shuttle and needle bar ".

If the machine does not sew properly, repeat operation No. 2 until the machine performs perfect sewing. Then drill, ream and pin as explained in paragraph 4 a.

- *Timing of feed dog and needle bar.*

#### General Rules

The feed dog must be adjusted in such a manner that it starts to move away from the operator at about the time the needle begins its downward movement from its highest position.

The feed dog must have finished its forward (feeding) motion at the time the point of the descending needle is about to enter the fabric. The feed dog must not move the fabric while the needle is still in the fabric.

If the feed dog is not correctly timed in relation to the needle, adjust as follows:

Remove the top cover.

Open the small cover " A " (Fig. 32).  
Loosen full screw " B " (without taking it away).  
Raise the top cover, holding it at the left end.  
When replacing the top cover it is necessary that the hook " C " (Fig. 32) and the pin " D " on the arm enter into their component positions in the top cover.

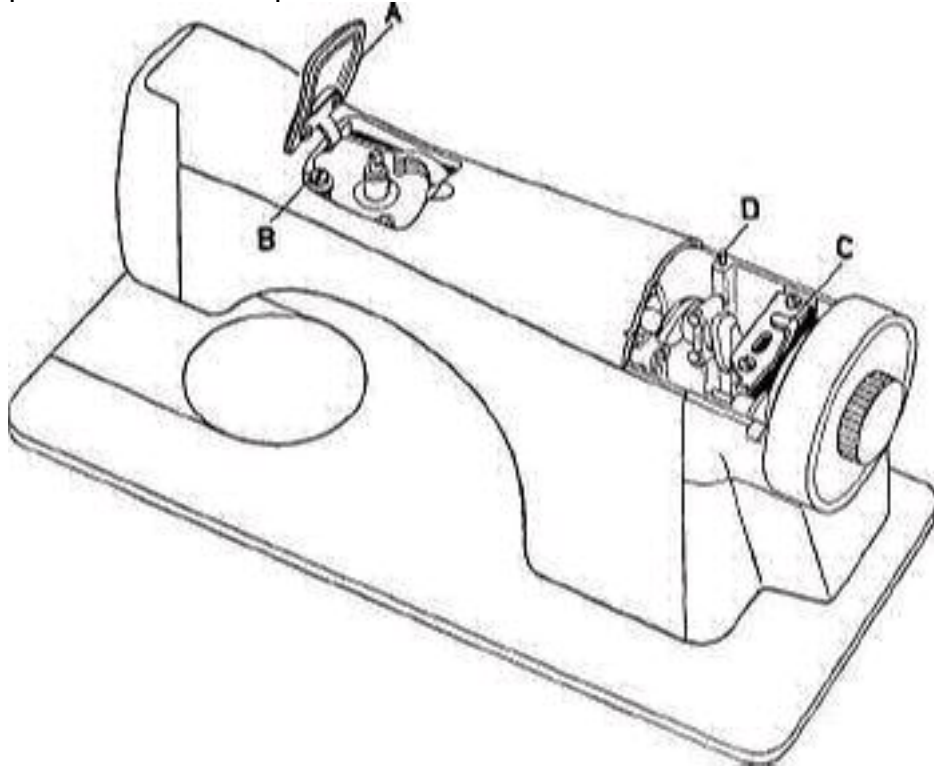
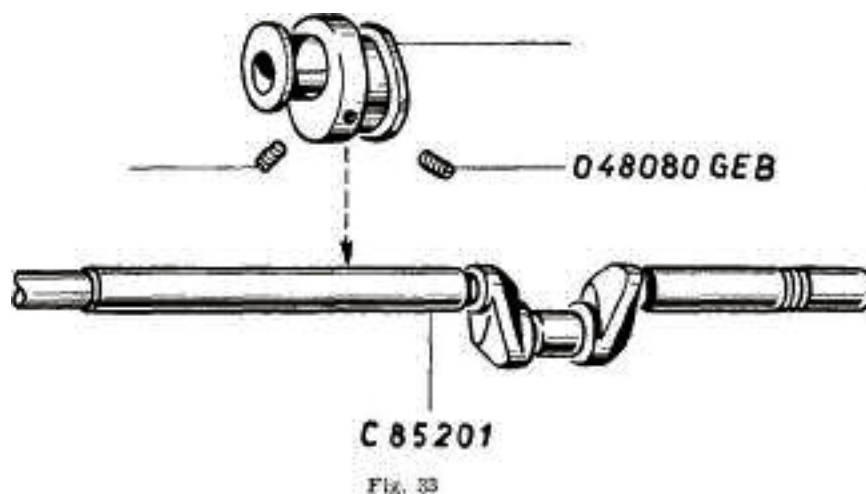


Fig. 32

Turn the flywheel until the two screws 048080 GEB of the feed dog eccentric 20026 (Fig. 33) are visible and loosen them slightly. Turn the feed dog eccentric on the upper shaft C 85201 (taking care not to move it sideways) until the feed dog is in the correct position as already explained above. After the adjustment has been made tighten the two screws 048080 GEB securely.



20026  
048080GEB

The timing of the feed dog and needle bar can be made with the help of the gauge 10-3 (Fig. 34).

Insert the pin " B " of the gauge into the timing hole of the feed dog eccentric A 20026.

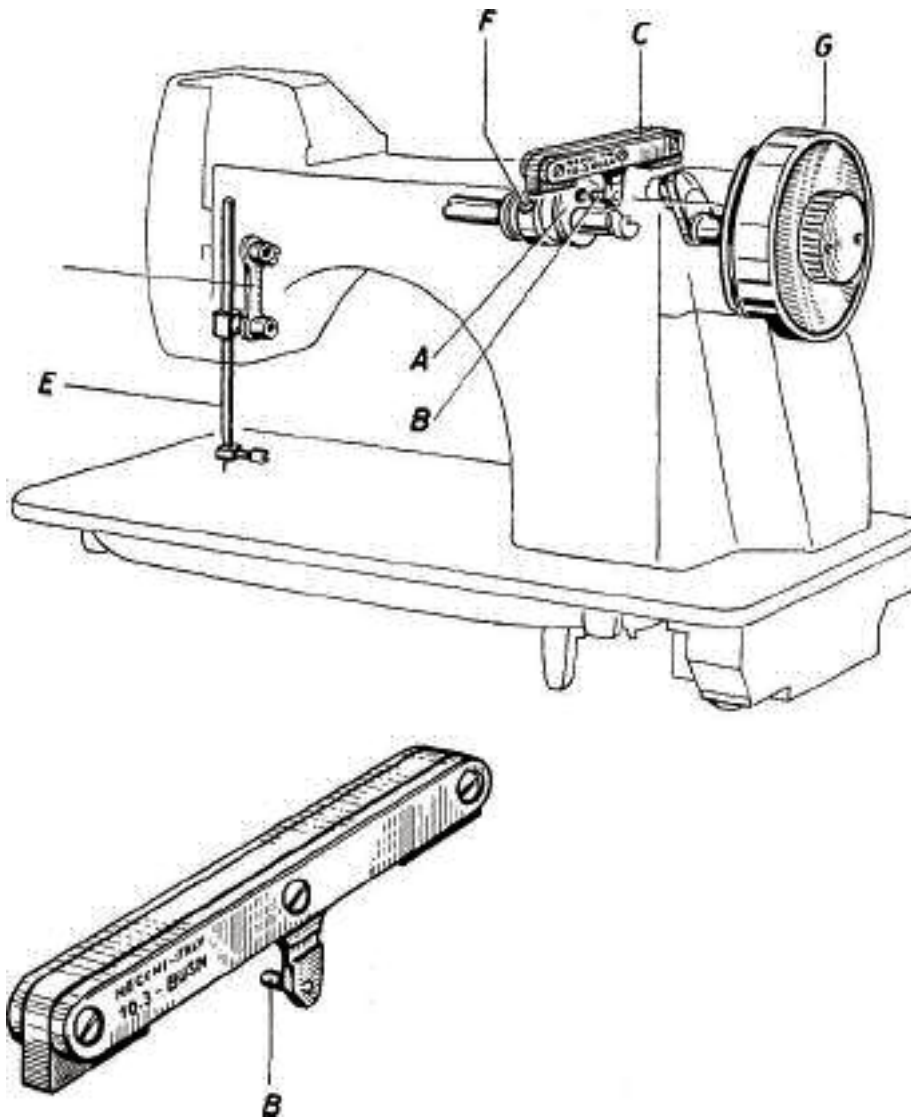
Turn the flywheel slowly toward you until the gauge rests on the two side rims of the machine as shown in Fig. 34.

If the timing is correct, the needle bar " E " should now be at its lowest position and the connecting link " H " (Fig. 34) should be in a straight vertical position.

If the position is not correct rectify it in the following way: loosen the two screws 048080 GEB of the eccentric 20026 (Fig. 33) and place the gauge 10-3 over the two side rims of the machine then insert the pin " B " in the corresponding hole of the eccentric 20026 and turn the flywheel until the needle bar is in the lowest position.

Tighten the two screws securely 048080 GEB after the adjustment.

The above mentioned procedure is only made if the feed dog does not move correctly in relation to the needle bar.



H  
Fig. 34

Fig. 34-a

- *Timing the regulating shaft of the stitch length regulating knob (Fig. 35).*

Before starting, remove cams from machine (as explained previously), then swing cam disengaging lever entirely to the right as far as it will go, and proceed as follows:

Loosen the screws "8" which hold the collar "9" to the shaft "A". Do not loosen the two screws "10". Turn the stitch length regulating knob counterclockwise to zero (0).

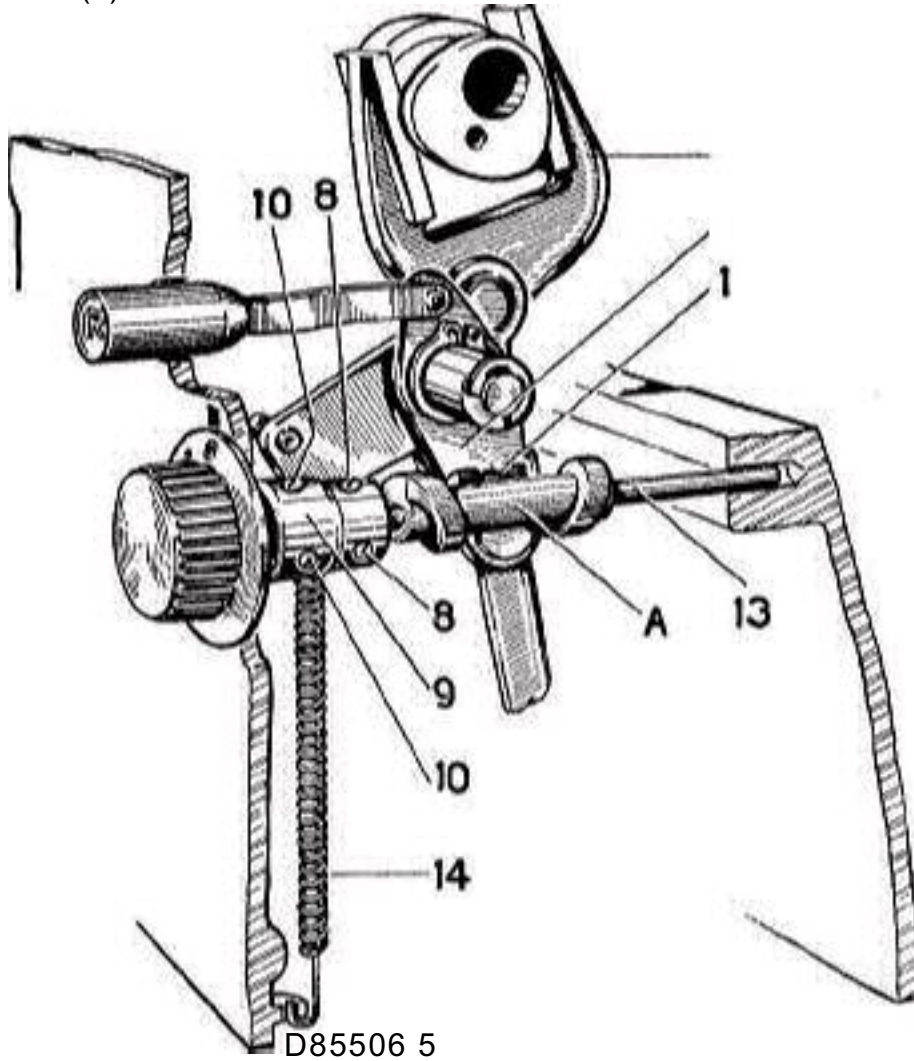


Fig. 35

Gripping the shaft " 13 " by hand, turn it counterclockwise until the pin " 1 " of the reverse plate is completely in the groove. In this position the shaft is blocked and cannot move any further. To check the above adjustment 3, proceed as follows:  
Slightly tighten the two screws " 8 " of the collar " 9 ".  
Press upon the reverse push button. It must not move. If this is not the case, repeat adjustment 3 as explained above.

Slightly tighten the two screws " 8 " which hold the collar " 9 " on the shaft A/13.

Place two thicknesses of material under the presser foot and lower the presser foot.

Leave the stitch length regulating knob at zero (0), let the machine run and check whether the material under the presser foot is moving.

If the material is not moving, firmly tighten the two screw " 8 " in collar " 9 " on the shaft A/13.

If the material moves, proceed as follows:

Slightly loosen (so that there is still some friction) the two screws " 8 " in the collar " 9 ".

If the material under the presser foot moves *backward*, push the shaft in its axial direction toward the rear wall, being careful not to turn the shaft.

If the material moves *forward*, push the shaft in its axial direction toward the front wall.

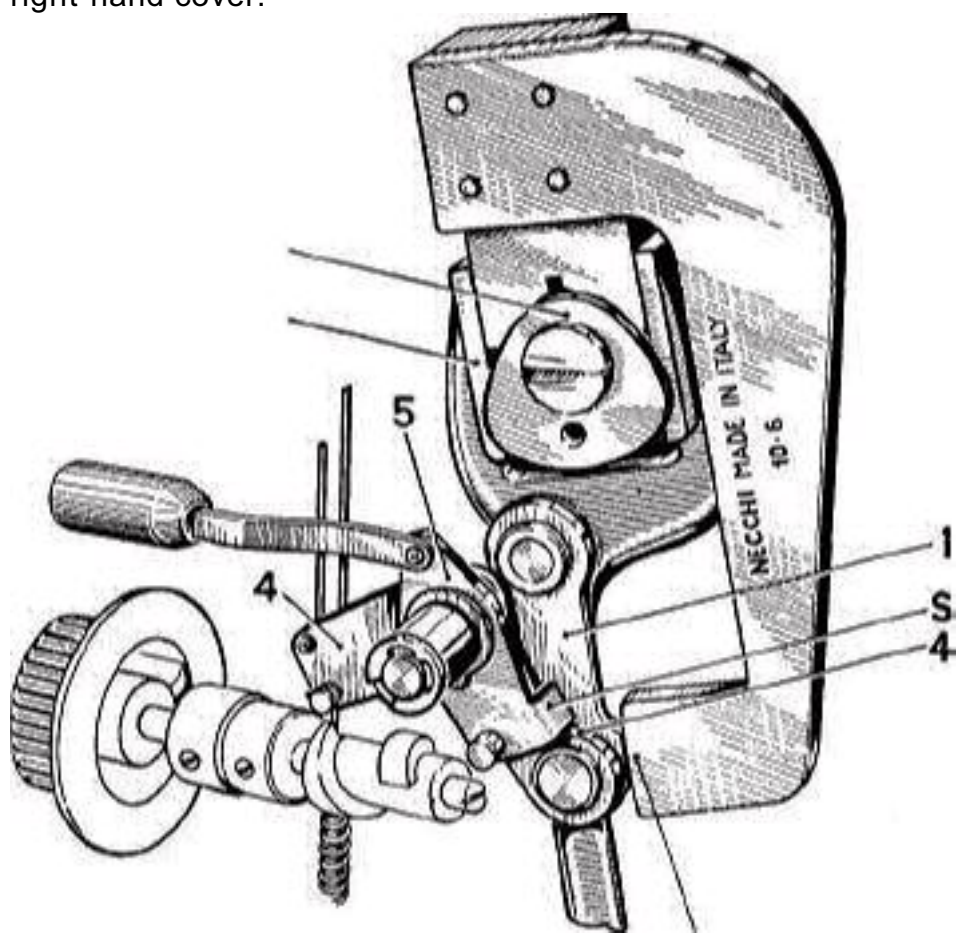
Repeat this procedure, if necessary, until the material does not move at position " 0 " (zero) of the stitch length regulating knob.

Securely tighten the two screws " 8 " in collar " 9 " of shaft " 13 ".

To make sure that the shaft A/13 did not turn during this adjustment, try to press the reverse push button which must not move at all.

If the button moves, repeat adjustment 3.

The timing of this regulating shaft A/13 can also be performed with the aid of the gauge 10-6.  
Using timing gauge 10-6.  
Remove the automatic mechanism mounting plate and the right-hand cover.



20026 D85506

Fig. 36



Remove top cover.

Disconnect pull-rod " A " from pin " B " (Fig. 37) by pushing it to the left with a screw-driver or, still better, with a finger. To facilitate this operation, remove first the cams from the machine, then swing the cam disengaging lever entirely backward toward the machine arm.

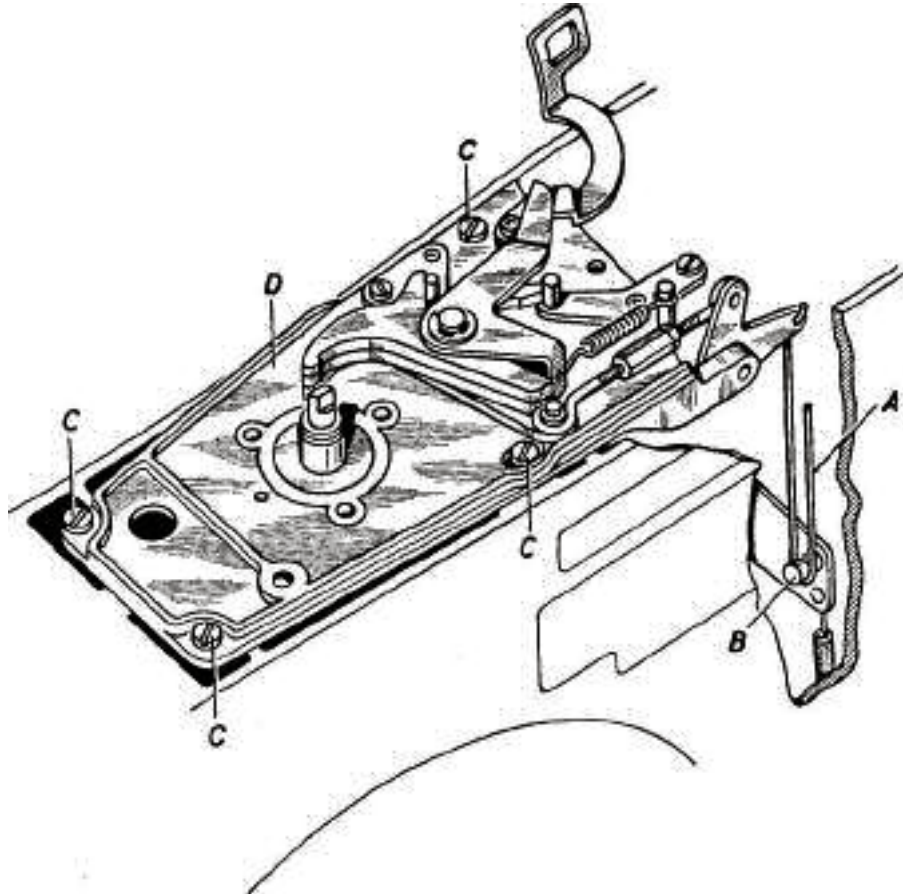


Fig. 37

Loosen the four screws " C " completely.

Raise the mounting plate " D " for the Automatic Device inward.

Loosen fully two screws " A " (Fig. 38).  
Pull cover away from machine.

Loosen the two screws " 8 " which hold collar " 9 " (Fig. 35).  
Turn the stitch length regulating knob counterclockwise to zero (0).

Turn the flywheel until the eccentric 20026 of the upper shaft reaches the position as shown in Fig. 36.

Insert the gauge 10-6 in such a way that its V-shaped upper portion

is exactly inserted between the forks of the feed eccentric connecting rod No. D 85506 (Fig. 36) and, at the same time, is contacting the eccentric No. 20026. In order to reach the right position, eventually turn the flywheel by hand in one sense or the other as required. When the gauge is correctly inserted, the

flywheel cannot be moved. The lower portion of the gauge 10-7 should rest on the flat alignment portion of rod " 1 " as shown in Fig. 36. In order to reach this position, eventually push the reverse stitch button.

NOTE. - Be sure that the lower portion of the gauge rests flush on flat portion of rod " 1 " (Fig. 36).

While keeping the gauge in its right place by one hand, with the other hand turn the regulating shaft counterclockwise around its axle until it can go no further. This means the pin " 1 " at the end of reverse stitch plate " 5 " is now inserted in the groove of the stitch regulating shaft completely (Fig. 35).

NOTE. - While turning the stitch regulating shaft around its axle, push it toward the stitch regulating knob so that the bent portion " S " of the reverse stitch plate " 5 " rests on the stitch regulating lever plate " 4 " (Figs. 35 and 36).

Tighten the two screws " 8 " firmly and remove the gauge 10-6.

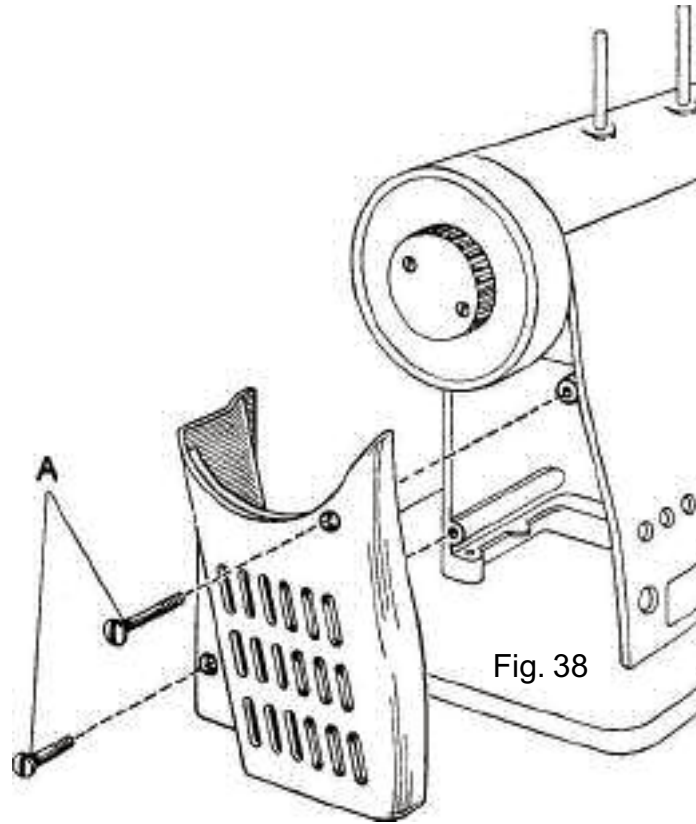


Fig. 38

- *Timing of the automatic control eccentric A 85241 (Fig. 39).*

General Rules

The automatic control eccentric controls the impulses of the cam axle, and has to be adjusted so that, while sewing a zig-zag automatically, the cam axle makes each of the single impulses when the needle bar is on its way upward.

The timing *without* gauge has to be done as follows:

Remove the automatic mechanism mounting plate.

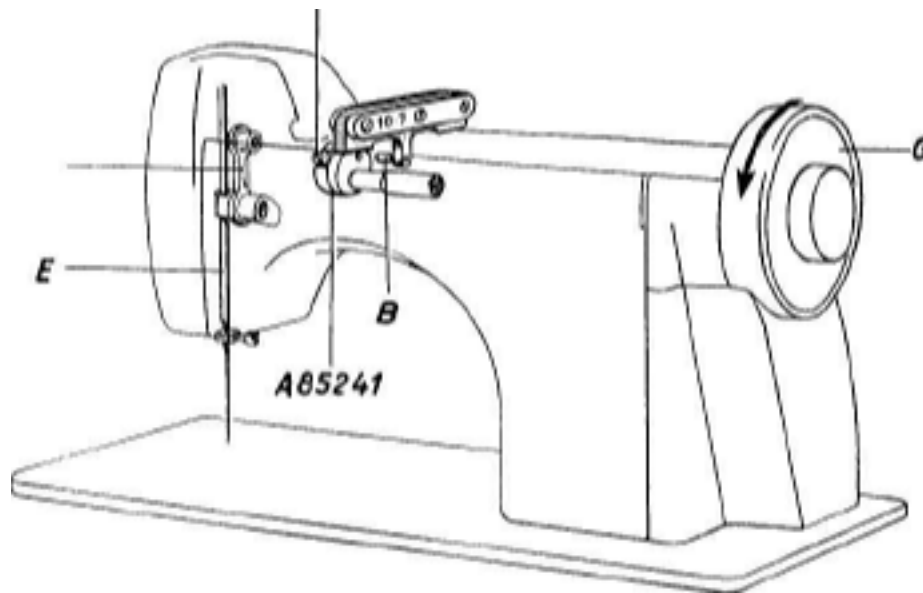
Bring the needle bar to its highest position.

In this position, the highest point of the eccentric must be on top of the upper shaft.

Firmly tighten the screw 85279, taking care to avoid end play in the upper shaft.

H  
85279

Fig. 39



The timing of the eccentric A 85241 in relation to the needle bar can be made with the help of the gauge 10-7 by following this procedure:

Remove the automatic mechanism mounting plate.

Insert pin " B " of gauge 10-7 (Fig. 39) into the timing hole on eccentric A 85241.

Turn the flywheel " G " slowly until the base of the gauge rests on the two side rims of the machine.

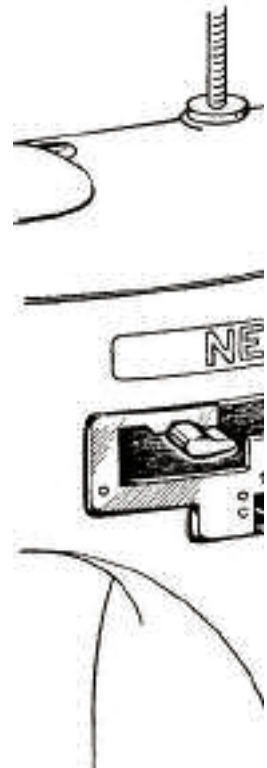


Fig. 40

If the timing is correct, needle bar " E " should now be at its highest position and the connecting link " H " should be in a straight vertical position.

If the above requirements are not met, loosen the screw No. 85279 of the eccentric No. A 85241 (use Allen wrench 20-5) and, while gauge 10-7 is kept against the surface of the machine arm and the pin " B " remains inserted in the timing hole of the eccentric, turn the flywheel " G " slowly until the needle bar " E " reaches its highest position. Then tighten the screw No. 85279 firmly.

- *Timing of the zig-zag movement and the movement of the needle bar.*

Remove the mounting plate for the Automatic device. Remove the zig-zag mechanism cover plate No. 85621. Replace the zig-zag mechanism cover plate with gauge 10-4 (Fig. 43).

Set the machine for straight sewing by moving the needle positioning lever to the center of the gauge, and the zig-zag width to zero (completely to the left) (Fig. 40).

Turn the balance wheel slowly toward you until the needle bar has reached its highest position and the needle bar connecting link (D 26020) is in a vertical position (Fig. 45).

With the needle bar in this position, the eccentric "A" of the vertical gear No. C 85664 (Fig. 41) must occupy either position I, or position II, in the channel of the oscillating lever "C" (Fig. 42).

If the needle bar is in its highest position, but the eccentric "A"

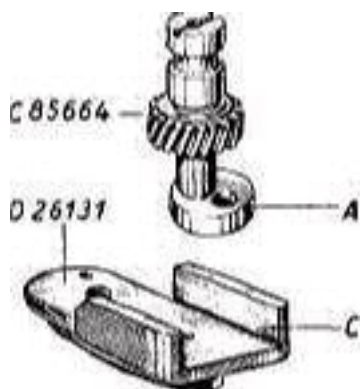
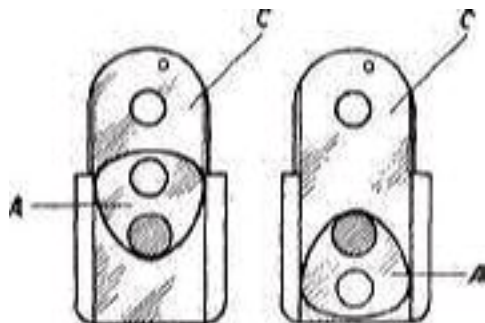
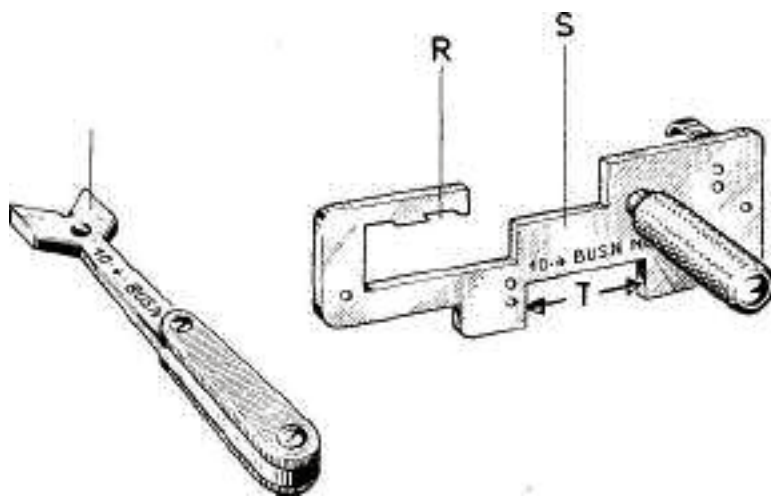


Fig. 41  
position I      position H

Fig. 42



U

Fig. 43

occupies a position other than those described above, then loosen first the two screws " E " of the worm gear " F " (Fig, 45), hold the balance wheel firmly, thus keeping the needle bar in its highest position, and, by hand, turn the worm gear " F " around the upper shaft until the eccentric " A " is in position I or position II (Fig. 42).

After this adjustment firmly tighten the two screws " E " (Fig. 45).

The timing of the *zig-zag* movement and the movement of the needle bar can also be performed with the aid of the gauge 10-4.

The gauge 10-4, shown in Fig. 43, consists of:

A plate " S " with a knurled stud serving as a holder.

During the timing operation this plate " S " replaces the zig-zag mechanism cover plate. The notch " R " serves for positioning of the needle positioning lever and the space " T " is required for the zig-zag width lever.

A small steel plate " U ", with a handle-shaped portion at one end and a V-shaped cut-out at the other end.

Timing procedure.

Remove the mounting plate for the "Automatic" device.

Replace the zig-zag mechanism cover plate with the plate " S "

of gauge 10-4.

Adjust the machine for straight sewing (see Fig. 40).

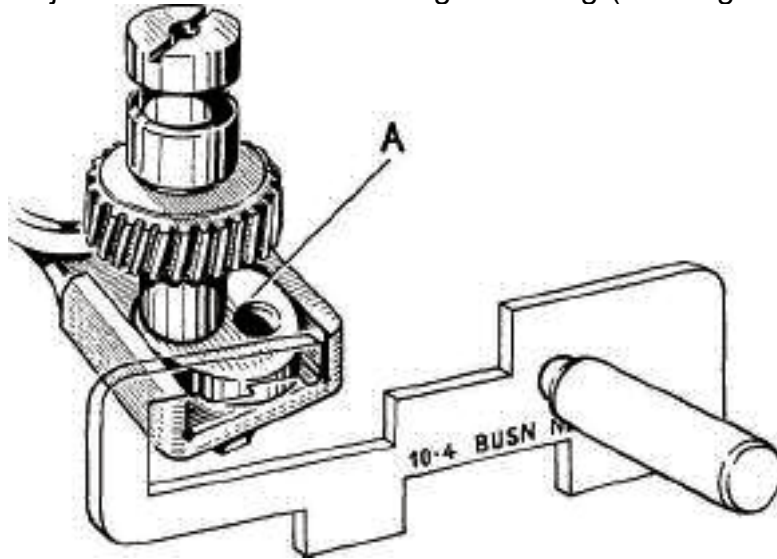


Fig. 44

Turn the balance wheel slowly toward you and bring the eccentric " A " to the right, as shown in Fig. 44.

Insert gauge " U " through the plate " S " and, by turning the balance wheel toward you, bring the eccentric " A " in such a position that the V-shaped cut-out of the timing gauge " U " fits properly against the back portion of this eccentric (Fig. 45). In this position the balance wheel cannot be turned further and the

gauge " U " is pressed firmly against the eccentric " A ".

In the position described above, the needle bar must be in its highest position and the needle bar connecting link No. D 26020 must be in a vertical position (Fig. 45).



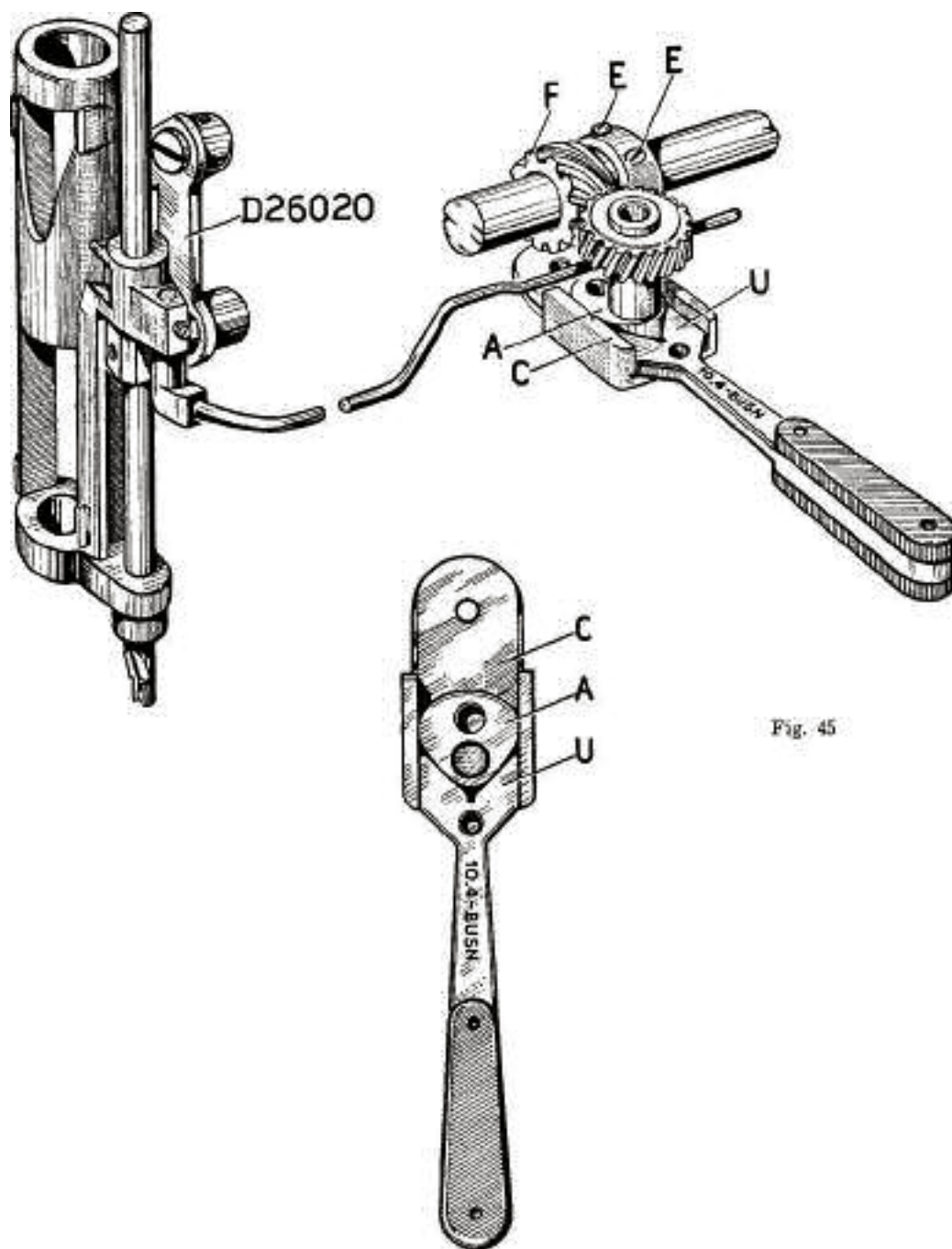


Fig. 45

If this condition is not met, proceed as follows:  
 Loosen the screws " E " of the worm gear " F " (Fig. 45) on the upper shaft.  
 Take gauge " U " and place it against the eccentric " A " (in order to block this eccentric), then turn the balance wheel toward you until the needle bar is in its highest position (Fig. 45),  
 Firmly tighten the two screws " E " of the worm gear " F ", then take away gauge " U ".  
 Take away gauge plate " S " and replace it with the zig-zag me-

chains m cover plate No. 85621.

22 2 7 23 24 27 26 29

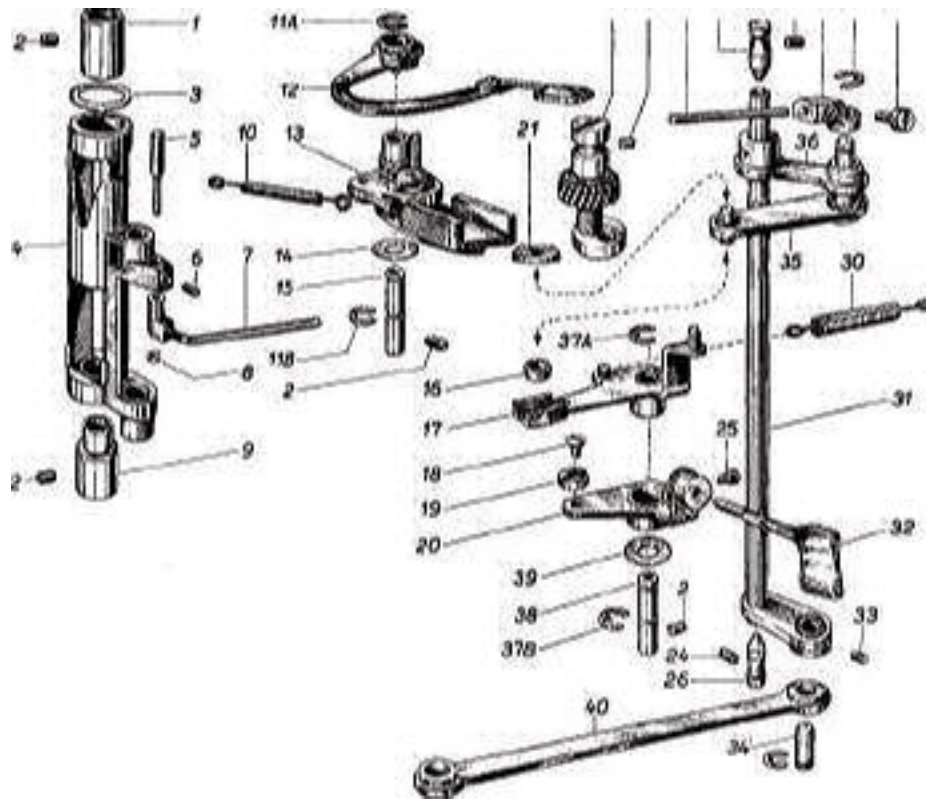


Fig.  
46

## HOW TO DISMANTLE THE UPPER GROUP OF THE ZIG-ZAG MECHANISM (FIGS. 46 AND 47)

Remove the top cover.

Remove the mounting plate for the "Automatic " device.

Remove the zig-zag mechanism cover plate and open the face

plate of the machine.

Remove the needle positioning rod " 7 " (Fig. 46) in the following order:

Remove retaining ring " 8 ".

Loosen screw " 6 " which holds left end of the rod " 7 ".

Remove pin " 5 " by pulling it upward.

Loosen screw " 29 " at right-hand end of rod " 7 ".

Remove the needle bar positioning rod " 7 " by pulling it out of the machine from the face plate side.

The needle bar positioning lever assembly " 13 " is now free for removal which shall be done in the following order (see Fig. 46):

Loosen screw " 33 " which holds the pin " 34 " (underneath the bed plate).

Remove spring " 10 " (from the left side).

Remove retaining ring " 11A" which is slipped on top of pin " 15 ".

Remove the needle bar positioning lever " 12 " by pulling it backward and then upward out of the machine.

Remove spring " 30 " (toward the right).

/) Loosen screw " 25 " and remove zig-zag width regulating lever " 32 ".

g) Remove the feed lifting connecting rod No. A 26345 from the machine. To remove the nuts, use the special tool 20-1. Shift the eccentric No. 20026 towards the left until it rests on the gear.

Turn the needle bar positioning lever assembly " 13 " toward the back and the lever assembly for zig-zag width control " 17 " completely to the right. In this manner, the small stud in the link " 35 " of the vertical shaft " 31 " can be taken out of the lower groove of needle bar positioning lever assembly " 13 " and this will allow you to remove from the machine the sector No. 21 and the roller No. 16.

Remove retaining ring " 11B " which is slipped over the pin " 15 ". To simplify this operation, use a special pull rod (see Fig. 47).

l) Loosen screw " 2 " which holds pin fixed in the arm of the Machine. k) Take out pin " 15 ". To facilitate its removal, take the screw

of the presser bar and screw it into the top of pin " 15 ". By Pulling the screw by hand, the pin " 15 " comes out easily. 1) Remove the needle bar positioning lever assembly " 13 " by Lifting it upward toward the back of the machine.

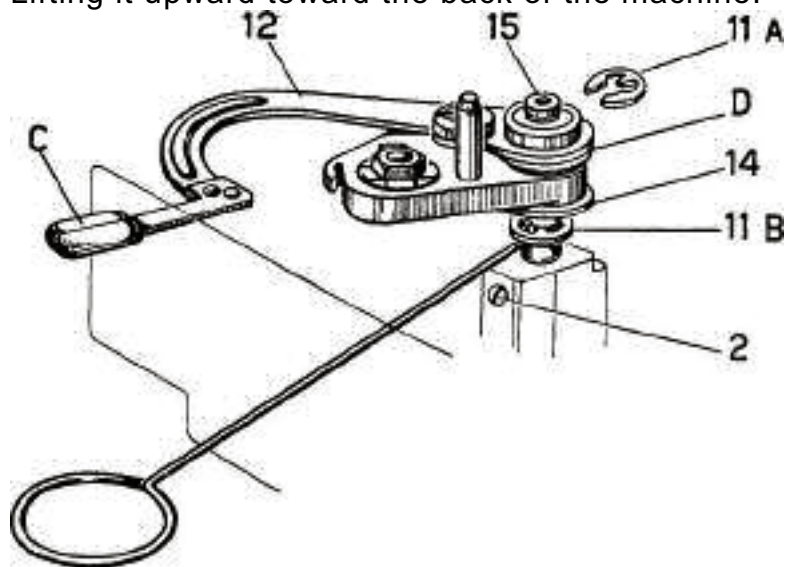


Fig. 47

Now the lever assembly for zig-zag width control " 17 " is free to be dismantled in the following order:

Remove the feed eccentric connecting rod No. D 85506 (see chapter, "Removing of Feed Eccentric Connecting Rod ").

Turn the fly wheel (balance wheel) so that the fork of the oscillating rock shaft No. 21230 is in its highest position.

Turn the vertical shaft " 31 " (around its own axle) so that the small lever " 36 " is completely to the right.

Push link " 35 " to the back of the arm so that it is almost under the lever " 36 ".

Remove retaining ring " 37A " from pin " 38 " of the lever

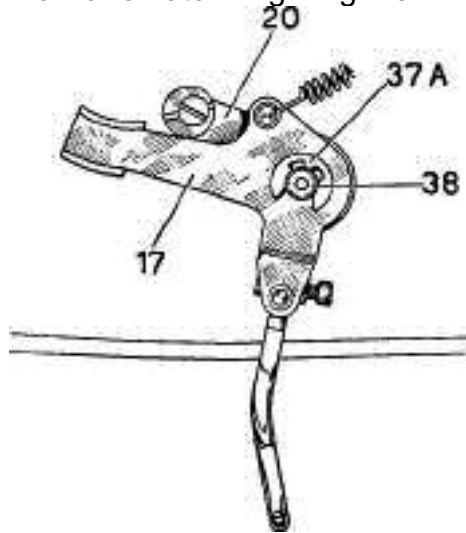


Fig. 48

Assembly for zig-zag width control " 17 ". (The pin " 38 " must not be taken out).

/) Remove the lever assembly for zig-zag width control " 17 " and the zig-zag width regulating lever " 20 ".

**CAUTION:**

It is advisable, if not necessary, not to remove the vertical shaft "31". This will enable you to maintain the proper height of the needle positioning lever during the assembly of the machine.

**HOW TO ASSEMBLE THE UPPER GROUP OF THE ZIG-ZAG MECHANISM (FIG. 46)**

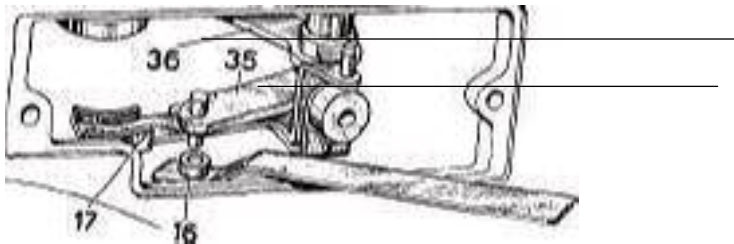
On stud " 38 " (wich is permanently fixed in the machine arm with a retaining ring " 37B ", assemble the parts mentioned below in the following order:

Place the two lever assemblies " 20 " and " 17 " upon each other, as shown in Fig. 48, and close this assembly with a retaining ring " 37A " on top of this stud, shift the eccentric No. 20026 towards the right until it comes in contact with the upper shaft.

Insert the roller " 16 " on the lower portion of the stud in the link " 35 " of the vertical shaft, as indicated in Fig. 49.

Fig. 49

HECCML



Move the lever assembly " 17 " and the small link " 35 " so that the roller " 16 " enters the channel (groove) of lever assembly "17".

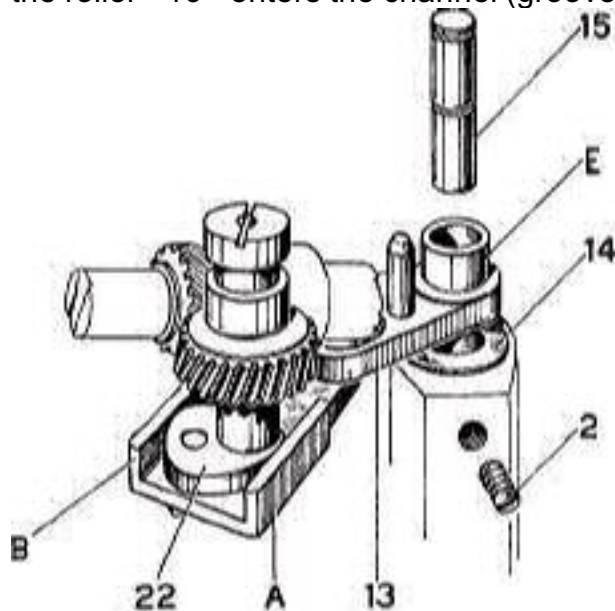


Fig. 50

Place and line up the washer " 14 " (see Figs. 46 and 50) on top of the hole in the upper arm, then insert pin " 15 ". Take lever assembly " 13 ", introduce it between the upper shaft and the rear wall of the machine, pass it below the upper shaft so that its bearing " E " is placed above the washer " 14 " and the ec-

centric " 22 " enters the two sides " A " and " B " of the channel (see Fig. 50).

Insert pin " 15 " into bearing " E " of the lever assembly and through the washer " 14 ". Push this pin down to its middle groove, so that the retaining ring " 11 B " can be slipped into this groove.

Grip the retaining ring " 11B " with a pair of tweezers and slip it into the groove of pin " 15 ". See that the washer " 14 " stays *above* the retaining ring " 11 B " (Fig. 47).

- g) The bearing bushing " E " of the lever assembly must be set down on washer " 14 " and retaining ring " 11B " *without force*. Adjust the clearance (open distance) between the underside of the eccentric " 22 " (see Fig. 50) and the channel of the lever assembly " 13 " so that there is a free space of about 0,02" (see Fig. 51).

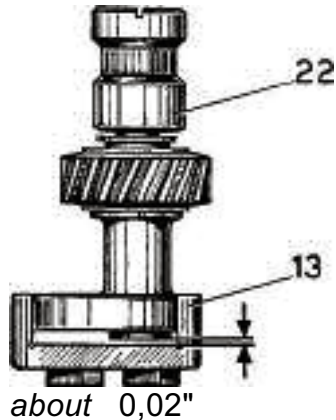


Fig. 51

- h) Tighten securely screw " 2 " which holds pin " 15 " in the hole of the upper arm (Fig. 50). Place the sector " 21 " (Fig. 46) on the short stud in the link " 35 " of the vertical shaft, then let the sector " 21 " move into the groove underneath the lever assembly " 13 ".
- l) Take the needle bar positioning lever » " 12 " (Figs. 46 and 47) and introduce it between the upper shaft and the rear wall of the machine in such a manner that its handle " C " passes below the upper shaft and through the front opening of the machine (Fig. 47). The lever bearing " D " of this same lever assembly " 12 " must be slipped over the pin " 15 ".
- Slip retaining ring " 11A " into the upper groove of the pin " 15 ". 1) Attach spring " 10 " (Fig. 52). m) Attach spring " 30 " (Fig. 52).
- n) Replace the needle bar positioning rod " 7 " (Fig. 46) from the face plate side of the machine and insert its right-hand end into the hole of the block " 27 ". Connect this rod " 7 " with a needle



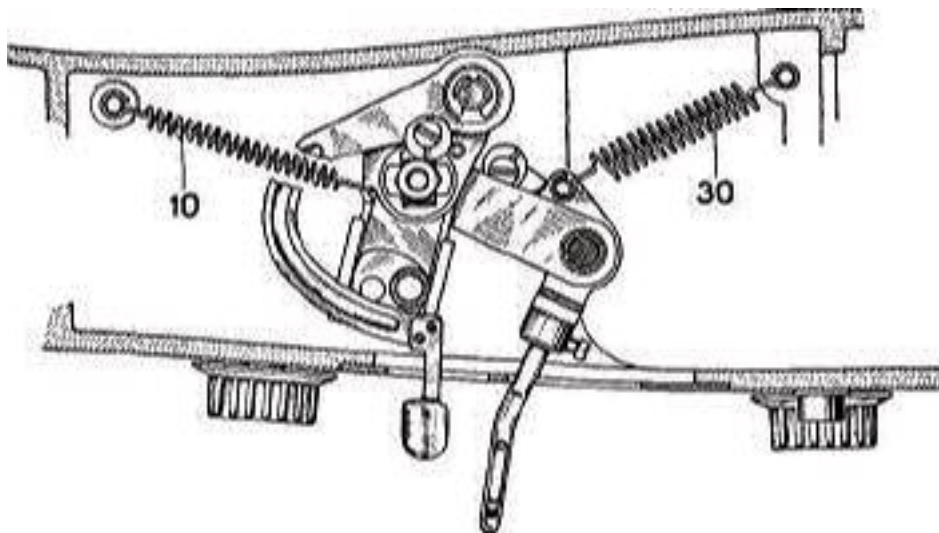


Fig. 52

bar support " 4 " by means of the pin " 5 " and the retaining washer " 8 ". Tighten screw " 6 " which holds pin " 5 " in the needle bar support " 4 ". Tighten temporarily screw " 29 " which holds the right-hand end of rod " 7 " in the block " 27 ". The correct position of the rod " 7 " must be adjusted in accordance with the instructions in chapter, " Important Adjustments in Upper Group of Zig-Zag Mechanism ", Section " 2 ".

Insert handle " 32 " into lever assembly " 20 " (Fig. 46) and secure it by firmly tightening screw " 25 ".

p) Replace connecting rod " 40 " (Fig. 46) underneath the bed plate, and adjust the position of the needle in relation to the needle plate by means of the needle bar positioning rod " 7 " (see Section 2 of " Important Adjustments in Upper Group of Zig-Zag Mechanism ").

q) Replace the zig-zag mechanism cover plate No. 85621 and tighten its two fastening screws.

r) Replace the feed eccentric connecting rod No. D 85506 as explained in section, " Reassembling Feed Eccentric Connecting Rod and Stitch Length Rod ",

After having replaced this lever, check again the timing of the movement of the feed dog (see section, "Timing of Feed Dog and Needle Bar ").

Reassemble the feed lifting connecting rod No. A26345.

#### IMPORTANT ADJUSTMENTS TO BE MADE AFTER THE REASSEMBLY OF THE UPPER GROUP OF THE ZIG-ZAG MECHANISM

Check the timing of the zig-zag movement in relation to the needle

bar (see chapter, " Timing of Zig-Zag Movement of Needle Bar ").

Center the needle in the hole of the needle plate, with the aid of the rod " 7 " (Fig. 46) as follows:

Remove zig-zag mechanism cover plate No. 85621 and replace it with gauge (10-4).

Set the machine for straight sewing in the center position (Fig. 40), then bring the needle down through the hole in the needle plate (use Zig-Zag Needle Plate).

Insert a screw driver through the opening in the zig-zag positioning plate and loosen screw " 29 " of block " 27 " (Fig. 46).

Adjust the rod " 7 " (Fig. 46) with the aid of the needle bar support " 4 " so that the needle is in the center of the needle plate hole.

Tighten firmly screw " 29 ".

Check the distance between needle and shuttle (see chapter, " Timing of Shuttle and Needle Bar ").

## MINOR ADJUSTMENTS IN THE UPPER GROUP OF THE ZIG-ZAG MECHANISM

When the needle positioning lever no. A85662 is in the center notch and the zig-zag stitch lever handle No. 85620 is set at " O ", namely at the extreme left (after the cams have been removed

from the machine), the needle must be in the center of the hole of the zig-zag stitch needle plate. If the needle is not in the center of the hole, make the adjustment as explained in chapter " Im-

portant adjustments to be made after re-assembling the upper

group of the zig-zag mechanism ".

The machine runs noisily when sewing zig-zag with disconnected

" automatic " mechanism. The cause of the noise can be located

somewhere in the upper group of the zig-zag mechanism, and it

is advisable to check all the connections between the various parts,

to see whether any undue play exists. Dismantle mechanism and

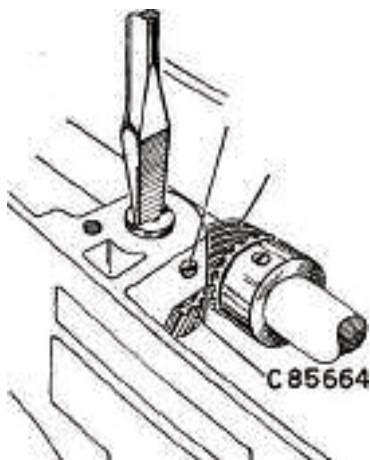
check if and where excessive play exists. Especially check the

fit of the sector No. 26106 and the roller No. 26105. If necessary, replace the worn-out parts with new ones.

Zig-zag sewing is noisy due to excessive play between the gears

No. 26240 and No. C 85664. To adjust, proceed as follows: loosen

screw No. 048050 GEB which holds the gear No. C 85664 in the arm. By means of a screw-driver, to be inserted in the notch at the upper end of the gear No. C 85664 (Fig. 53), turn slightly the eccentric support of this gear clockwise; the gear No. C 85664 will then get closer to the gear No. 26240 and the play between the two gears will thus be reduced. Tighten the screw No. 048050 GEB firmly after this adjustment.



048050GEB 2 6 2 4 0 ^

Fig. 53

If, after having turned the eccentric support of the gear No. C85664 clockwise as far as it will go, there is still too much play between the two gears, replace the worn out gears with new ones.

The machine is set for straight sewing (the cams have been removed and the zig-zag stitch lever is set at " O "), but still sews zig-zag. This may be due to two reasons, namely (Fig. 54): The zig-zag stitch lever, D 85611 drawn back by spring " A ", does not contact the eccentric No. 85663 of the lever No. C 85641.

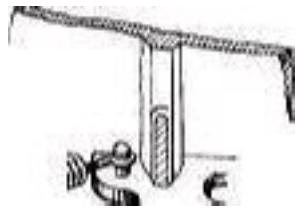
The lever No. C 85641 is not in its right position.

In the case " a " proceed as follows (Fig. 54):

Test the strength of spring " A ";

Check whether the sector No. 26106 is sliding freely in the lower channel of the oscillating lever No. A 85606;

Check whether the lever No. D 85611 is moving freely around its pivot No. 85693.



035040F  
G  
'85663  
C85641  
^ ^ 8 5 6  
9 3  
85620  
A85606

Fig. 54  
In the  
54):

the

which

85663

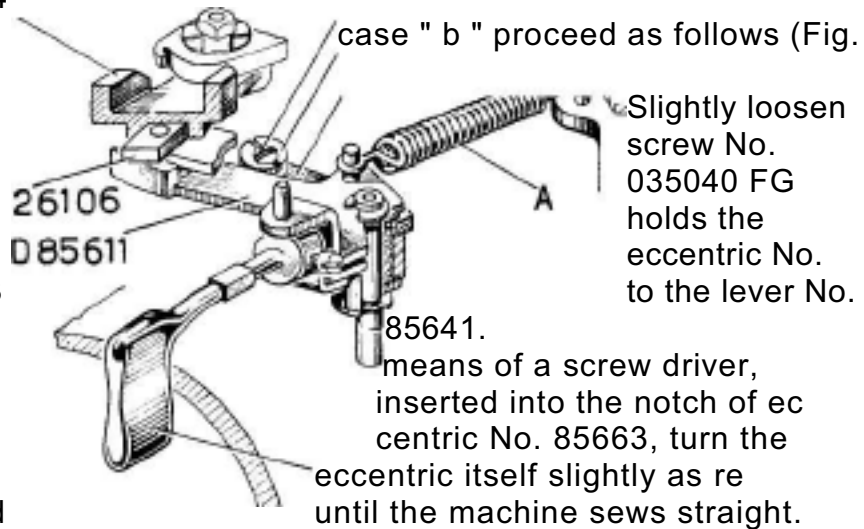
C

By

quired

*Note:* The zig-zag lever No. D 85611 must be in contact with the eccentric No. 85663.

Firmly tighten screw No. 035040 FG.



case " b " proceed as follows (Fig.

Slightly loosen  
screw No.  
035040 FG  
holds the  
eccentric No.  
to the lever No.

85641.

means of a screw driver,  
inserted into the notch of ec  
centric No. 85663, turn the  
eccentric itself slightly as re  
until the machine sews straight.

## THE FEED DOG

The purpose of this part is to feed the fabric regularly for a certain distance at every stitch so that the space between one perforation of the fabric by the needle, and the next one, equals the desired length of stitch.

A perfect feeding operation is of great importance for the final result of sewing. An incorrectly operating feed dog will cause irregular feeding of the fabric, unequal length of the stitches, and a seam which is not straight. There are many circumstances which may cause the defects just mentioned.

Before further investigating the causes of incorrect feeding, it is necessary to make certain that the various parts of the feeding mechanism are properly assembled (see instruction for "Timing of Feed Dog and Needle Bar "). Here are some adjustments of other parts of the feeding mechanism:

Adjustment of any looseness in this mechanism.

Adjusting the height of the teeth above the needle plate.

Alignment of the feed dog in relation to the feed dog slots and the needle plate.

Alignment of the underside of the presser foot in relation to the teeth of the feed dog (this adjustment is very important for the straight feeding of the fabric).

*1 - Adjustment of any looseness in the feeding mechanism.*

Excessive looseness of parts that are connected with the feeding mechanism, such as the feed shaft, the feed dog support and the feed eccentric connecting rod, can be ascertained by setting the stitch length regulating lever for very short stitches. In this case, the movements of the parts are offset by the variety of play and the feeding of the fabric will not be in accordance with the length of the stitch as set on the stitch length regulating knob. It is advisable to check the looseness in the following parts:

pointed bearing pins for feed rock shaft No. 20100;  
pointed bearing screw No. 44 for feed dog support No. 20121;  
Screws No. 58 at the ends of the connecting rods No. D 85506  
and  
No. A 26345;  
stitch length regulating rod (see instruction re. " Assembling of  
feed eccentric connecting rod No. D 85506 and of the stitch  
length  
regulating rods ").

*2 - Adjusting the height of teeth of the feed dog above the needle plate.*

*General Rules*

Turn the balance wheel by hand toward you and check the maximum height of the teeth of the feed dog above the needle plate.

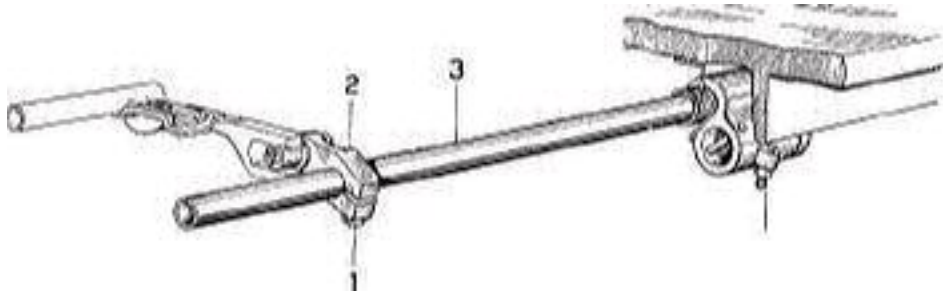
When the feed dog is in its highest position, its teeth must protrude about 1/32" above the needle plate.

If necessary, adjust the feed dog as follows (Fig. 55):  
loosen screw No. 1 that fastens the crank No. 2 to the feed lifting shaft No. 3;

■— adjust crank No. 2 until feed dog teeth are in the right position as described above;  
tighten screw No. 1 firmly.

For making this adjustment, the gauge No. 10-1 can be used by following this procedure (Fig. 56):

Remove the presser foot and the needle; place Gauge No. 10-1 on the needle plate in such a way that the thinner portion is over



035150 GAN

Fig. 55

the teeth of the feed dog while the thicker portion rests on the needle plate, as shown in Fig. 56. The two steps "a" and "b" between the thinner and the thicker portion of the Gauge are of different sizes (0,028" and 0,035" respectively). First place the gauge on the needle plate in such a way that the thinner step "a" is down over the feed dog teeth and turn the balance by hand wheel by a full rotation. The feed dog must then come in touch with the gauge (and move it).

Turn over the gauge, so that larger step "b" is resting over the feed dog. When turning the balance wheel, the teeth of the feed dog must not contact the gauge (the gauge is not moved).



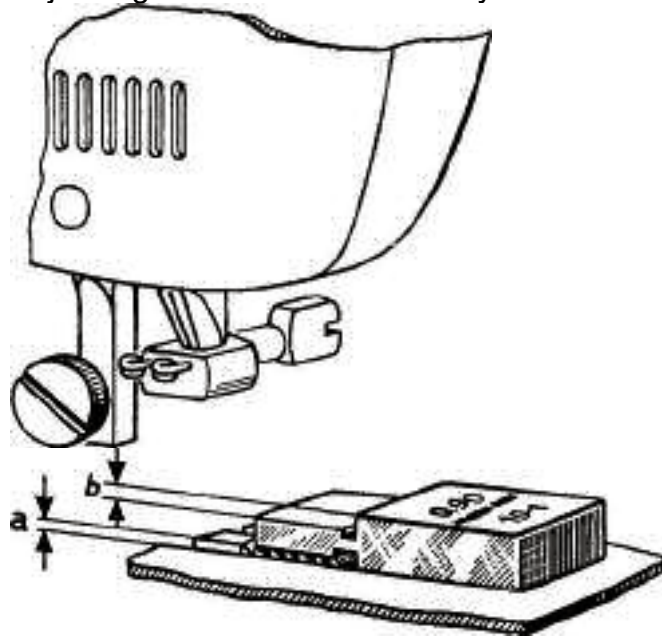
*Note:* It is necessary to check if both conditions 1 and 2 are met. If not, adjust the feed dog, following this procedure:

Fig. 56

Loosen screw No. 1 (Fig. 55) and adjust the crank No. 2 as required;

tighten the screw No. 1 firmly.

Check again if both conditions 1 and 2 are met. If not, keep on adjusting crank No. 2 until they are.



- *Alignment of feed dog in relation to the slots in the needle plate.*

It is necessary to check whether the rows " C " of the feed dog (Fig. 57) are parallel with, and at the same distance from the edges

of the slots in needle plate " D " .

The motion of the feed dog in the needle plate slots must be unit-

form; namely the distance " a " (Fig. 58), when the feed dog starts its horizontal movement in the slot, must be the same as the di-

stance " b " (Fig. 59) when the feed dog has completed its hori-

zontal movement in the slot, This test can be made by setting the stitch regulating knob for the maximum stitch length, both for ward and reverse.

*Adjustment " A " Two cases may occur: 1st Case*

The rows " C " of the feed dog (Fig. 57) are parallel with the edges of the needle plate slots, but the distances " a " and " b " are not the

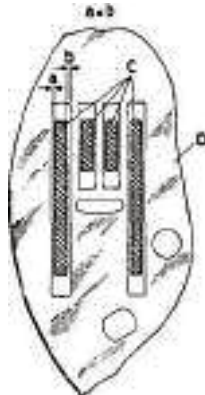
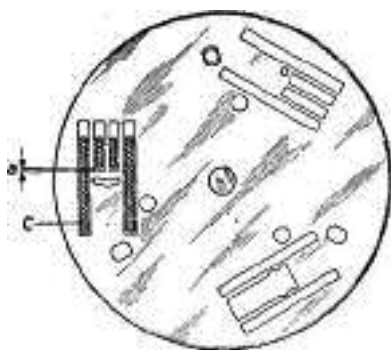
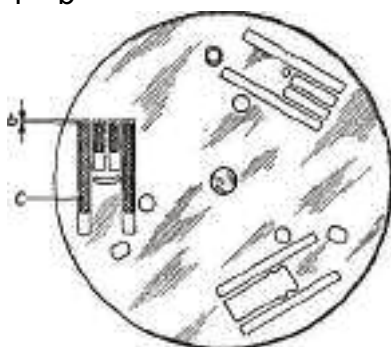


Fig. 57

same. To adjust, proceed as follows: loosen screws " E " (Fig. 60) that fasten the two pointed bearing pins " F " of the feed rock shaft " G ", as well as the screw " H " that fastens the crank " L ". By hitting slightly with a soft hammer on the pins " F ", displace the shaft



1= b



The feed dog has completed its horizontal movement in the slot of the needle

Fig. 59

The feed dog starts its horizontal movement in the slot of the needle plate

Fig. 58

" G " until the rows of the feed dog are in the right position, namely at the same distance from both edges of the slot. Tighten screws " E " firmly, making certain that no looseness exists between the pointed pins " F " and the feed rock shaft " G ". Before tightening the screw " H ", check adjustment " B " as explained later on.

#### 2nd Case

The rows "C" of the feed dog (Fig. 57) are not parallel with the edges of the needle plate slots. To adjust, proceed as follows: remove needle plate (as shown in Fig. 5) and slightly loosen the screws " M " (Fig. 60) which fasten the feed dog to its support. Then align the feed dog " C " as required and set it in the correct position. Place the needle plate in its receptacle and check whether the feed dog is parallel with the slots. Remove needle plate again and tighten the screws " M " firmly.

#### Adjustment " B "

If this adjustment is required, loosen the screw " H " which holds the crank " L " to the feed rock shaft " G " (Fig. 60). Rotate the shaft " G " by hand slightly toward the left or right, as required. Tighten screw " H " and check whether all parts are correctly adjusted.

- How to check the alignment between the underside of the presser foot and the teeth of the feed dog.

To make the machine feed correctly and thus to obtain a perfect seam, it is necessary that the entire bottom face of the presser foot rests fully (flush) on all teeth of the feed dog. To check whether this requirement is met, use a thin piece of paper (about 0,03" thick) in the following manner (first, however, make certain that both the presser foot and the feed dog are correctly fitted on the machine):

Turn the balance wheel by hand toward you until the feed dog rises to its highest position above the top surface of the needle plate.

Lower the presser foot until it rests on the feed dog.

Lift the presser foot somewhat, then insert the piece of thin paper successively between presser foot and feed dog at each of the four

corners of the presser foot, always lowering the presser foot fully after the paper has been inserted.

The presser foot rests properly on the feed dog when the piece of

paper is retained firmly between presser foot and feed dog at each

of the four corners of the presser foot.

If this requirement is not met, it may be due to three different causes. Namely:

The presser foot, either due to excessive wear or to improper fast

ening to the presser bar, does not rest correctly on the feed dog.

The feed dog is either excessively worn or it is not fastened pro-

perly in the machine.

There exists a combination of both aforementioned defects.

To adjust, proceed as follows:

Replace the old presser foot with a new one.

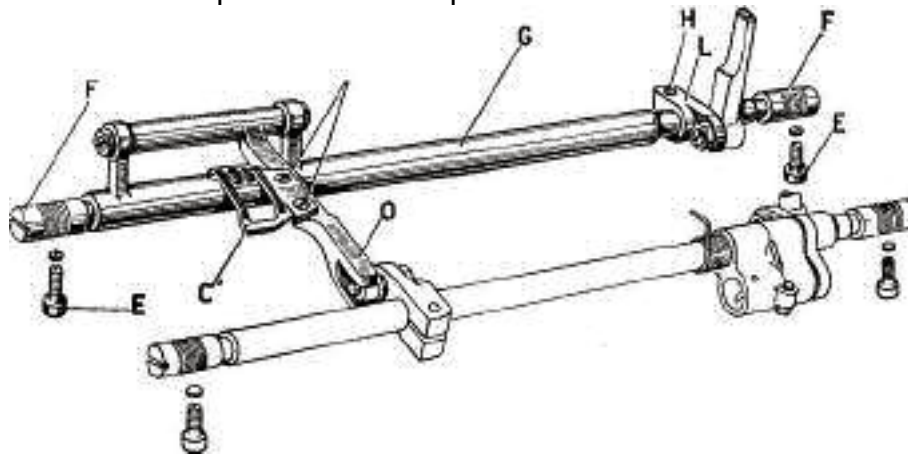
Repeat operations " a ", " b ", and " c ". If the requirement " d " is not yet met, proceed further as follows:  
Replace the old feed dog with a new one and repeat again operations " a ", " b " and " c ". Here is the procedure to follow in order to change the feed dog:

Remove needle plate (Fig. 5).

Remove the feed dog " C " by loosening the screws " M " (Fig. 60).

Place the new feed dog on its support " O " (Fig. 60) and fasten it by inserting and tightening the screws " M ".

Make adjustment " A " (2nd case) as explained in chapter " Alignment of Feed Dog in relation to the slots in the Needle Plate ". Place needle plate in its receptacle and fasten it.



M

Fig. 60

*- Minor adjustment of the feed dog.*

In case the machine, after the above described adjustments have been carried through, does not yet feed correctly, check the following points:

The pressure of the foot on the fabric is not correct. When adjust-

ing the pressure of the foot, keep in mind that:

Thick and heavy fabrics require a greater pressure than thin and light fabrics.

Light pressure is required for fine and sheer fabrics so as to prevent damage to the fabric.

The teeth of the feed dog are worn out. A visual inspection of the feed dog, and feeling the sharpness of its teeth by touching them

gently, usually is sufficient to determine whether the feed dog is worn to such a degree as to necessitate its replacement with a

new feed dog.

**HOW TO CONTROL THE PRESSURE OF THE PRESSER FOOT**

The pressure is controlled with the aid of the pressure regulating thumb No. 85322 (see Fig. 61).

By loosening the pressure regulating thumb screw, the pressure of the presser foot can be released. Make certain that the presser foot always exerts a certain pressure upon the fabric.

The pressure upon the fabric increases gradually as the pressure regulating thumb screw is turned down. The number scale in front of the face plate, in connection with the presser bar index pin No. 85325, indicates the pressure exerted at the moment by the presser bar spring No. 26050 upon the presser foot. In this connection it should be mentioned that there is a well defined though loose interdependence between the pressure imposed by the presser bar spring and the tension of the upper thread.

Namely:

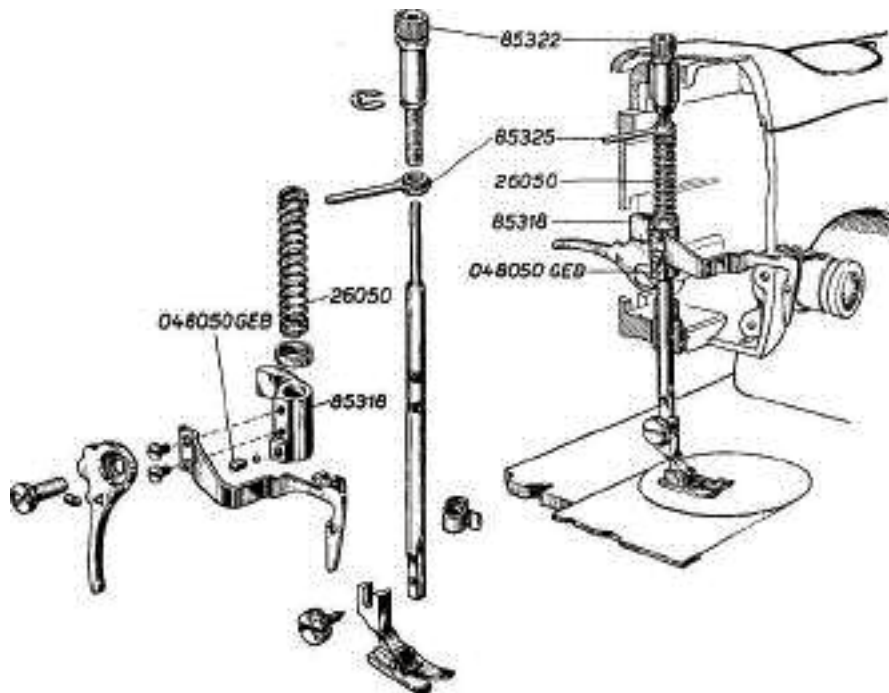


Fig. 61

while for the type of fabric in work, the tension of the lower thread must be kept constant, the pressure of the presser bar spring and the tension of the upper thread must be changed in accordance with the thickness of the type of fabric.

*- Positioning of presser bar and presser foot.*

The opening in the presser foot (hole or slot), which permits the passage of the needle, must be adjusted so that it is exactly above the outspending opening in the needle plate (Fig. 62). Should the presser foot not be positioned correctly, proceed as follows:

Slightly loosen the presser bar screw No. 048050 GEB in the presser bar guide No. 85318 (see Fig. 61).

Turn the presser foot until it is in the correct position on the needle plate.

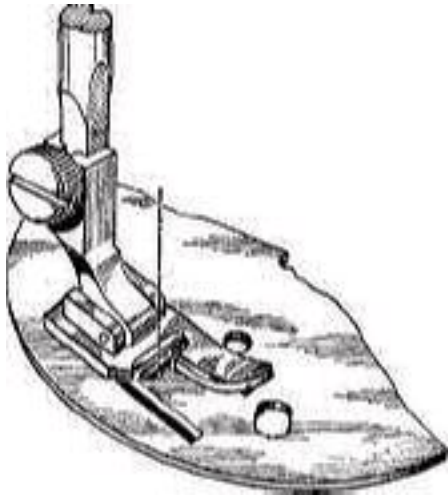


Fig. 62

Tighten the aforementioned screw firmly, first making sure that the presser bar guide No, 85318 has not shifted upward or downward from its original position, since this would bring with it a change of the pressure and the vertical position of the presser foot.

- *Height of presser foot.*

(Position in vertical direction)

The presser bar lever No. 20095 (see Fig. 63) permits three different positions of the presser foot:

The presser bar lever is entirely down.

In this instance, the presser foot rests firmly upon the needle plate (or, upon the feed dog) and there is some space " a " between the presser bar lever and the presser bar guide above (Fig. 63).



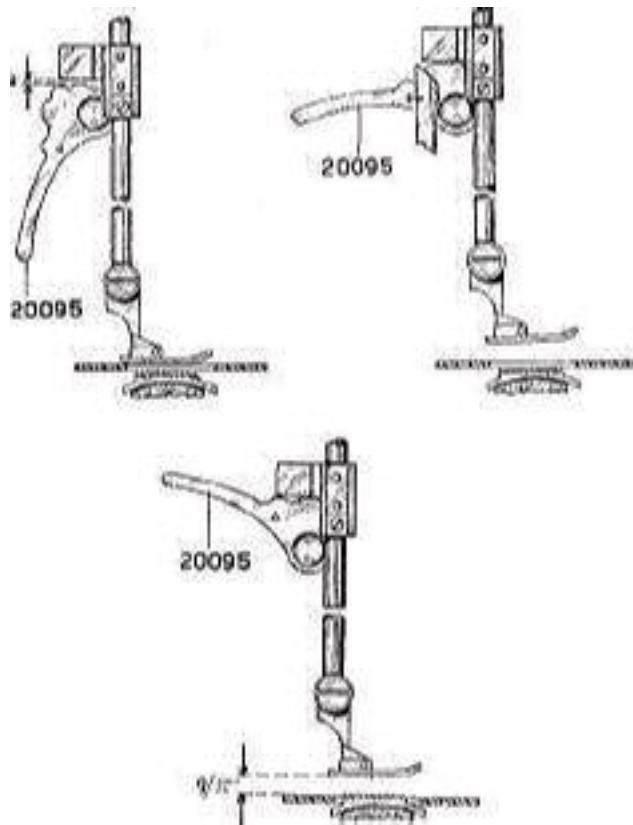


Fig. 64

Fig. 63

Fig. 65

The presser bar lever is partially raised (see Fig. 64). This is the intermediate (or embroidery) position. In this position, a white triangle in the presser bar lever lines up with a horizontal timing mark on the arm. With the lever in this position, the presser foot is kept raised just sufficiently high to permit the passage of the embroidery hoop below it, while the tension of the upper thread remains unchanged.

The presser bar lever is raised completely (Fig. 65).

In this instance, the presser foot does not rest upon the needle plate (or the feed dog) and both tension discs are separated from each other (the upper thread is under no tension). In this position of the presser bar lever, the bottom face of the presser foot should be about  $\frac{9}{32}$ " above the needle plate (Fig. 65).

## UPPER THREAD TENSION

Correct adjustment of the upper thread tension is imperative for good sewing.

To function properly, the tension discs A, B, C, D (see Fig. 66) must be kept very clean. It is not advisable to clean dirty tension discs quickly by simply drawing a rag between them. Such a procedure may shift the dirt to some hidden spot in the tension mechanism and cause the tension discs to get out of contact with each other. This occurrence, of course, will disturb the tension of the upper thread and make sewing impossible.

To clean the upper thread tension, proceed as follows: unscrew the thread tension knob first and then take off successively all other parts of this mechanism (Fig. 66). All these parts shall be cleaned thoroughly in a pan filled with cleaning fluid, and then be wiped dry. Every part must be examined thoroughly with regard to possible defects. The tension discs must not have rust spots on their contact faces, or deep grooves worn into them by the thread.

Defective tension discs must be corrected, if possible. Place the contact faces of such repaired discs together, and check whether they touch each other fully. If the tension discs, or any other part of the tension mechanism, are defective beyond repair, replace them with new parts. After having cleaned and examined all parts of the tension mechanism, replace them in their original positions. Then adjust the pressure upon the tension discs until the correct tension has been obtained.

*Note:* To clean the upper tension mechanism, it is not necessary to take it off completely; it is sufficient to unscrew the knurled knob and remove all parts that are assembled on the split stud " F ", as shown in Fig. 66.

While re-assembling these parts, make certain that check spring "E" is set in notch " S " of the bushing " G "; also make certain that the tension discs A, B, C and D are placed in the right order and their faces are set as shown in Fig. 66.

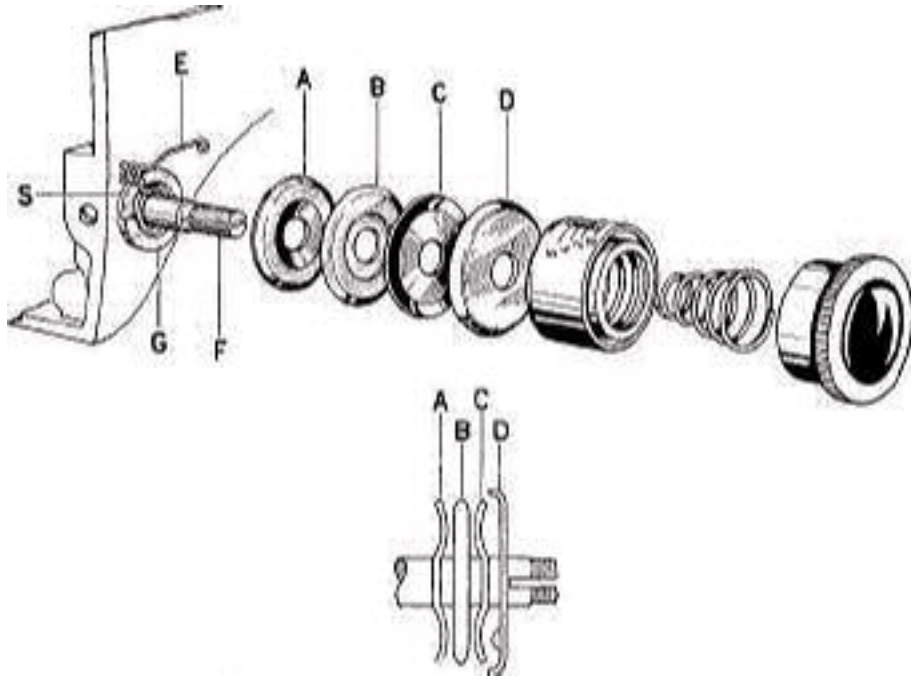


Fig. 66

1 - *The thread take-up spring (check spring) of the upper tension.*

This check spring " E " (Fig. 66) serves two purposes, namely:  
To take up and hold the slack of the upper thread, given free by the descending thread take-up lever (No. D 20033), until the eye of the descending needle has entered the fabric.

To release gently the thread which, during the finishing phase of the stitch, was required for the stitch formation, and to permit the thread take-up lever to close the stitch without tearing the fabric.

When released the check spring must occupy the position as shown in Fig. 67, namely, when the presser foot is resting on the needle plate, the vertical distance between the loop of the check spring " E " and the lever edge of thread guide " A " must be about  $\frac{23}{64}$ ". If this distance is larger or smaller adjust as follows:

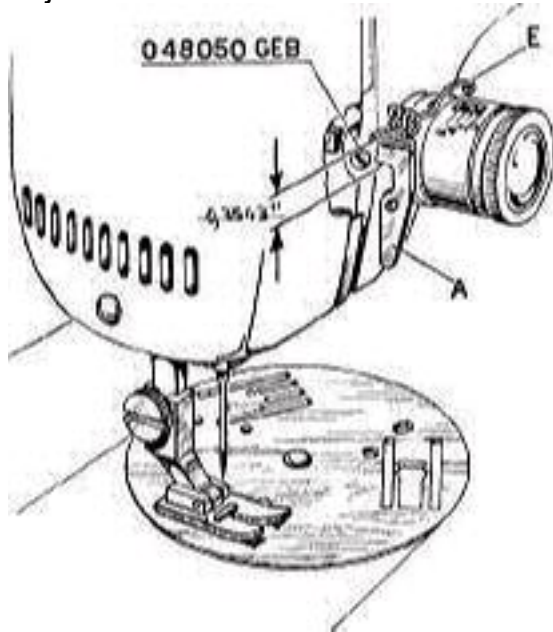


Fig. 67

Open the face plate.

Loosen screw No. 048050 GEB (see Fig. 67) which holds the tension mechanism to the machine arm.

Turn the whole tension mechanism until the check spring rea-

ches its correct position. In turning the tension mechanism, take care so as not to displace it sideways.

Fasten the tension mechanism in its new position by tightening screw No. 048050 GEB firmly.

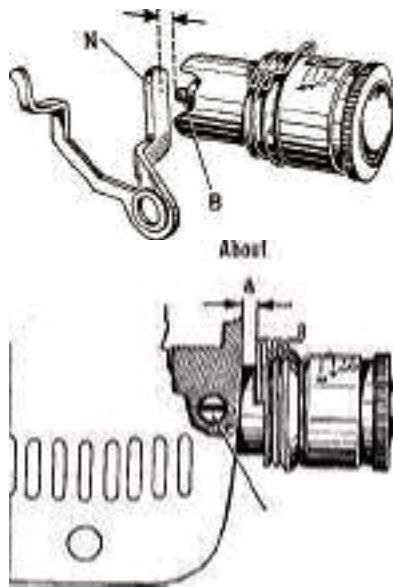
- *Positioning of the tension mechanism in relation to the hole in the arm.*

It is very important to check whether the position of the tension mechanism in relation to the hole in the machine arm is correct. Here is the procedure to follow for this adjustment:

Set the presser bar lever No. 20095 in its intermediate position (embroidery position), as shown in Fig. 64, and check whether the following requirements are met:

The disc opening rod (release rod) "B" (Fig. 68) is as close as possible to disc opening lever "N", however without touching it. The thread take-up spring (check spring) can move freely without rubbing against the machine arm (Fig. 69). Distance "a" (Fig. 69) must be about 1/16".

If an adjustment is needed, loosen screw No. 048050 GEB (Fig. 69) and move the whole tension mechanism along its axis (do not rotate it) until the requirements under paragraphs 1) and 2) are met. Then tighten screw No. 048050 GEB firmly.



04805  
0 GEB  
Fig. 68

Fig. 69

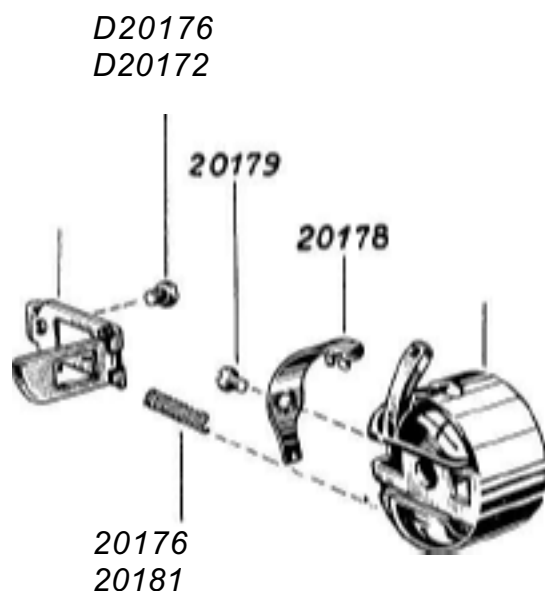


Fig. 70

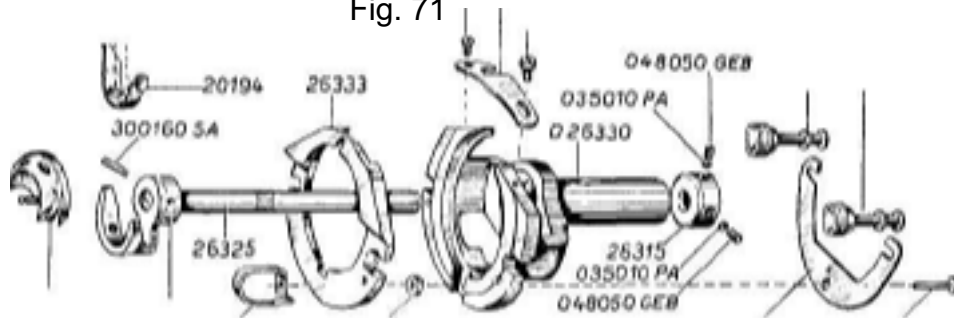
- *Tension of the lower thread (tension of the bobbin case).*

The tension spring No. 20178 in the bobbin case No. D 20176 (see Fig. 70) must place the lower thread under maximum tension when the bobbin case tension spring screw No. 20179 is completely tightened. This tension will gradually decrease when the tension spring screw is loosened. The lower thread must always be under some tension until the screw No. 20179 is completely loosened. The tension of the lower thread must remain uniform for any particular position of the adjusting screw No. 20179 and must not change while the screw remains in this position. Fig. 70 shows the bobbin case in a dismantled condition.

## THE OSCILLATING SHUTTLE

26337	26339	20/95 21330	'26335
26327		025030 FOBS	025130 FOB
20795		025030 DAB	

Fig. 71

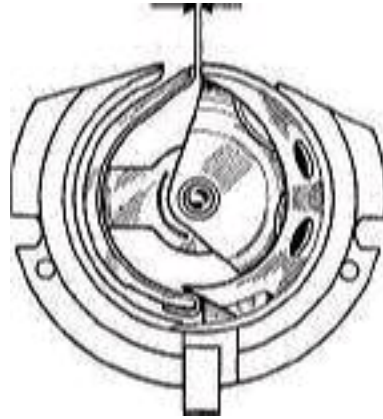


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0

h

The shuttle No. 26327 (see Fig. 71) is set in motion by the shuttle carrier No. D 26340, with the intermediate aid of the shuttle carrier adjusting spring No. 20194, and it retains its position in the race body No. D 26330 by means of the race cover No. 26333. The race cover is connected at its lower portion with the race body by means of a ring-shaped hook No. 26339 and is held against No. D 26330, the race body, with the aid of two knobs No. 26337. These knobs are under spring pressure, and thus press the race cover against the race body. By pulling both knobs away from the race cover and swinging them sideways, the race cover can be swung away from the race body, whereby the race cover will turn around the aforementioned ring-shaped hook. The shuttle then can be removed easily from the race body. When assembled with the race body, the race cover must yieldingly press against the race body. This will prevent the shuttle from jamming, should pieces of thread, dirt, etc. get between shuttle and race body while the machine is in motion. To keep the machine in good order, it is essential to clean the shuttle (as well as all other



0,012'

Fig. 72

vital parts of the stitch mechanism) frequently and thoroughly, and to remove all dirt, lint, and pieces of thread which may have accumulated in the machine. Remove also any residues (gummed oil) caused by the use of improper lubricant.

The same care must be applied to the raceway in the race body, and to the race cover. They must be cleaned frequently and thoroughly. It is also essential to keep free and clean the vertical groove (channel) in the lower portion of the race body, which serves to let any dirt, etc. escape.

A space of about 0,012" (Fig. 72) between the shuttle and shuttle carrier spring No. 20194 is required for the passage of the thread. Changes of the clearance between shuttle and shuttle carrier spring may occur when:

The shuttle carrier spring No. 20194 is deformed (for instance, due to jamming of the shuttle in the race body).



The fastening screws No. 20195 somehow have become loose. Too much play between shuttle and shuttle carrier spring will cause excessive noise and will influence the timing of the oscillating shuttle.

It is also advisable to check from time to time, whether the shuttle is still timed correctly.

Furthermore, also check whether the point of the shuttle has been blunted, or whether those portions of the shuttle over which the thread passes, have become rough due to rust or corrosion.

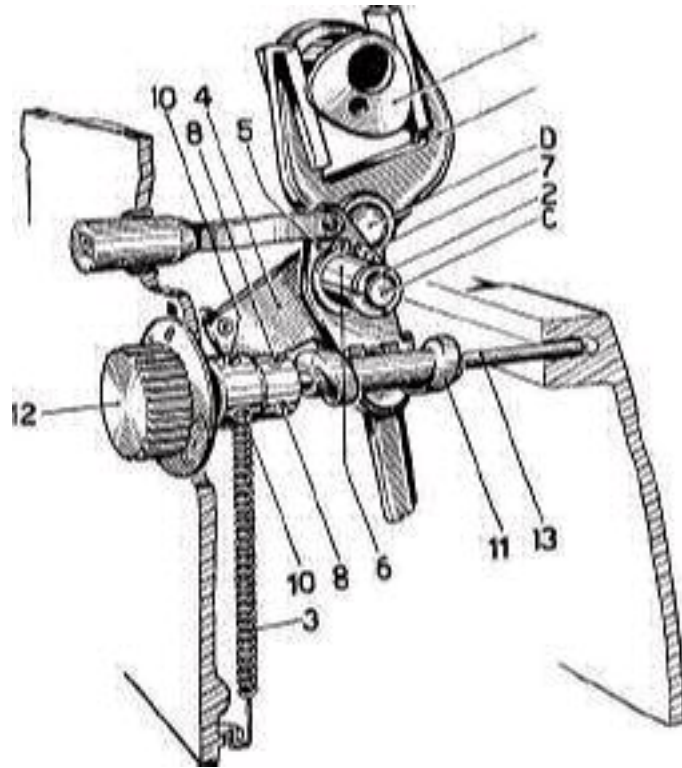
Moreover, it is also essential to check whether the inclined portion " P " of the shuttle ( " needle guard " - see Fig. 73) has been damaged (nicked) by a bent needle.

Should this have happened, it will be necessary to repair this damaged portion by smoothing it with fine emery cloth, and polishing it with crocus cloth, or on a buffing wheel, afterwards.



Fig. 73  
The shuttle will work properly after this correction.

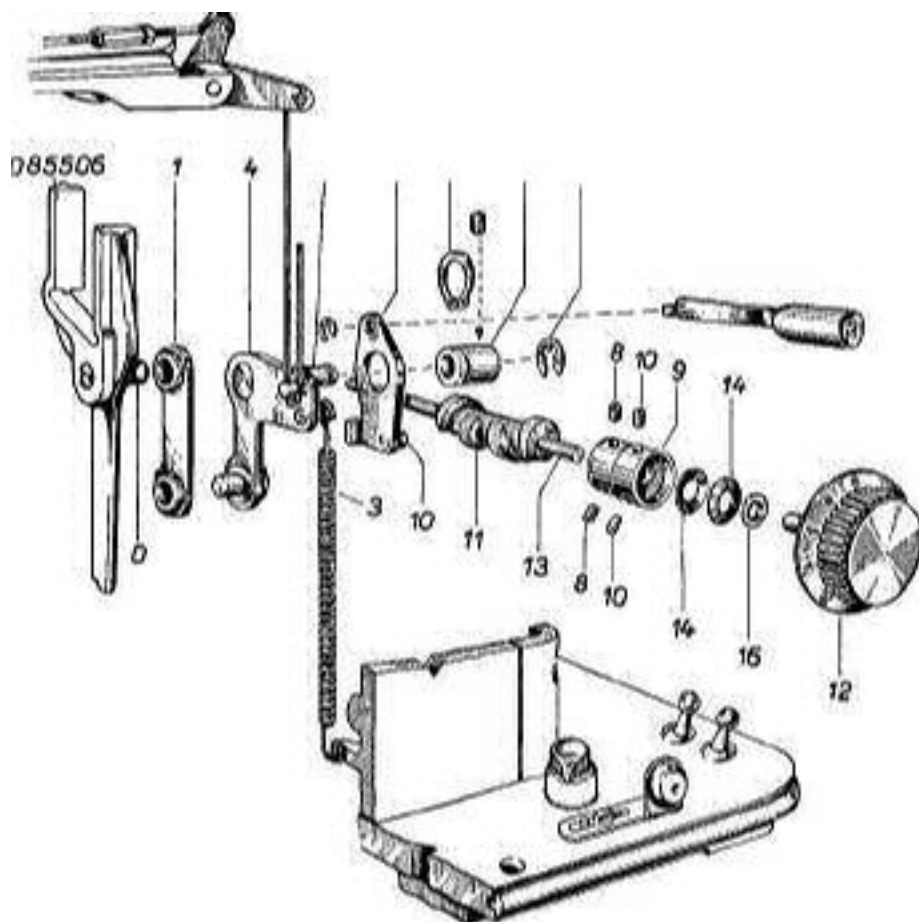
TO REMOVE THE FEED ECCENTRIC CONNECTING ROD NO. D 85506 AND THE CONNECTING RODS OF THE STITCH LENGTH REGULATING MECHANISM (FIGS. 74 AND 75)



20026 D85506

Fig. 74

Dismantle and remove from the machine the feed lifting connecting rod No. A 26345 (to loosen the nut at the end of this rod use the special wrench No. 20-1).  
Dismantle the feed eccentric connecting rod No. D 85506 (see parts list), following this procedure:



C 5 7 6 2

Fig. 75

Unscrew fully the conical screw No. 58 at the lower end of this connecting rod.

Loosen the screws No. 048080 GEB that fasten the feed eccentric No. 20026 to the upper shaft.

Move the eccentric No. 20026 (together with the connecting rod No. D 85506) toward the left, along the upper shaft, until the connecting rod is disengaged from the stitch length regulating mechanism and can be taken out from below the machine.

Disconnect spring No. 3 at its lower end (Figs. 74 and 75).

By means of the tool, shown in Fig. 47, remove the snap ring " 2 " which is holding the pivot " C " of the stitch length lever " 4 " (Fig. 74).

The stitch length lever " 4 " can be now taken out by pushing it toward the inside of the machine.

Disengage the plate " 5 " by pushing down the reverse sewing control button.

*Note.* Do not remove the bushing " 6 " with its retaining ring " 7 ". In case the replacement of bushing " 6 " should be required, care must be taken to the effect that the new bushing is placed in the right position so that the free end of the small stud in plate " 5 " (Fig. 75) is neither too close to nor too far from the stitch regulating shaft.

#### HOW TO REMOVE THE STITCH LENGTH REGULATING KNOB AND THE REGULATING SHAFT (FIG. 75)

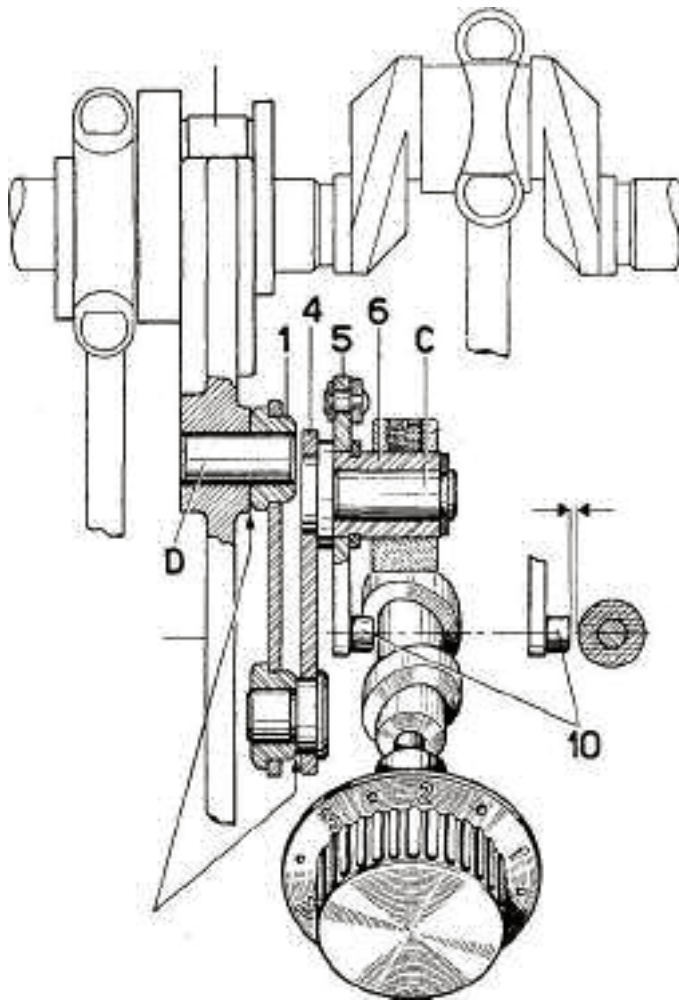
Loosen the screws "8", as well as the screws "10" on bushing " 9 ".

Take off stitch length regulating knob " 12 ". In taking off this knob, care must be taken so that washer " 16 " as well as spring washers " 14 " (Fig. 75) are not lost.

Take off the regulating shaft "11 ", along with its pin " 13 ", by drawing it toward you until the rear end of pin " 13 " comes out of its hole.

#### HOW TO REASSEMBLE THE STITCH LENGTH REGULATING KNOB AND THE REGULATING SHAFT

Take the regulating shaft " 11 " and insert the shorter end of its pin " 13 " into the bushing " 9 ", as shown in Fig. 75.



20026  
 0,011" ^ 0,015  
 D85506

Fig. 76

Insert the longer end portion of the regulating shaft pin " 13 " into the proper hole in the rear side of the arm.

*Note.* - While assembling the regulating shaft " 11 ", care must be taken that the pivot " 10 " in the reverse stitching control plate " 5 " is located between the two thread portions of the regvilating shaft, as shown in Fig. 76.

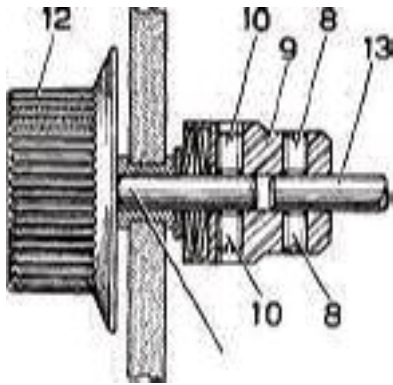


Fig. 77

Insert the pivot pin of stitch length regulating knob " 12 " into the hole in the arm so that the end of this pin is protruding slightly inside of the arm casting. Slip first onto the pin of the stitch length regulating knob, which protrudes inside of the arm, the flat washer

" 16 ", and then the two spring washers " 14 " must be positioned as shown in Fig. 77.

The bushing " 9 " which was previously on the pin end " 13 ", must now be moved along said pin until its opposite end is slipped onto the protruding pivot pin of the stitch length regulating knob " 12 ". The bushing " 9 " must be positioned as shown in Fig. 77.

Adjust the friction of the stitch length regulating knob as explained in Chapter: "Adjustment of the friction of the stitch ".

Check the timing of the regulating shaft as explained in Chapter: " Timing of the regulating shaft for the stitch length regulating knob ".

HOW TO REASSEMBLE THE FEED ECCENTRIC  
ROD NO. D 85506 AND THE CONNECTING RODS  
OF THE STITCH LENGTH REGULATING MECHANISM  
(FIGS. 74 AND 75)

1) Insert the reverse stitch plate "5 " (which is connected with the reverse stitch control button) on the bushing " 6 " which is fixed inside the casting of the arm and, at the same time, insert the reverse stitch control button into its proper hole in the arm, from the inside outwards. Proceed as follows: first insert the reverse stitch control button into its hole in the arm, and then place the plate " 5 " on bushing " 6 ".

*Note:* The reverse stitch plate must be so positioned that its pin " 10 " is located between the two thread portions of the regulating shaft, as shown in Fig. 76.

Assemble the stitch length lever " 4 " (see Fig. 75) by inserting its pivot " C " into the bushing " 6 " which is fixed to the inside of the arm casting.

*Note:* The stitch length lever " 4 " must be positioned in relation to the reverse stitch lever " 5 " as shown in Fig. 36.

Slip the retaining ring " 2 " in the groove of pivot " C " of the stitch length lever " 4 " (Fig. 75).

Assemble the feed eccentric connecting rod No. D 85506 with the stitch regulator connecting rod " 1 " (see Fig. 76) in the following manner:

Place connecting rod " 1 " (No. D 85512) on the pivot stud " D " of the feed eccentric connecting rod No. D 85506.

Slip the forked portion of connecting rod No. D 85506 (with connecting rod " 1 " hanging down on it) over the feed eccentric No. 20026.

Move the feed eccentric No. 20026, together with the connect-

ing rod No. D 85506, along the upper shaft until the hole in the lower end of connecting rod " 1 ", hanging down on the connecting rod No. D 85506, slips onto the lower stud in the stitch regulator lever " 4 " (No. D 85513).

Push the feed eccentric No. 20026 further until the connecting rod " 1 " rests against both the connecting rod No. D 85506 and the lever " 4 ". The connecting rod " 1 " must be positioned so that it is not bent and does not leave any play side ways.

Tighten the two screws No. 048080 GEB in the feed eccentric No. 20026 to fasten it to the upper shaft.

/) Connect the lower end of the feed eccentric connecting rod No. D 85506 with its component parts below the bed plate of the machine.

*Note:* After the assembly of the feed eccentric connecting rod No. D 85506, it is necessary to check the timing of the feed dog, as explained in Chapter, " Timing of Feed Dog and Needle Bar ". Assemble the feed lifting connecting rod No. A 26345 in the machine.

Connect the spring " 3 " (see Fig. 75) with the lever " 4 ".

1 - *General rules with reference to important adjustment of stitch length regulating knob and regulating shaft.*

Take out the cams, turn stitch length regulating knob at zero (turn knob counter-clockwise until it stops), then check the following points:

The zero " O " mark of the graduations on the stitch length regulating knob must coincide with the square mark on the arm above the knob.



The reverse sewing button " R ", when pressed must not move at all.

Two thicknesses of regular sewing material, when placed under the presser foot, must not move at all when the machine is operated.

In the following are given a few hints to remedy the inconveniences in case the stitch length regulating knob, or the regulating shaft are not properly adjusted:

Zero mark in stitch length regulating knob does not coincide with mark on machine arm (see chapter, " Zero Position of Stitch Length Regulating Knob ").

The reverse sewing button, when pressed moves into the machine,

even if the stitch length regulating knob is at zero (see point 1, 2, 3 and 4 of " Timing of the Regulating Shaft").

Two thicknesses of sewing material, when placed under the presser foot while the stitch length regulating knob is at zero, move

when the balance wheel is turned by hand. See adjustments under

5, 6 and 7 of chapter, "Timing of Regulating Shaft".

In case the ~~stitch length regulating knob turns too hard, or too easily,~~ see Chapter " Adjustment of the Friction of the Stitch Length Regulating Knob ",

- *Adjustment of the friction of the stitch length regulating knob.*

If the stitch length regulating knob is too loose, the friction between the two spring washers on the center pin of the stitch length regulating knob (see Fig. 77), between bushing " 9 " and the arm of the machine, must be increased.

To make this adjustment, proceed as follows:

Remove the right-hand cover (motor cover) No. 85152.

Loosen the two screws " 8 " and " 10 ".

Press together stitch length regulating knob " 12 " and bushing " 9 " with a special pair of pliers (see Fig. 78). While pressing these parts together, tighten the two screws " 8 " and then two screws " 10 " which fasten the bushing " 9 " to the center pin of the stitch length regulating knob.

After this adjustment it is absolutely necessary to check in accor-

dance with the general rules in chapter, "Adjustment of Stitch Length Regulating Knob and Regulating Shaft ».

If the stitch length regulating knob turns too hard, it is necessary to reduce the pressure between the two spring washers (see Fig. 77).

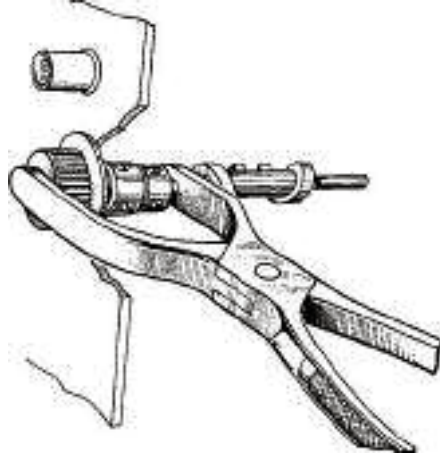


Fig. 78

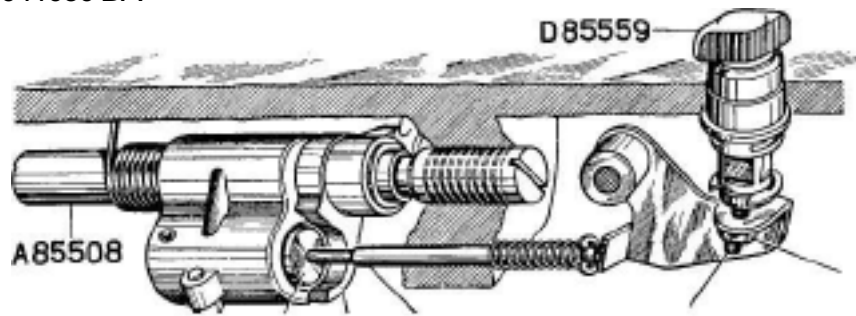
- *Zero Position of the stitch length regulating knob.*

Check whether the zero sign on the stitch length regulating knob coincides exactly with the square mark on the machine arm, when the knob is turned completely to the left (counter-clockwise). This position must be correct and is indispensable in order to obtain the maximum stitch length at position " 4 " of the knob (about 5/32").

If the zero sign of the stitch length regulating knob does not reach the mark on the machine arm, correct as follows:  
Remove right-hand (motor) cover.  
Disconnect lower end of spring " 3 " (Fig. 74) from machine arm to facilitate the adjusting procedure.  
Loosen the two screws " 8 " which hold the bushing " 9 " on the pin " 13 " of the regulating shaft.  
Do not loosen the two screws " 10 ".  
Turn the stitch length regulating knob counter-clockwise until the zero sign coincides with the mark on the arm.  
Tighten again the two screws " 8 ".  
After having made the above adjustments, it is indispensable to recheck the adjustment " c " and " d " as explained in chapter. " Important Adjustments on the Stitch Length Regulating Knob ".  
**ADJUSTMENT OF THE FEED DOG DISENGAGING MECHANISM (SEE FIGS. 79 AND 80)**

The adjustment of the Feed Dog Disengaging Mechanism has to be made with the aid of the screw No. 042090 GAB and the nut No. 041030 DA.  
When the knob No. D 85559 is completely down in the darning position, the conical part No. 85545 must come out completely from its position in part No. 85544 (see Fig. 79). In the illustrations Figs. 79 and 80 a sectional view of part No. 85544 is given to clarify these illustrations. Therefore, when the knob D 85559 is completely pressed down, then conical part No. 85545 must disengage the part No. 85544.

041030 DA



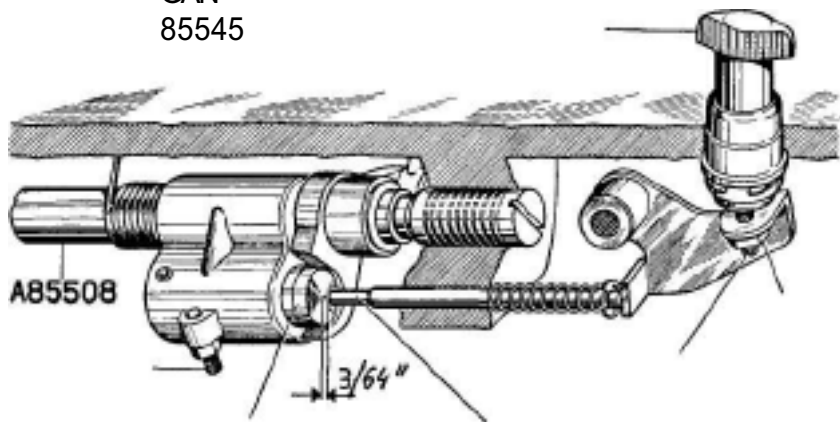
035150 GAN—^  
042090 GAB

85545' 85544 N85589  
Fig. 79

D8555  
9-  
041030  
DA  
042090  
GAB  
035150  
GAN  
85545

85589

Fig.  
80



Conversely, when the knob No. 13 85559 is completely raised (see Fig. 80), there must be a space of about  $\frac{3}{64}$ " between the push pin No. 85589 and the conical part No. 85545.

It is indispensable to make these adjustments when the machine is already completely assembled (no matter whether with or without the "Automatic").

If an adjustment has to be made, proceed as follows:

Raise the knob No. D 85559 completely upward.

Loosen the nut No. 041030 DA.

Screw (or unscrew) slightly the screw No. 042090 GAB until a minimum distance of  $3/64$ " between the push pin No. 85589 and the conical part No. 85545 is obtained.

Firmly tighten the nut No. 041030 DA.

Now, check whether the conical part No. 85545 is being pushed out completely from part No. 85544 (see Fig. 79) when the knob No. D 85559 is completely pressed down in the darning position.

If this is not the case, then the part No. 85544, and also the Feed Dog Lifting Shaft No. A 85508 are pushed too much to left (toward the needle bar). Therefore, the adjustment has to be made toward the right (toward the balance wheel).

If it is necessary to move the part No. 85544 and the shaft No. 85508 toward the right, it will also be necessary to move the Feed Eccentric No. 20026 (on the upper shaft) and the connecting rods Nos. D 85506 and A 26345 in the same direction. In this case it will be necessary again to check the timing of the Feed Dog in relation to the needle bar. When reassembling the machine, check again the adjustments a, b, c, d and e, as explained above.

The teeth of the Feed Dog must be about  $5/64$ " to  $7/64$ " below the needle plate when the knob No. D 85559 is completely pressed down. Adjust this distance with the aid of screw No. 035150 GAN (see Figs. 55 and 80).

ADJUSTMENT OF THE ECCENTRIC NO. 85663 ON THE  
NEEDLE POSITIONING LEVER NO. C 85662 (FIG. 81)

This adjustment is made in the factory during the assembly of the machine, and should not be repeated in case it should be necessary to remove this lever from the machine or assemble it again with the machine.

The readjustment of the eccentric No. 85663 is only necessary when the needle positioning lever has to be changed.

After having reassembled the machine (without the " Automatic ") with the new positioning lever and after having replaced the spring No. 85658 (Fig. 81), proceed as follows:

Set the machine for straight stitching (needle positioning lever in center position, and zig-zag width lever completely to the left). Bring the needle bar to its highest position.

Without running the machine, move the zig-zag width lever se-

veral times back and forth. If the eccentric No. 85663 is not in its correct position, the needle bar (without moving up or down) will move sidewise from left to right and vice versa.

To correct this occurrence, proceed as follows:

Loosen slightly the screw No. 035040 FG which fastens the ec-

centric No. 85663 to the needle positioning lever No. C 85662.

Insert a screw driver into the groove of the eccentric No. 85663, turn it clockwise (as explained under c) until the needle bar is not moving sideways any more.

See to it that the stud " A " of the zig-zag width lever No. A 85606 (Fig. 81) touches the adjustable eccentric.

Firmly tighten the screw No. 035040 FG which holds the eccentric on the needle positioning lever.

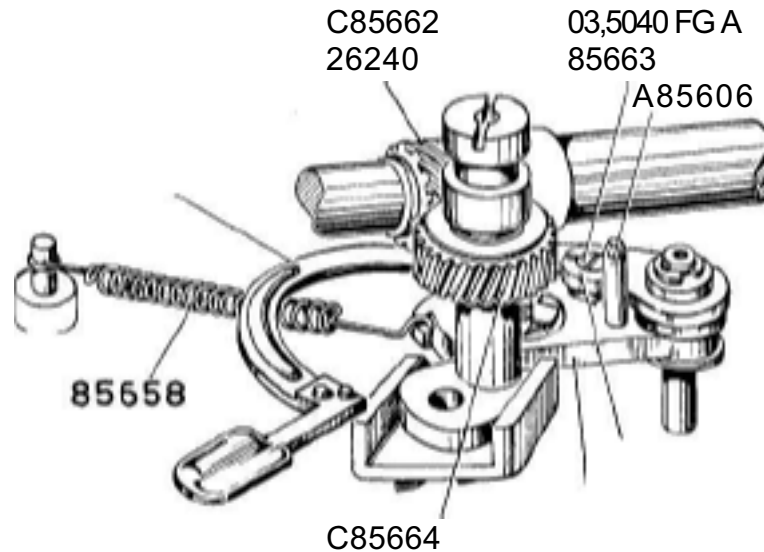


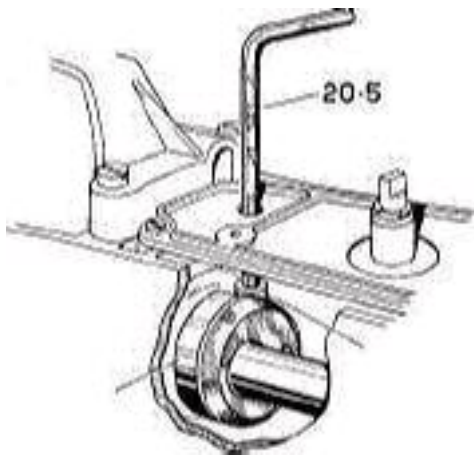
Fig. 81

The above adjustment, of course, is only valid if the vertical gear No. C 85664 (Fig. 81) is already in its proper place and the gear has not changed its correct position.

#### ADJUSTMENT OF THE AXIAL PLAY (END PLAY) OF THE UPPER SHAFT

The eccentric No. A 85241 (Fig. 82), which induces the impulses of the cam axle, is also being used for regulating the axial play of the upper shaft.

After a long time of use, the upper shaft of the machine may possibly have more axial play than is permissible. In order to eliminate this play, proceed as follows:



85279  
A85241

Fig. 82

Take off top cover and open face plate of the machine.

Pass Allen wrench (socket wrench) No. 20-5 (1/8") through the hole in the mounting plate for the automatic device (Fig. 82), and loosen slightly the screw No. 85279 on the eccentric No. A 85241. With one hand push the counterweight of the upper shaft toward the interior of the machine. With the other hand and the Allen wrench No. 20-5, push the eccentric No. A 85241 toward the shaft bearing adjacent to the eccentric.

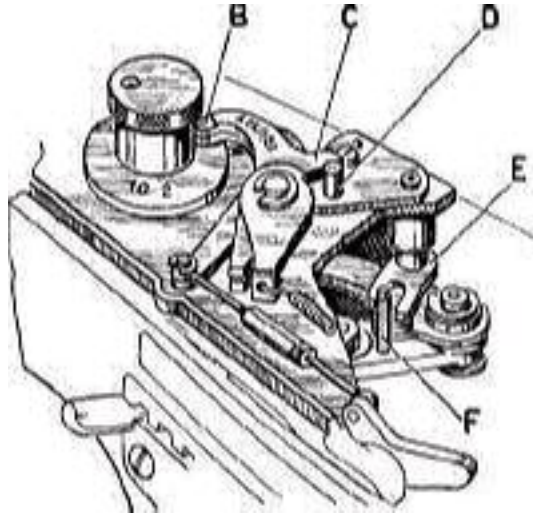
Firmly tighten screw No. 85279 and check if the axial play of the upper shaft is completely eliminated. There should be no play at all of the axial shaft and also no hard point when the balance wheel is being rotated by hand.

The adjustment mentioned above, can also be made when the mounting plate for the automatic device is removed.

The timing of the eccentric A 85241 must be checked every time the axial play of the upper shaft has been readjusted.



ADJUSTMENT OF THE CONTACT FINGERS NO. A 26/1/23  
AND NO. A 26/1/13 WHICH REGULATE THE POSITION  
OF THE NEEDLE AND THAT OF THE ZIG-ZAG  
WIDTH REGULATING LEVER



Put the end "B" of the finger A 261 23 in contact with the gauge No. 10-2 and put the rear end "C" of the finger in contact with the pin "D". The left branch of fork "E" must then be in slight contact with the pin "F".

83

This adjustment is required in order to obtain a perfect execution of the automatic designs. The adjustment has to eliminate the play between cam and needle positioning lever, and between cam and zigzag width lever.

*General rules:* Place the gauge No. 10-2 on the cam axle and move the cam disconnecting lever No. D (A 26/3/25) entirely to the left; move the zig-zag width lever to zero and check whether the contact fingers are in the position as shown in Figs. 83 and 84. To adjust proceed as follows (the machine should be completely assembled, and be at a standstill):

Place the gauge No. 10-2 on the cam axle, move needle positioning lever completely to the left, and bring the zig-zag width lever to zero (completely to the left). Now, move the cam disconnecting

Put the end "G" of the finger A 26/1/13 in contact with the gauge No. 10-2 and put the rear end "L" of the finger in contact with the pin "H". The left branch of the fork "M" must then be in slight contact with the pin "N".

Fig. 84

Lever No. D (A 26/3/25) into working position, namely, move it completely to the right, so that it is very close to the arm of the machine (see Fig. 85).

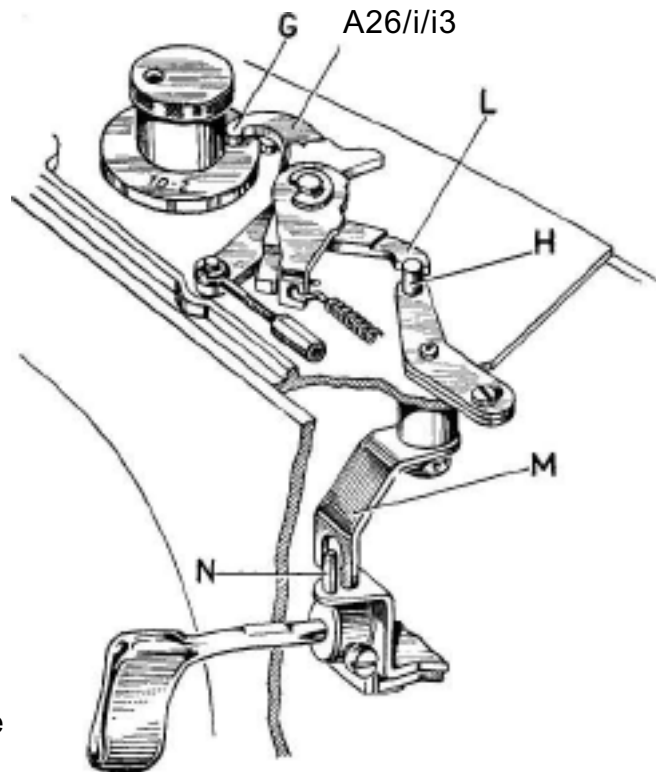
Loosen slightly the screw No. 025040

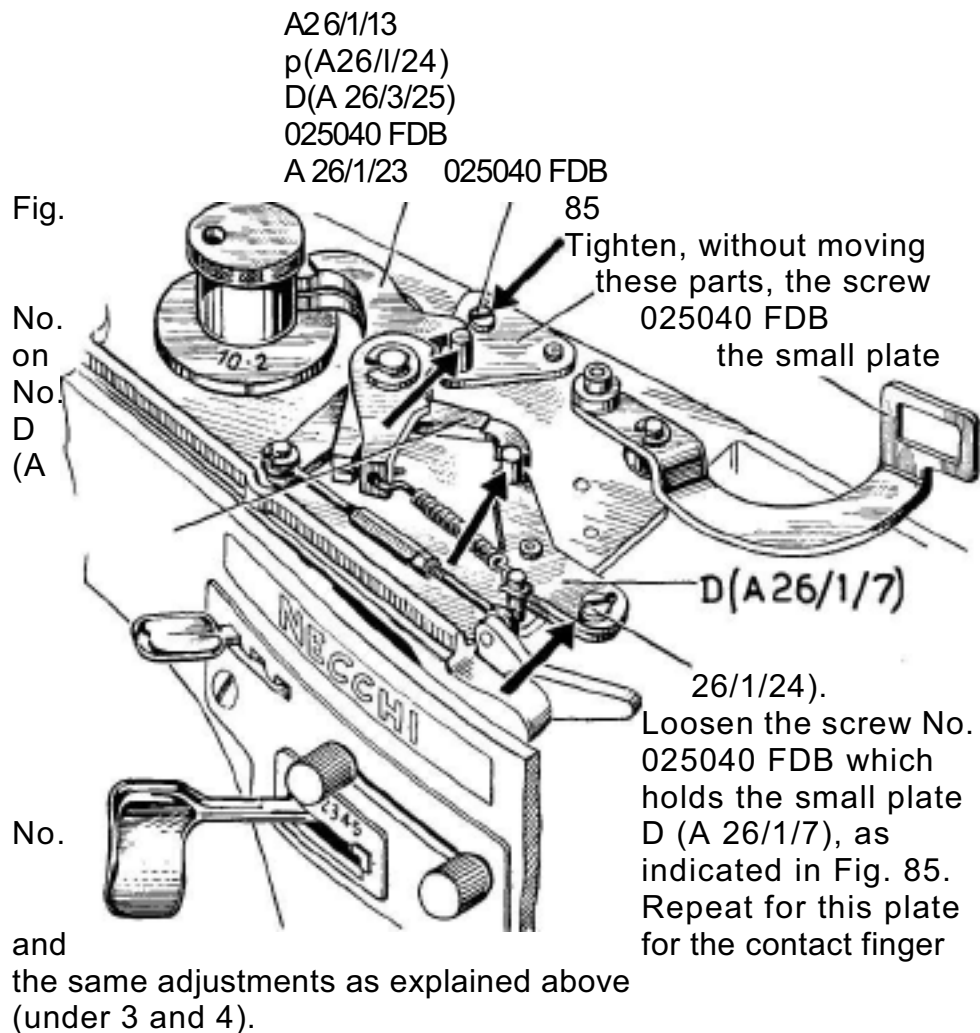
FDB (see Fig. 85) which

holds the small plate No. D (A 26/1/24), as shown in Fig. 85.

With one hand press the stud "D" (Fig. 83), which is firmly inserted in the small plate No. D (A 26/1/24) as indicated in Fig. 85, slightly against the contact finger No. A 26/1/23, so that the point of the curved portion of this finger is touching the gauge No 10-2 while the other hand (working in the opposite way) presses

the head of the screw No. 025040 FDB until a positive resistance is obtained.





ADJUSTMENT OF THE FEED REGULATING ROD (WHICH  
REGULATES THE « AUTOMATIC » LENGTH OF THE STITCH)  
NO. A 26/3/21

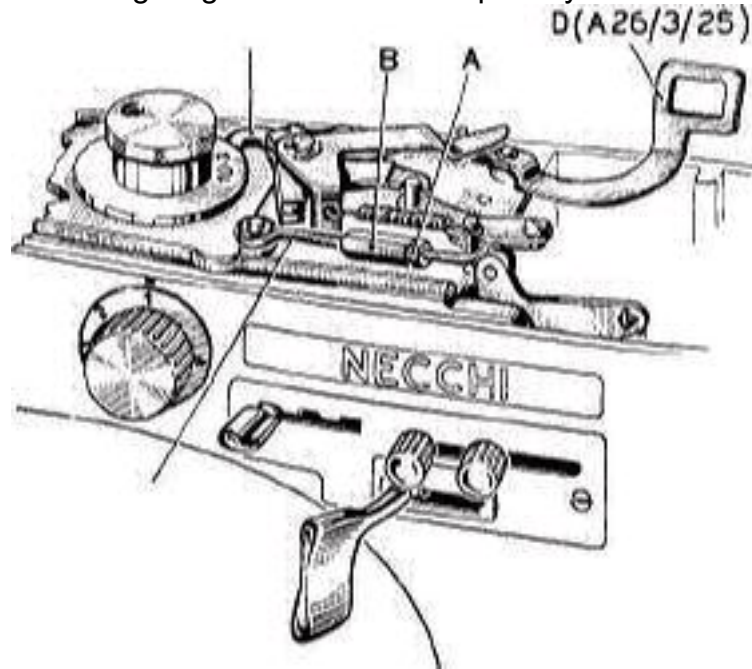
This adjustment and the one explained previously pertaining to the contact fingers No. A 26/1/13 and No. A 26/1/23, are very important in order to obtain perfect fancy stitching, and especially *the Greek Key Stitch and the automatically made buttonholes*.

Before making the following adjustments, it should be made certain that the machine is perfectly assembled, and especially that the timing of the stitch length regulating shaft is correct (see chapter "Timing of the Regulating Shaft" and "Adjustment of the Feed Dog").

Proceed now as follows:

Place gauge No. 10-2 on the cam axle (Fig. 86).

Move zig-zag width lever completely to the left.



D(A26/1/14)  
A(A26/3/2i)

Fig

The needle positioning lever may be in any one of the three positions.

Bring the cam connecting lever No. D (A 26/3/25) in working position, namely moves it entirely to the right toward the arm of the machine (Fig. 86).

Move the design graduating knob to " 1 ".

Set the stitch length graduating knob at " 4 ".

Place two thicknesses of material under the presser foot and lower the presser foot entirely.

The machine must remain in this position during the entire following adjustment.

This adjustment is divided into two parts:

*1st Part:*

Run the machine without thread. The material under the presser foot should move forward, but with a very slow, almost imperceptible motion.

*2nd Part:*

In addition to the use of Gauge 10-2 the "distance blade" should be placed between Gauge 10-2 and the feed contact finger No. D (A 26/1/14) as indicated in Fig. 87.

To insert the distance blade, swing the feed contact finger No. D (A 26/1/14) back from Gauge No. 10-2 by operating the cam connecting lever No. D (A 26/3/25). Then push the cam connecting lever back again to its normal position.

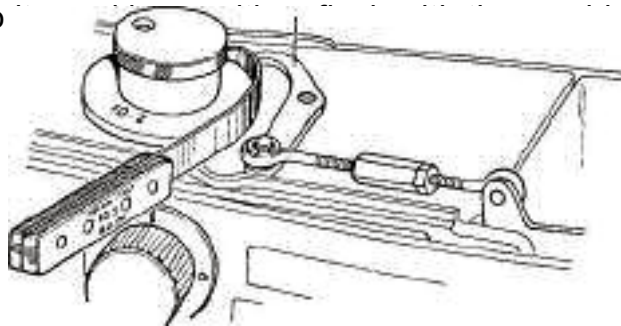


Fig.  
87

Let the machine run with the same speed as under (1), the material should not move backward with the same very slow, almost imperceptible motion as under test 1.

If the conditions put forward under the first and second part of the above test, are not met, correct them in the following way: Loosen the nut "A" (see Fig. 86), using wrench No. 20-6. Turn the counter-nut "B", either clockwise or counter-clockwise, until the desired adjustment is obtained. Usually, very little movement of the nut is required.

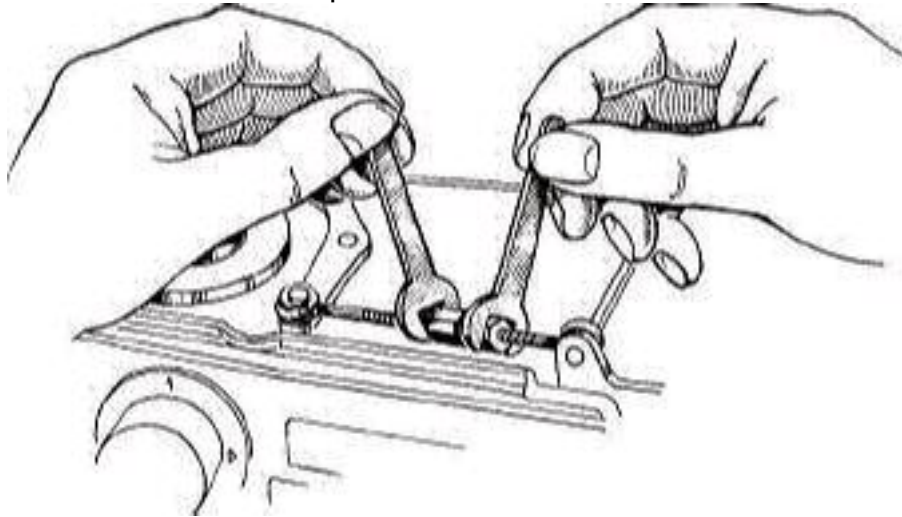


Fig. 88

The two adjustments of nut "A" and counter-nut "B" are made at the same time, using two wrenches No. 20-6 (Fig.

Tighten the counter-nut " B ".

Check again whether the requirements for the first and second

parts of the adjustment are met.

*Some troubles and their remedies.*

The machine moves backward during the first part of the test (instead of forward).

*Solution:* Loosen nut " A ", turn counter-nut " B " clockwise, which is identical with lengthening the Rod "A" (A 26/3/21), then tighten the nut " A ".

The machine moves forward during the second part of the test (instead of backward).

*Solution:* Loosen nut " A ", turn counter-nut " B " counter-clockwise, tighten nut " A ".

The machine moves forward during the first part of the test and moves backward during the second part of the test. However, the

material moves more during the first part of the test than during the second part of it.

*Solution:* Loosen nut " A ", turn counter-nut " B " counter clockwise, tighten nut " A ".

The machine moves forward during the first part of the test and moves backward during the second part of it. However, the material

moves more during the second part of the test than during the first part of it.

*Solution:* Loosen nut "A", turn counter-nut "B" clockwise, tighten nut " A ".

The adjustments by means of the counter nut " B ": are very sensitive, a very slight turn of the counter-nut " B ", therefore, is entirely sufficient.

Repeat above adjustments, if necessary.

## ADJUSTMENT OF THE NUMBER OF IMPULSES FOR EACH TURN OF THE CAM AXLE

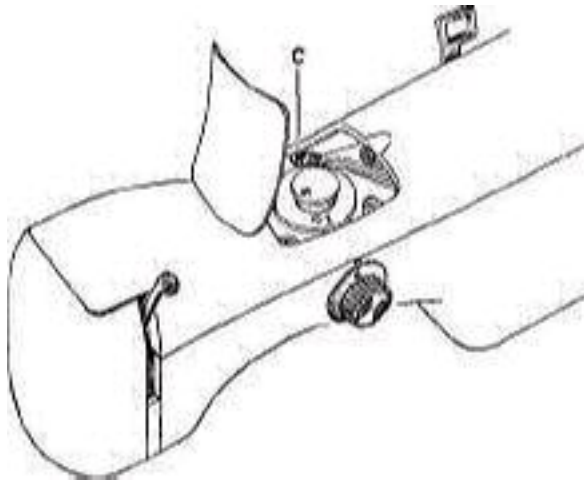


Fig H9

While the machine is operated, the cam axle (upon which the cams are placed) moves in short impulses. The cam axle makes a complete turn of 360 degrees during the completion of one design. While making this one revolution of the cam axle, a complete cycle of a design is made. During this one full turn of the cam axle about 30, 36, 60 or 150 impulses of the cam axle take place, depending on the position of the marks " 1 ", " 2 ", " 3 ", or " 4 " on the design graduating knob in relation to the mark on the machine arm above this knob.

The adjustment of the number of impulses is made at the factory and any readjustment is not necessary, even if the machine is dismantled or reassembled again. It is only when the following parts must be replaced with new ones, that the number of impulses may change and a recheck of the machine may be required: spring No. A 26/1/11, pulling drum No. C (A 26/3/6), spring sliding plate No. A 26/3/17, movement regulating ring No. D (A 26/3/15). The number of impulses which the cam axle completes during one turn of 360 degrees must then be checked again by following this procedure:



Set the design graduating knob at " 4 ".

Turn the balance wheel by hand (or let the machine run very slowly, holding the balance wheel back) and count the number of impulses which the cam axle receives during one full turn of 360 degrees. If the number of impulses is between 135 and 165, the adjustment is correct.

If the number of impulses is under 135, correct as follows:

Turn the balance wheel by hand and bring the thread take up lever to its highest position; set the design graduating knob at " 4 " (see Fig. 89).

Pull the cam connecting lever No. D (A 26/3/25) to its working position (toward the arm of the machine), so that the screws " A " and " B " are fully visible (see Figs. 89, 90 and 91).

Loosen slightly screw " A ", and also loosen very slightly " B ", move the graduation pointer " C " slightly toward the " plus " sign (see Fig. 90).

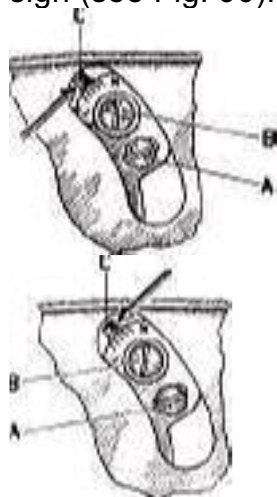


Fig.  
90

Fig. 91

Now tighten screws " A " and " B ". d) Check again the number of impulses as explained previously under

If the number of impulses is still under 135, repeat the adjustments " A ", " B ", " C " and " D ". If the number of impulses is more than 170 (for each turn of the cam axle), proceed as explained in the second test.

If the number of impulses, which the cam axle makes during one full turn of 360 degrees, is more than 165, correct as follows: Turn the balance wheel by hand and bring the thread take-up lev-

er to its highest position; set the design graduating knob at " 4 " (see Fig. 89).

Shift the cam connecting lever No. D (A 26/3/25) to its working position (toward the arm of the machine), so that the screws "A" " B " are fully visible (Figs. 89, 90 and 91).

Loosen slightly screw " A ", and loosen also very slightly screw " B ". Move the graduation pointer " C " slightly toward the " minus " sign (Fig. 91).

Now, tighten screws " A " and " B ".

Check again the number of impulses of the cam axle during one turn

of same, as previously explained under (2).

If necessary repeat adjustments " A ", " B ", " C " and " D ".

The adjustment of the graduation pointer " C " is very sensitive, therefore, very slight changes of its position are required.

*Horn to count the number of impulses of the cam axle.*

The following instructions will help you to facilitate this procedure:

Place the cam " 0 " (zero cam), or the gauge cam No. 10.2, on the cam axle (instead of the regular cams).

With a pencil, mark a short line on the zero cam (or the gauge cam No. 10.2) and then mark another short line on the mounting plate of the "Automatic " device (see Fig. 92).

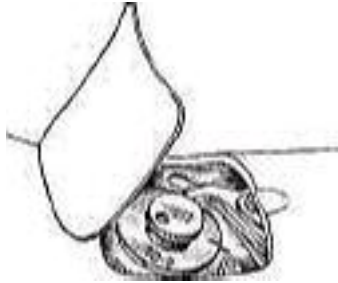


Fig. 92

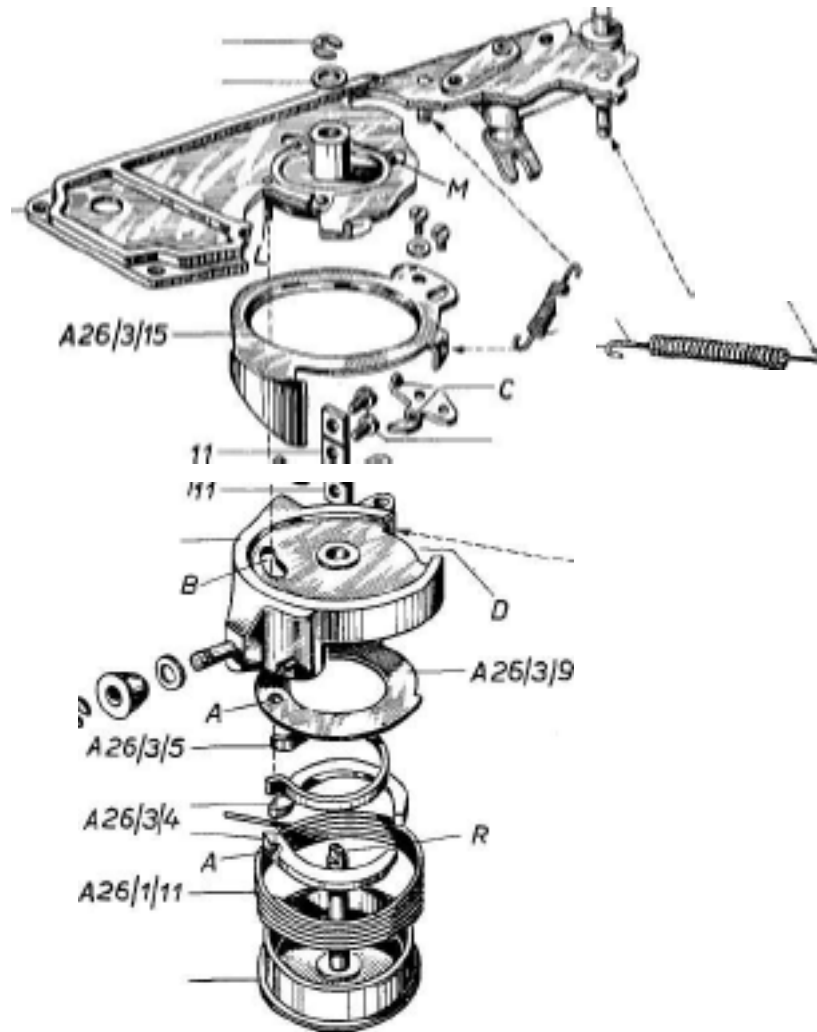
Turn the balance wheel by hand and count, one by one, the number of impulses made by the cam axle. Stop the machine when the cam axle has made a full turn of 360 degrees (when the mark on the gauge cam No. 10.2 is again in line with the mark on the mounting plate for the "Automatic").

Instead of turning the balance wheel by hand, the machine may also be run with the aid of the motor. In this case, however, one hand should be placed on the balance wheel to slow down the machine in order to distinguish and to count the number of impulses.

ASSEMBLING THE PARTS UNDERNEATH THE MOUNTING  
PLATE NO. C(A26/1/1) OF THE AUTOMATIC DEVICE  
(FIG. 93)

400090BZ  
A 26/3/14-  
C(A26/1/1)  
A26/3/i8

C(A26/3/i)  
A26/3; C (A  
26/3/6)



035080  
FOB A

26/3/12

Fig. 93

Fig. 93 shows how the various parts of the Automatic Device have to be assembled. In the following are indicated a few steps on how to assemble each single group.

*Preparation of assembling the group as shown in Fig. 94.*

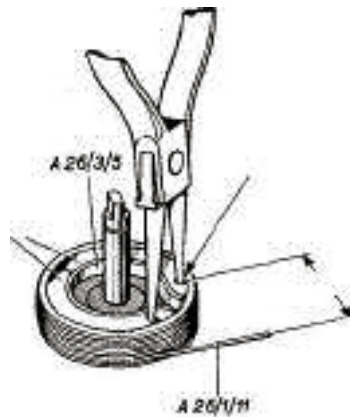
Place the two brake shoes No. A26/3/4 inside of the lower pulling drums No. C(A26/3/1), shown in Fig. 93.

Next, place the brake spring No. A26/3/5 (see Fig. 93) between the two brake-shoes (using a thin-nosed pair of pliers to bend the spring ends together).

Place the pull-spring (transport spring) No. A26/1/11 on the outside of the lower pulling drum No. C(A26/3/1).

This spring cannot be placed onto the pulling drum all at once. Slip on spiral after spiral. Make sure that the spirals are close to each other, without overlapping, and that they all stay close to the cylinder of the pulling drum.

By means of a thin-nosed pair of pliers, push the two brake-shoes No. A26/3/4 toward each other and then move both brake-shoes at one time until the distance between the protruding end of Spring A26/1/11 and the Hole " A " is equal



Hole A

A 2 6/3/4

About 0,703"-

to about 11/16". The Hole " A " is the one of the two holes on the brake-shoes which is at a greater distance from the end of Spring No. A26/1/11.

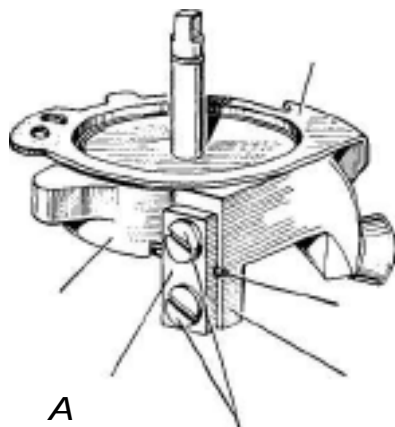
This adjustment is necessary in order to ensure that Hole " A " is visible through the Window " B " (Fig. 97) on Drum No. C(A26/3/6) during the subsequent assembling operations.

*Preassembling of group Fig. 95.*

Place the thin washer No. A26/3/9 (Fig. 96) above the already prepared group, as shown in Fig. 94, so that the small hole "A" of this washer is exactly above the hole "A" of assembly Fig. 94. Place the washer on assembly Fig. 94 as shown in Fig. 96. If during this assembly procedure the position of the hole in the washer should move, check its position again and rectify it, if necessary.

**A 26/3/15**

Round side of the  
pulling drum No. C  
(A26/3/6)



End of spring No. A 26/1  
11

Flat portion "O" of drum  
No. C (A26/3/6)

**A**  
**26/3/11**  
**035080FDB**  
Fig. 95

Place the upper pulling drum No. C(A26/3/6), which acts as a cover, over the already assembled group so that the flat portion "O" of this drum (see Fig. 95) will rest lightly (without force) against the spring No. A26/1/11. Tighten the spring No. A26/1/11 to the drum No. C(A26/3/6) by means of the small plate No. A26/3/11 and the two screws No. 035080FDB (see Fig. 95). Tighten these two screws thoroughly.  
NOTE: If the two brake shoes (Fig. 94) are assembled correctly, the two holes "A" of the brake shoe No. A26/3/4 and of

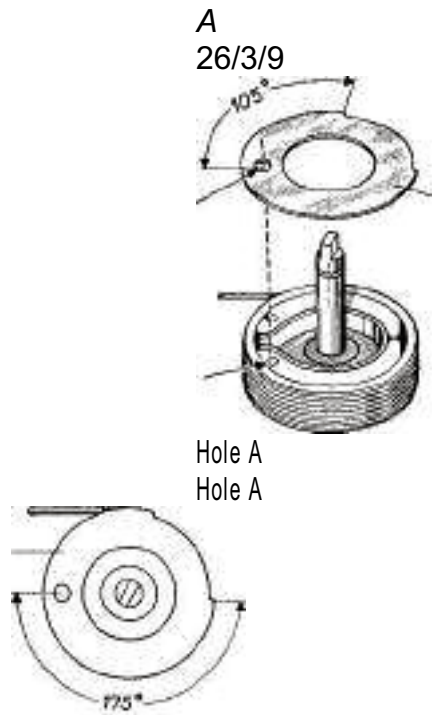


Fig. 96

A26J3/9

The washer No. A26/3/9 are seen above each other through the oblong hole " B " of the upper pulling drum No. C(A26/3/6) as indicated in Fig. 97.

If the thin washer No. A26/3/9 should have moved, push it (with a pin) into a direction so that the two aforementioned holes are just above each other.

Place the movement regulating ring No. A26/3/15 (see Figs. 93 and 95) over the upper pulling drum No. C(A26/3/6), center it perfectly and locate it so that the stop " C " (Fig. 93), which is attached underneath the movement regulating ring No. A26/3/15, is positioned within the opening " D " of the upper pulling drum No. C(A26/3/6) shown in Fig. 93.



*How to adjust the group of Fig. 95 in the mounting plate No. C(A26/1/1) for the automatic device (see Fig. 98).*  
 Make certain that the two holes " A " (Fig. 96) coincide and are visible in the window " B " (see Fig. 97) of the upper pulling drum No. C(A26/3/6).  
 NOTE: The stud " L " (see Fig. 98) of mounting plate No. C(A26/1/1) must enter into both holes " A ".

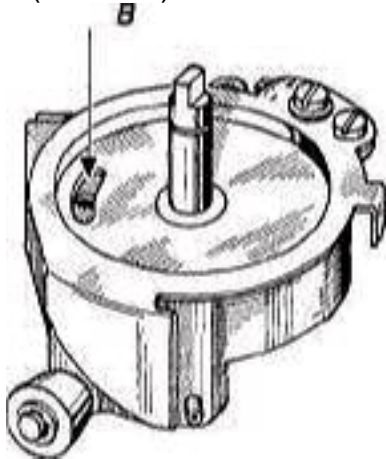


Fig. 97

Take group of Fig. 95 in your left hand, holding it as its lower portion, and with your right hand place the " Automatic " plate No. C(A26/1/1) over it.

Make certain that the cam axle " R " enters the cam axle bearing " M " of the " Automatic " plate and the stud " L " enters, through window " B ", into both holes " A " of Fig. 96.

Place distance washer No. A26/3/14 on top of cam axle as shown in Fig. 99.

Secure cam axle by means of retaining ring No. 400090BZ.

/) Hook on the springs No. A26/3/18 and No. A26/3/12 as shown in Fig. 100.

C (A 26/i/i)

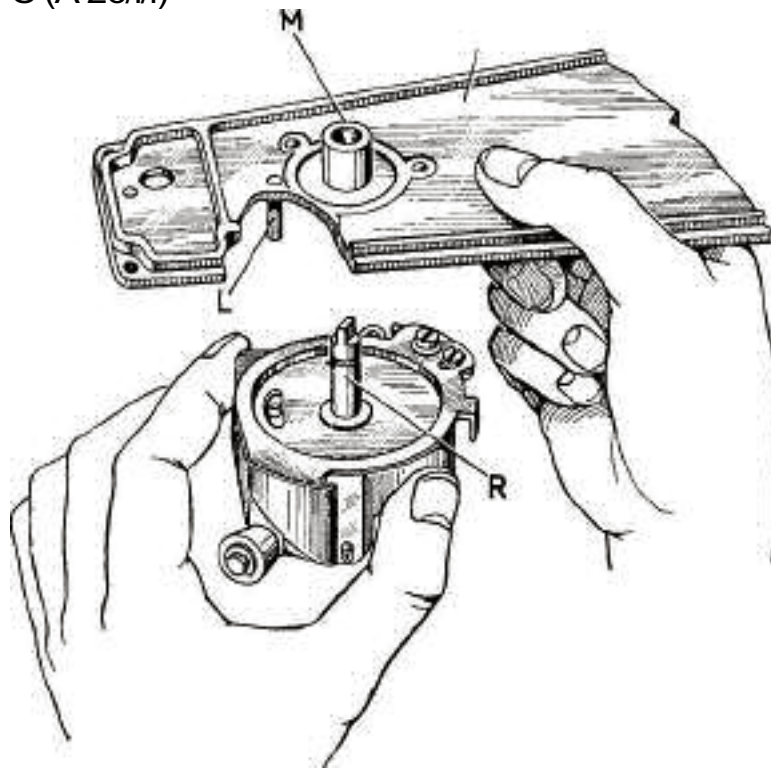


Fig.

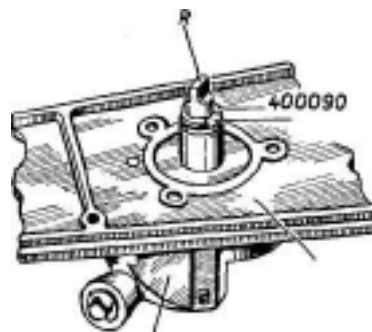
The most important points to be watched when assembling this group are as follows:

Make certain that the stud "L" of the "Automatic" plate (see Fig. 98) has entered the hole "A" indicated in Fig. 94. This hole is the one farthest away from the end of the spring No. A26/1/11. The windings of the pull spring No. A26/1/11 must not overlap each other. Furthermore, the end of this spring, which is tightly held by the small plate No. A26/3/11, must not touch the round portion of the upper pulling drum No. C(A26/3/6).

Before hooking on the two springs Nos. A26/3/18 and A26/3/12 the assembled automatic device, check with a finger whether the movement regulating ring No. A26/3/15 moves freely in each direction.

Before inserting the retaining ring No. 400090BZ (Fig. 99), which keeps the entire lower portion of the Automatic device on the mounting plate No. C(A26/1/1), use one (or more) distance washers No. A26/3/14 to eliminate any axial play of the cam axle.

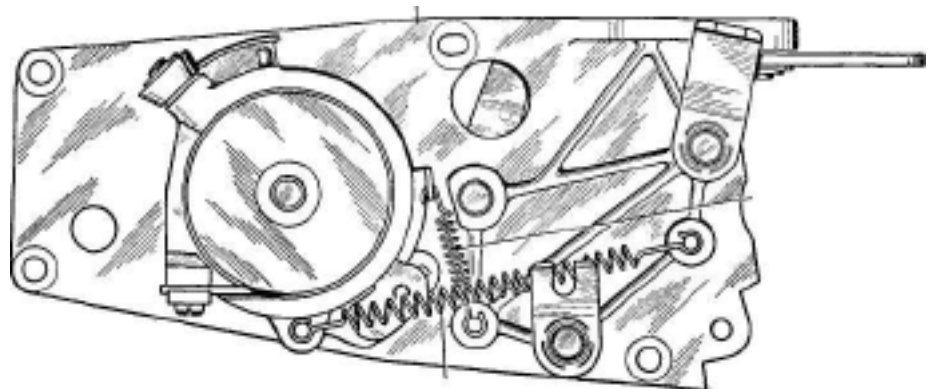
BZ 'A  
26/3/14  
C(A26/



1/1)  
A  
26/3/15  
Fig. 99

C(A26/1/1)

A 26/3/18



A 26/3/12  
Fig.  
100

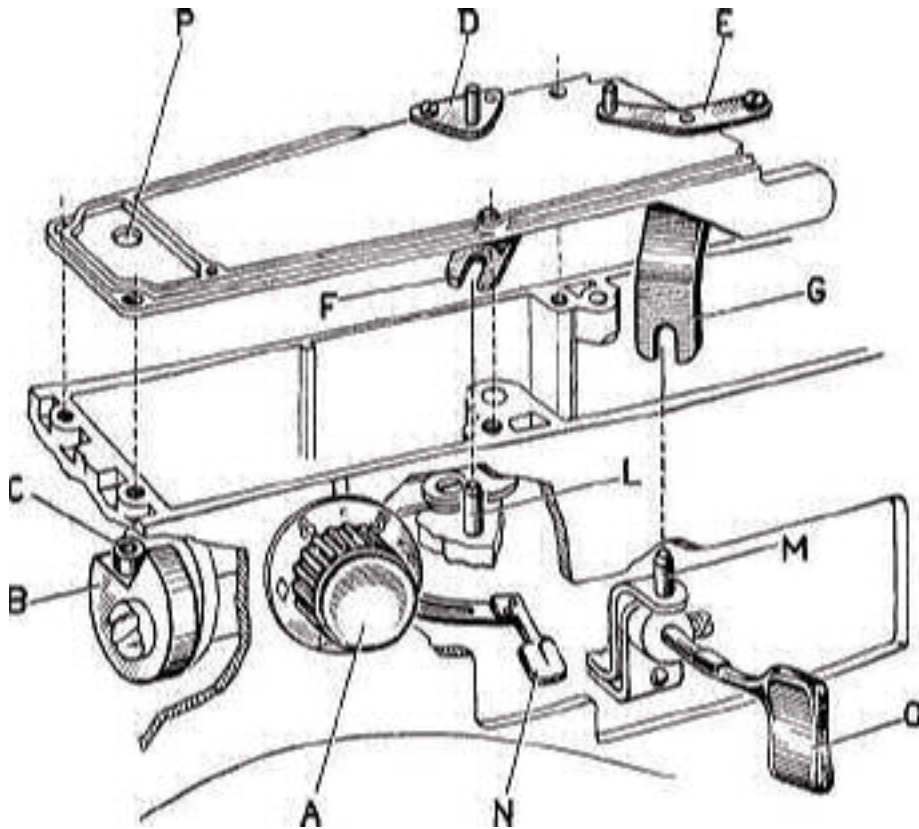


Fig. 101

To replace the mounting plates proceed as follows:

Turn the design graduating knob " A " between " 3 and 4 ".

Turn the flywheel toward you so that the eccentric " B " with the larger part is facing backward (in this position the head of the screw " C " (Fig. 101) is upward and is visible through the hole " P " in the " Automatic " mounting plate).

Bring the zig-zag lever " O " and the needle positioning lever " N " completely to the left.

Hold the " Automatic " mounting plate with the left hand and with the right hand move the two pin levers " D " and " E " so

that the two forks " F " and " G " are completely to the left. Bring the mounting plate above the machine arm so that the 4 holes in the plate are facing the corresponding screw holes in the machine.

/) Fit the " Automatic " mounting plate into the machine in such a way that the two forks " F " and " G " will couple correctly with the corresponding pins " L " and " M ".

Tighten the 4 screws in the corresponding holes.

#### TAKING CARE OF THE SEWING MACHINE MOTOR

Only a little care is required to keep the sewing machine motor in order for many years of good use, The following are the most frequent causes for inferior service from the sewing machine motor, and suggestions on how to prevent and remedy them:

*Motor does not run at all or runs only sluggishly.*

The above deficiency may be caused by the following circumstances:

1) a) The electric cords are defective, loosely connected, or not

Connected at all.

The electric plugs, the fuse, or the wall outlet are defective.

The motor brushes are worn, or the brush springs are excessively compressed or broken (see section " How to replace the motor brushes ").

The rheostat (motor control) is out of order.

Check all of the above items, remedy any defects, if possible; or replace defective parts with new ones.

The belt between motor pulley and balance wheel of machine is too tight. Loosen the two bracket screws " A " and " B "

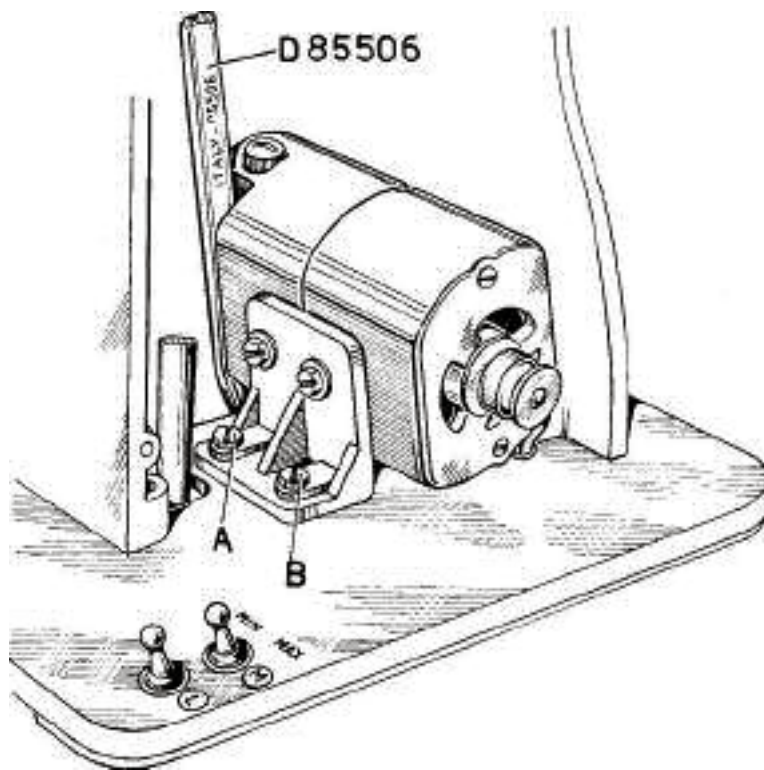


Fig. 102

(Fig. 102) and shift motor bracket until belt has just enough tension to pull the machine. Tighten the two bracket screws. Commutator of motor is dirty. Clean connector with cleaning fluid; then wipe it thoroughly dry.

*How to replace the motor brushes.*

The motor brushes are replaced in the following way:

Loosen and remove the motor cover of the machine.

Loosen and remove the two screws " A " and " B " which hold the motor support on the base of the machine.

Take the motor out of the machine, but do not pull out the motor cable from the hole in the bed plate (Fig. 103).

Unscrew the two cups " C " and " D " (Fig. 104) which hold the brushes, and replace the old brushes with new ones.

Replace the two cups " C " and " D ".

Place the motor back into the interior of the machine.

While replacing the motor into the machine take care that: the feed eccentric connecting rod No. D 85506 (Fig. 102) does

not touch the motor casing,

the motor belt is sufficiently tight Align the motor with the two screws " A " and " B " (Fig. 102),

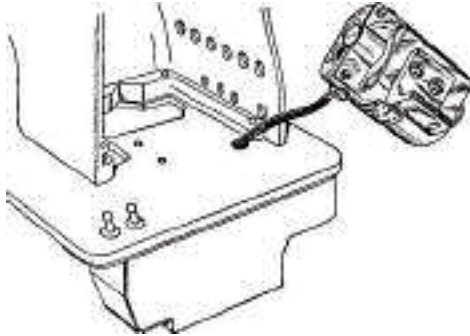
Fig. 103

the motor pulley is aligned with the belt groove of the balance wheel to avoid the belt being worn out on one side only.

Adjust

the motor position, if necessary, by means of the two screws " A "

and " B ".



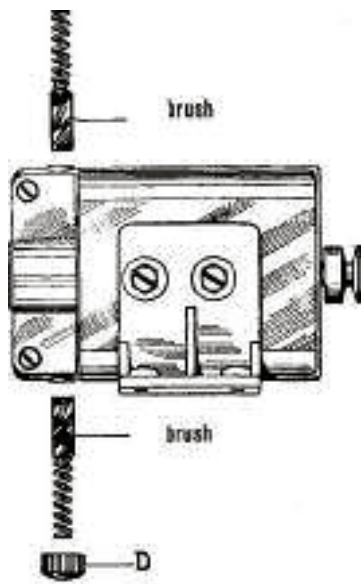


Fig. 104

m—c

*Motor turns tightly.*

Motor shaft is bent due to:

Motor having been dropped,

V-belt having been forced over the motor pulley after motor was mounted in place on the machine.

Handle motor carefully to prevent above defect. Have defective motor repaired.

Motor bearings are gummed due to use of improper oil. Have bearings cleaned with cleaning fluid. Motor must be thoroughly dry before running it again.



Oiling of motor: use only high grade sewing machine oil. Apply one or two drops of this oil into each bearing oil hole every two or three months. Do not use vegetable oils. Before oiling, clean lint from oil holes with a pin.

D. *Motor runs, but does not pull machine.*

Belt slips. This will occur if:

belt between motor pulley and balance wheel is excessively stretched;

motor pulley is too close to balance wheel;

motor bracket screws, or motor fastening screws, are loose;

there is oil between belt and motor pulley or between belt and balance wheel.

Replace worn belt; adjust motor bracket; tighten all motor mounting screws; wipe oil thoroughly from belt, balance wheel and motor pulley.

motor pulley too loose on motor shaft. Tighten screw in motor pulley.

*Motor is weak.*

Some armature wires are broken. Tampering by inexperienced persons may cause this defect. Use the same (original) motor fastening screws. Avoid longer screws. Longer screws may damage the wiring in the motor.

*Motor gets too hot.*

Belt between motor pulley and balance wheel is too tight and overloads the motor. Shift motor bracket until belt has just enough tension to pull the machine; tighten bracket screws.

Lack of lubrication. Lubricate both motor bearings as advised above.

*Motor smokes or emits a burning smell.*

Motor is overloaded due to excessive belt tension. Adjust belt tension as advised above.

Motor is not oiled at all; wrong lubricant has been used; motor is over oiled; oil on commutator. Have motor thoroughly cleaned as suggested above.

Motor runs tightly due to bent shaft. Have motor repaired.

*Motor runs noisily or groivls. Rattling noise during sewing.*

Motor pulley is not in perfect alignment with balance wheel of machine. Adjust motor pulley on motor shaft until belt runs straight up to balance wheel.

Motor hums while machine is not sewing. Rheostat control lever gets stuck in a depressed position. Check rheostat and free the motion of the control lever.

Motor pulley is loose on motor shaft. Tighten screw in motor pulley.

Motor bracket too loose on machine, or motor too loose on motor bracket. Tighten firmly all fastening screws which hold the above parts in place.

It must be emphasized that all motors on our machines are carefully made, inspected and tested. Therefore, handle each motor with care; do not dismantle or tamper with it, unless you are thoroughly acquainted with its construction. Do not damage or scratch the motor housing; do not drop the motor.

Do not make a motor entirely useless by unnecessarily damaging it beyond repair.