

NECCHI

**510-512
513-515**

SERVICE MANUAL

FORWARD

All mechanical products — and particularly the high precision ones — must undergo an accurate control before being delivered to the customer in order to eliminate any possible defect which may derive from storage or rough handling in transit. A good mechanic, when unpacking a new machine, will lubricate it thoroughly with a mixture of 90 % Kerosene and 10 % NECCHI oil, operating the machine for several minutes in order to expel possible dust, dried oil or lint from the various parts. The machine should then be dried with a rag and lubricated with NECCHI oil. If the machine is equipped with an electric motor, care should be taken, during the above operation, to protect the motor from the lubricating mixture. The mechanic will then control the perfect smoothness of the machine and carry out the fundamental

tests which ensure its perfect operation, correcting, when necessary, the adjustment of the various mechanical groups.

This manual has been prepared on the assumption that the mechanic is perfectly acquainted with the contents of both the "Instruction Booklet", accompanying our sewing machines, and the "Spare Parts Catalogue", which is distributed throughout our organisation.

Consequently, we will not describe the normal operations concerning the dismantling and reassembly of the various parts which comprise the machine.

We will deal only with those operations which we think are particularly difficult and which cannot be deduced from a simple examination of the above publications.

PART I – STRAIGHT STITCH SEWING MACHINES

NEEDLE–SHUTTLE

CENTERING NEEDLE INTO NEEDLE PLATE HOLE

The centering is performed at the factory by means of special gauges when coupling the bed plate with the arm of the machine.
In fact both the needle plate position on the bed plate and that of the needle bar in the arm are fixed and cannot be further adjusted.
It must be borne in mind that, since the distance

between the needle and the shuttle must always be constant, whenever inserting a small size needle into the needle bar (fig. 1) its position will be eccentric with respect to the needle plate hole, whereas only by inserting a large size (110-120) needle (fig. 2) will a perfect concentricity be obtained between needle and hole.
Carefully check that the needle is not curved or blunt in order to avoid stitch skipping and thread breakage.

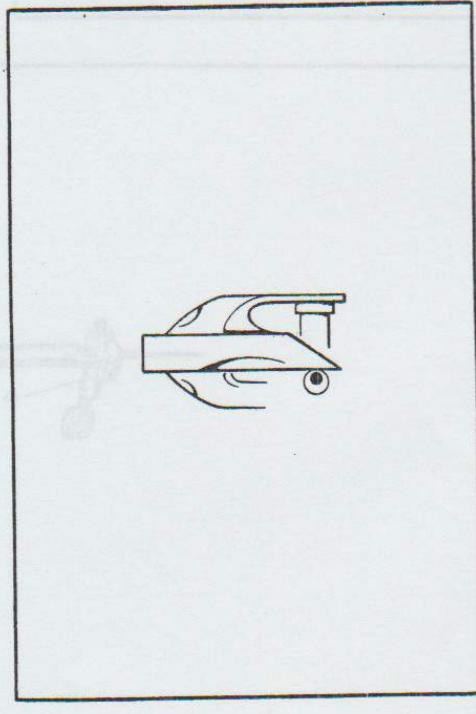


Fig. 1

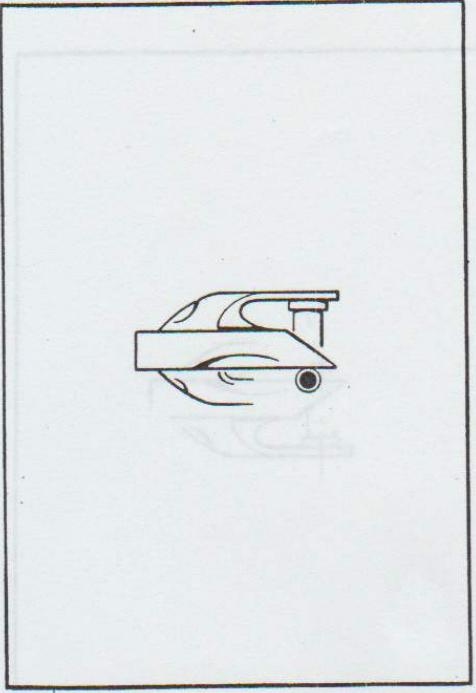


Fig. 2

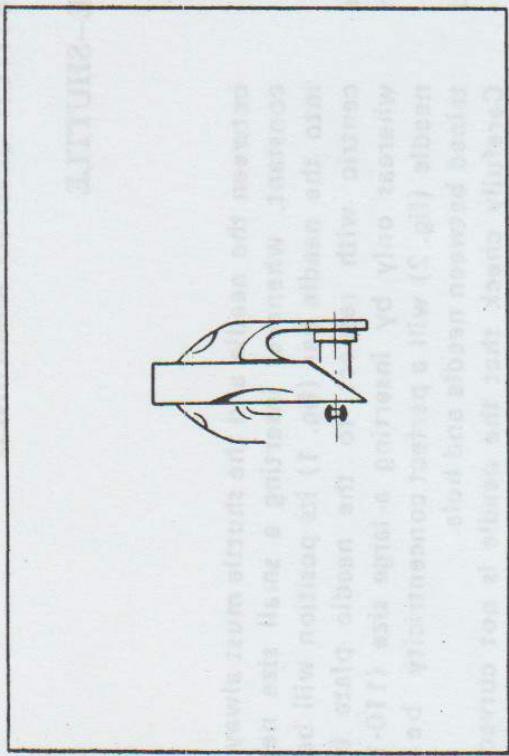


Fig. 3

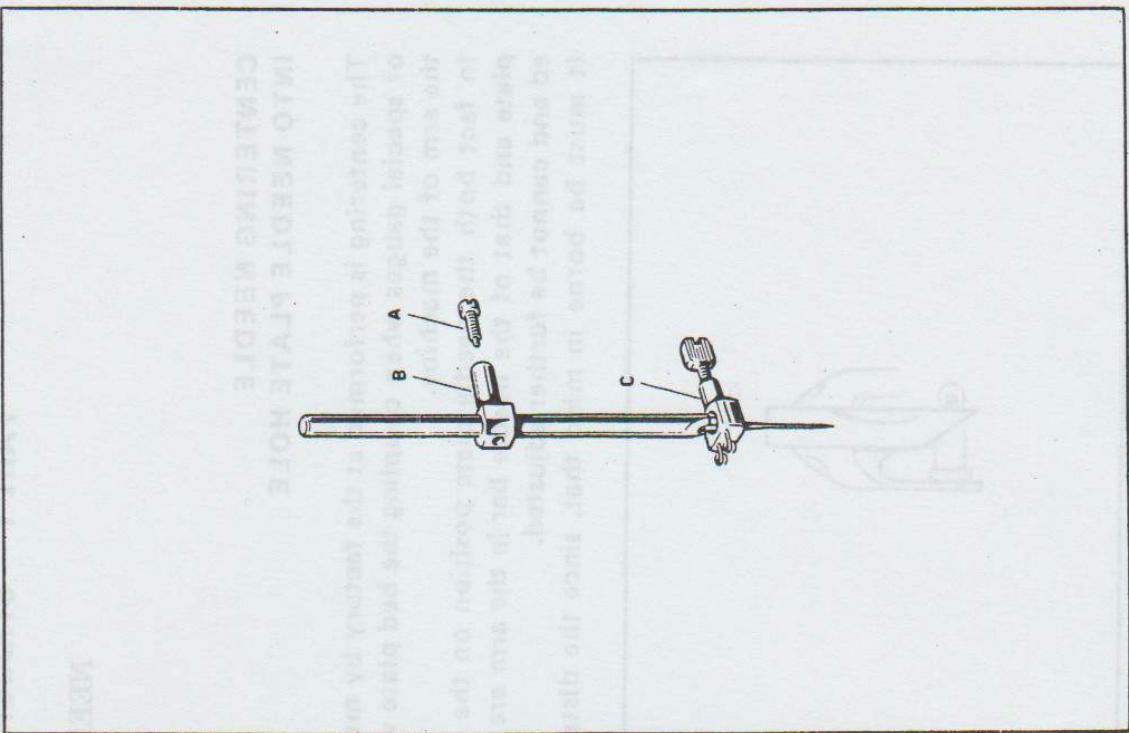


Fig. 5

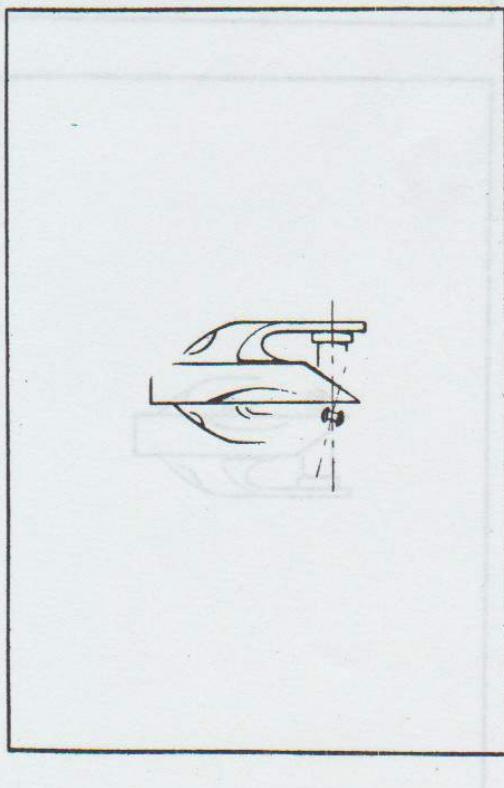


Fig. 4

NEEDLE POSITION

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In order that the loop formed by the thread, when the needle moves upward, is easily caught by the shuttle point, it is necessary that the axis of the needle eye be perfectly parallel to the shuttle (fig. 3).

If this condition is not met (for instance, as in fig. 4), it will be necessary to loosen screw A (fig. 5) — fastening needle bar clamp B to needle bar — and to rotate needle bar and needle in order to obtain the desired position.

Screw A should then be tightened again.

If the position is now correct, the clamp C axis will also be parallel to the shuttle.

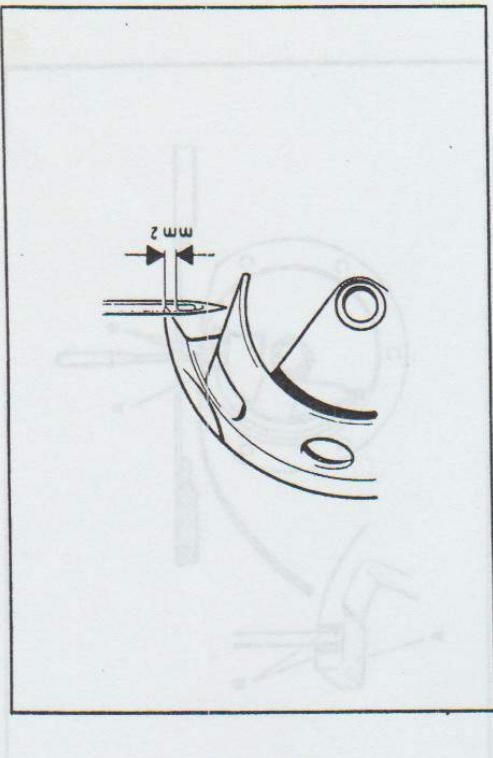
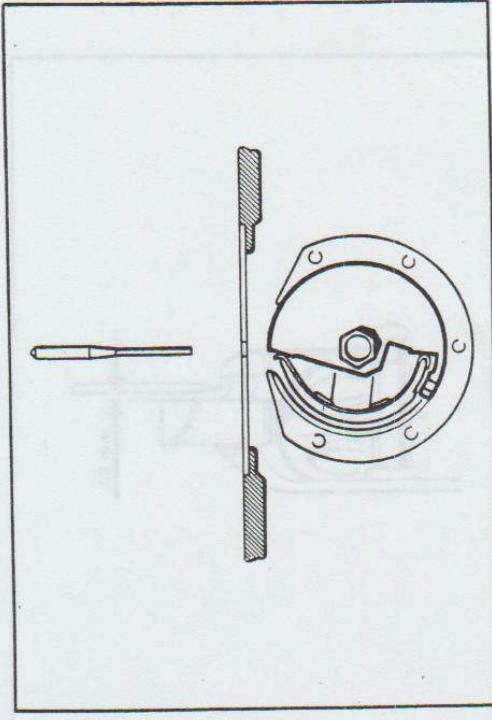


Fig. 6



HEIGHT OF NEEDLE AT SHUTTLE POINT

Turn balance wheel by hand; bring shuttle point exactly behind the needle.

In this condition (fig. 6) the shuttle point must be approximately $3/32''$ above the top of the needle eye.

If this is not so, loosen screw A on fig. 5 and move needle bar downwards or upwards, as the case may be, until the desired position is reached.

At this stage, having checked the needle position, tighten screw A again.

Fig. 7

The height of the needle can be adjusted with more precision and accuracy by using gauge 10.5 illustrated at figs. 7 and 8.

The procedure will be:

- bring needle bar upward,
- replace ordinary needle with dummy needle, which is to be found in the gauge handle,
- open race cover plate and remove bobbin case and shuttle,
- insert gauge into shuttle race,
- bring needle bar downwards.

Under these conditions the lower end of the dummy needle should be on a level with the lower plane of finger A of the gauge and — in order to check the correct position of the shuttle race — it should also be centered between the two notches B (fig.8).

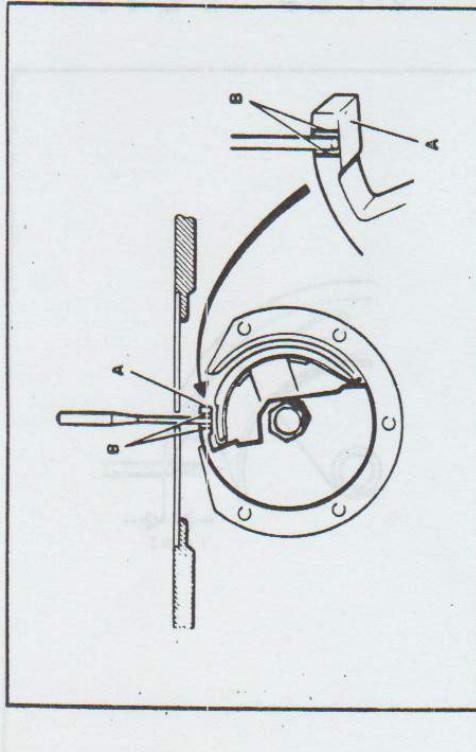


Fig. 8

NEEDLE-SHUTTLE CLEARANCE THICKNESS

In order to obtain a perfect seam the needle must be as near as possible to the shuttle point, but without touching it.

To effect this control, proceed as follows: tilt the machine up on the disc wheel, so that the shuttle is turned face upwards; the position of the needle should appear as in fig. 9.

Press needle against the shuttle with a screw-driver; the needle should bend slightly before touching the shuttle.

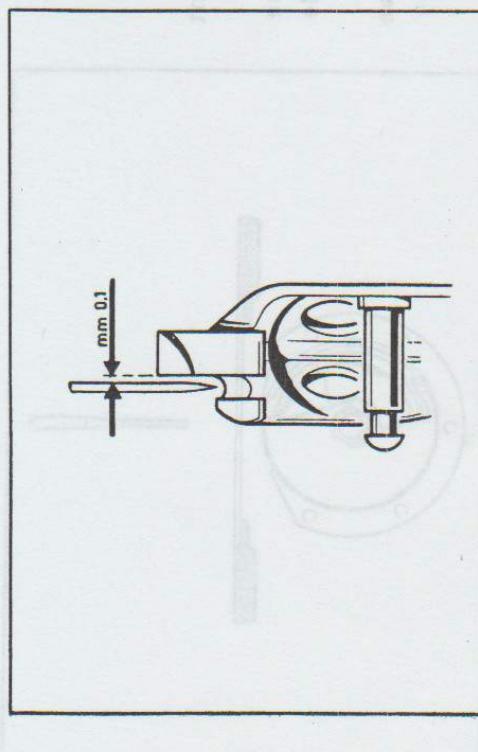


Fig. 9

The clearance between needle and shuttle, as described by our assembly regulations, must be as close as possible without touching. When adjust the clearance, loosen screw A (fig. 10) and move the complete shuttle carrier (and the shuttle with it) until the correct clearance is reached.

When shifting the shuttle carrier, it is advisable to use a light hammer and a small brass punch, placing the latter on the points indicated by arrows B or C, as the case may be.

If B is the case, when the adjustment has been completed, check that the shaft collar (which regulates the end play of the shuttle carrier) has not been moved, since this would tighten the running of the machine and call for a re-adjustment of the collar.

During this operation, the shuttle carrier should not revolve on its axis, because this would alter the centering of the needle in the race cover plate.

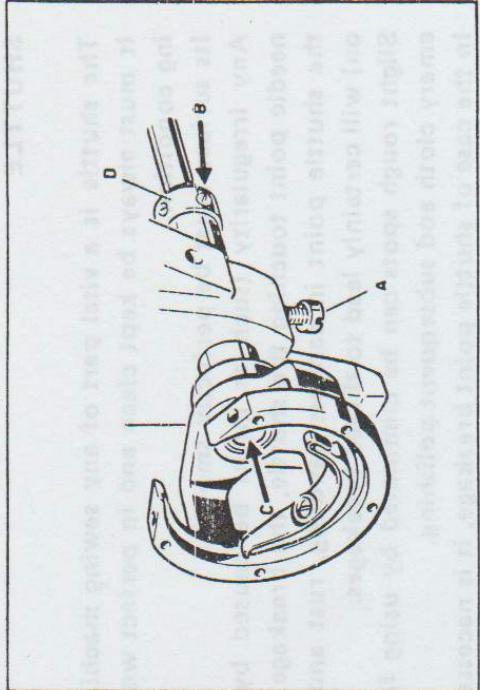


Fig. 10 Rule off washer or

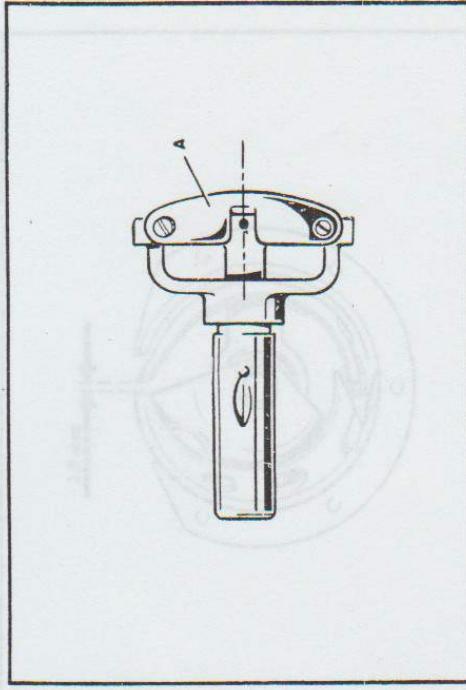


Fig. 11

CENTERING NEEDLE-RACE COVER PLATE

The needle must be perfectly centered (fig. 11) in respect of plate A. This adjustment is carried out by loosening screw A on fig. 10 and by slightly revolving the complete shuttle carrier.

SHUTTLE

The shuttle is a vital part of any sewing machine. It must always be kept clean and in perfect working condition.

Its surface must be perfectly smooth.

Any irregularity (such as might be caused by a needle point touching the shuttle, the breakage of the shuttle point in careless handling, rust and so on) will certainly lead to thread breakages.

Slight rough spots can be eliminated by using fine emery cloth and subsequent polishing.

In the case of shuttle point breakage, it is necessary to replace the shuttle.

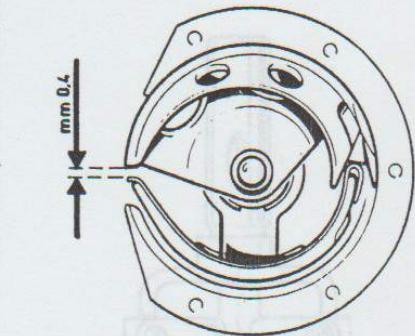
Between the shuttle and shuttle race spring (fig. 12) there must be a passage for the thread which, according to our assembly regulations, must be approximately 1/32".

If this passage is larger, the machine will become noisy owing to shuttle clattering; if it is smaller, the thread will not flow freely and will break (this is particularly true when thick threads are used).

The clearance in question is determined at the factory and cannot be further adjusted except by slightly deforming the shuttle carrier, using a brass punch and hammer.

Fig. 12 shows a cross-section of the shuttle race spring and shuttle carrier.

PRESSER BAR



The presser bar serves:

- to transmit an adjustable pressure to the foot,
- to prevent the foot from rotating on its axis,
- to raise the foot, by means of a lever, above the needle plate level.

FOOT PRESSURE

Generally, the thicker the fabric the greater the pressure which must be exerted by the pressure foot.

The adjustment of the pressure must be made in a practical way; it should not be too strong, since the

Fig. 12

feed dog might damage the fabric, nor too weak, since in this case an improper feeding operation would result with irregularly distanced and out-of-line stitches.

This adjustment is to be obtained by the thumb screw which, when turned clockwise, will increase the pressure and, when turned counterclockwise, will decrease it.

FOOT POSITION

It is evident that the needle, when descending, must pass through the foot and needle plate holes which must therefore be perfectly aligned.

In order to correct any possible defect in the foot centering, it will be necessary to loosen screw A (fig. 14) and turn the foot as much as needed, then tighten screw A again.

FOOT POSITIONS IN ELEVATION

There are three foot positions:

Fig. 13 – *Working position*. The foot is pressing onto the needle plate. The discs of the upper thread tension are closed.

Fig. 14 – *Embroidery position*. The foot is taken off in order to leave the largest possible space for the passage of the embroidery hoop. The discs of the upper thread tension are closed.

Fig. 15 – *Rest position*. The tension discs open and thus the thread tension is released. The foot should be $1\frac{1}{4}''$ to $5\frac{1}{16}''$ above the needle plate. The adjustment of this clearance will be made by loosening screw A (fig. 14) and by making the pressure bar and foot slide along its axis in its guide B.

PARALLEL POSITION OF FOOT-FEED DOG

In order to obtain regular feeding of the fabric the lower surface of the foot must rest perfectly square on all the small teeth of the feed dog.

Make sure first that the foot and the feed dog fastening screws are securely tightened, then, in order to check the above mentioned condition, use a thin sheet of tissue paper as follows:

- turn balance wheel by hand until feed dog reaches its highest position above the needle plate;
- insert tissue paper between foot and one of the four feed dog corners, lowering the foot at the same time;
- repeat this operation for each one of the four feed dog corners.

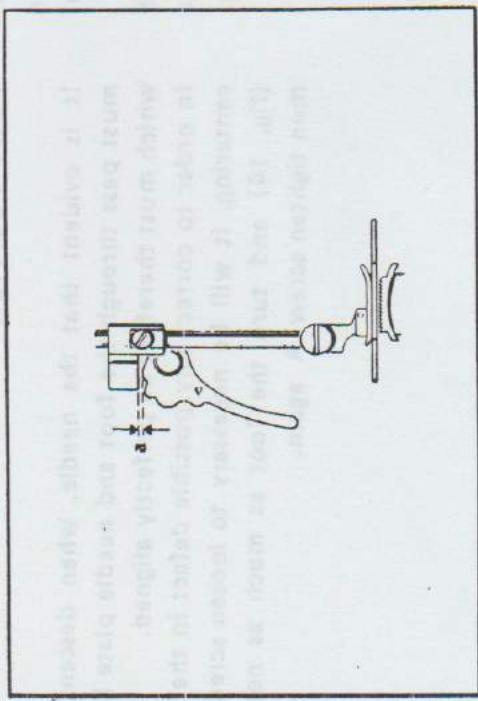


Fig. 13

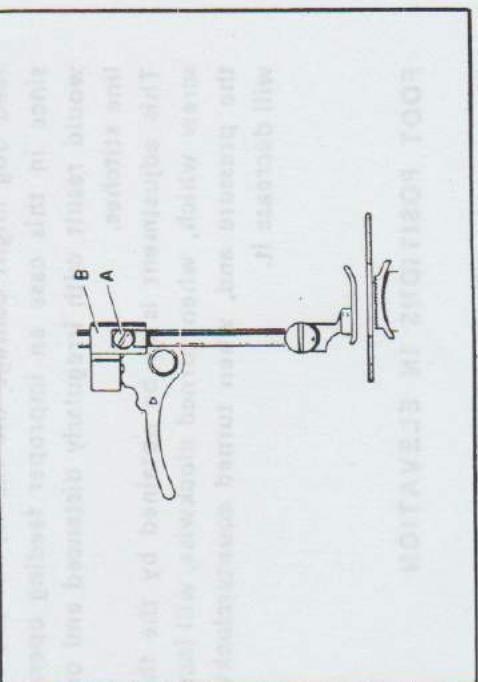


Fig. 14

We can be sure that there is correct positioning between foot and feed dog only when the tissue paper cannot be extracted freely (by pulling it) in any of the four above mentioned positions.

If, on the other hand, this does not happen, we can assume that:

- the foot is defective;
- there is too much clearance at the conical pins of the feed dog holder;
- the feed dog teeth are worn out.

In the first case replace the foot, in the second case adjust the conical pins properly and, in the third one, replace the feed dog.

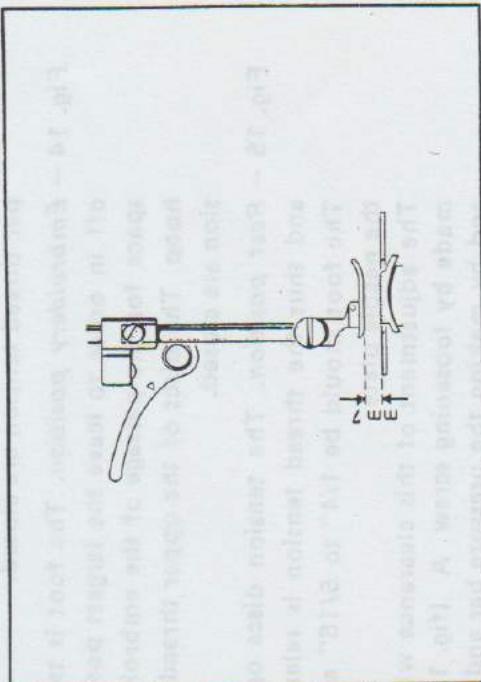


Fig. 15

FEED DOG

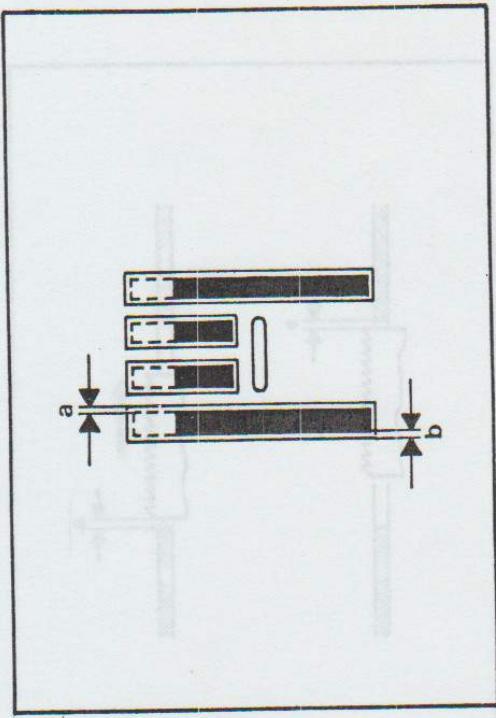
ADJUSTMENT OF EXCESSIVE CLEARANCE

Excessive clearance in the various parts of the feeding mechanism should be the smallest possible in order to guarantee smooth operation. The existence of these clearances may be easily detected by adjusting the stitch on settings *close* to 0.

If clearance is excessive, no feeding is possible under these conditions, and the fabric remains motionless instead of slightly moving forwards or backwards, according to the adjustment made. In this case, all play will have to be reduced to a minimum, paying attention, however, that the machine does not develop a bind when making these adjustments. In this connection

Generally, these conditions can be obtained simply by loosening the two screws A (fig. 17), adjusting the feed dog position and, finally, tightening screws A again. However, if this adjustment is not sufficient to obtain the second condition, the complete feed dog shaft D (fig. 17) must be shifted, in either direction.

Another important adjustment to be made is the following: with the stitch regulating lever or knob set for longest forward stitch, space A (fig. 18),



FEED DOG POSITION IN NEEDLE PLATE SLOTS

The feed dog rows must be:

- parallel to those of the needle plate slots (fig. 16),
- equally distant from those of the needle plate slots.

Fig. 16

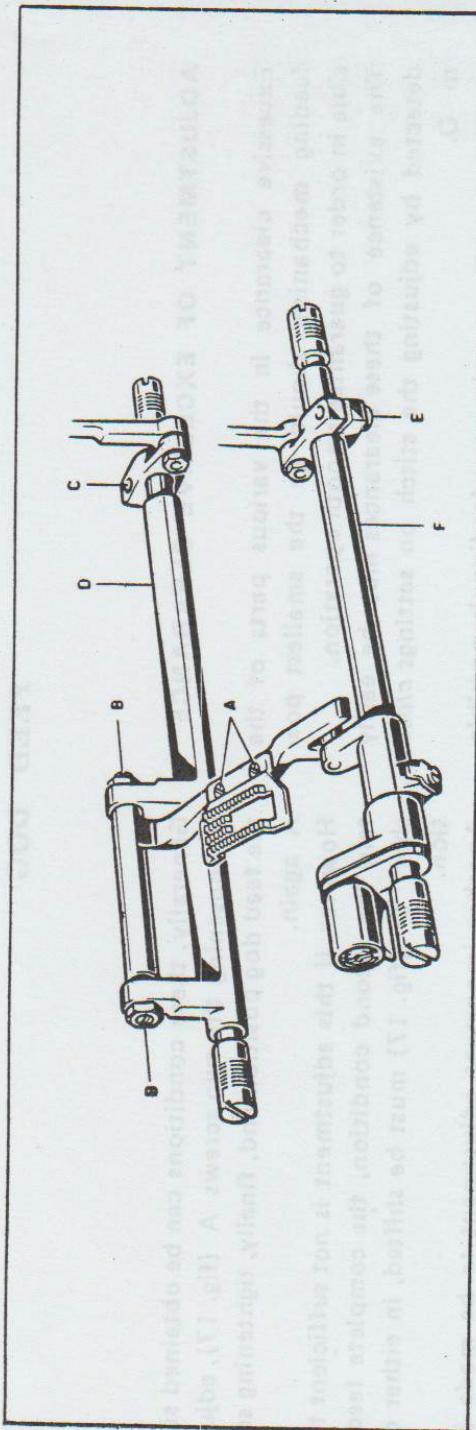


Fig. 17

existing at the beginning of the movement of the feed dog above the needle plate, must be between 0,3 and 0,5 mm.

In these conditions are not met, screw C (fig. 17) should be loosened and shaft B rotated by hand as necessary.

Screw C must then be tightened again.

TEETH PROJECTION ABOVE NEEDLE PLATE

To check teeth projection above needle plate surface use proper gauge 10.1 as follows:

- move foot to its highest position,

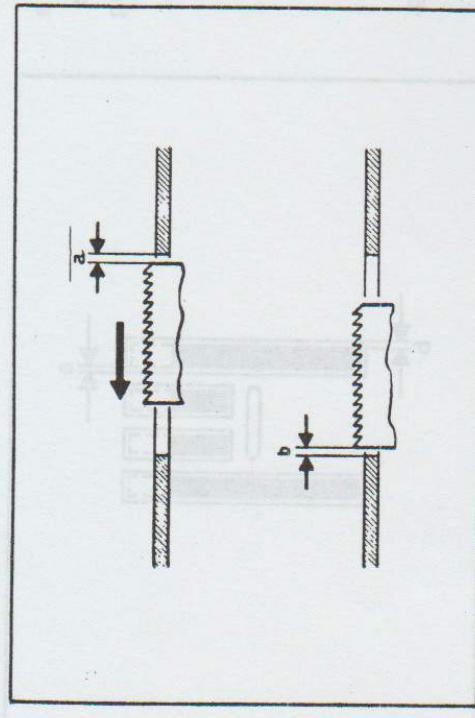


Fig. 18

- remove needle and set stitch regulating lever or knob at their maximum forward stitch,
- place gauge on teeth as in fig. 19, once with its higher step *a* (0,9 mm) and once with its lower step *b* (0,7 mm).

By turning balance wheel by hand until one full revolution is completed, it will be found that:

- step *a*: gauge does not move,
- step *b*: gauge moves.

Under these conditions the teeth will project above the needle surface by

$$\frac{0,9 + 0,7}{2} = 0,8 \text{ mm or } 1/32".$$

If an adjustment is needed, it will be necessary to loosen screw *E* (fig. 17), to rotate slightly, lifting shaft *F* in either direction, and tighten screw *E* again.

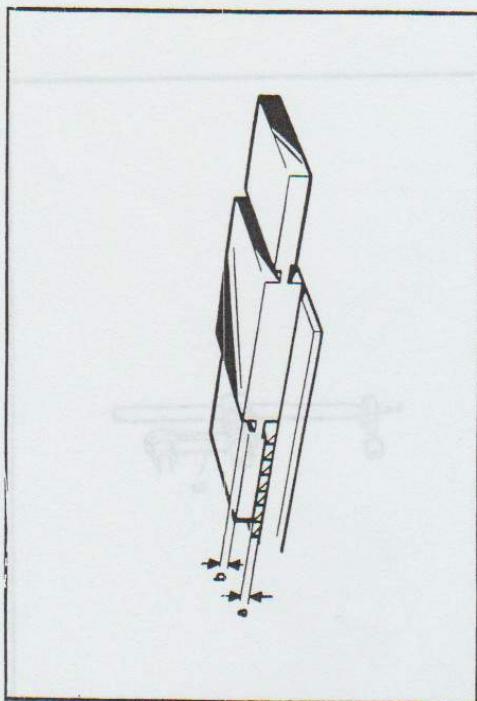


Fig. 19

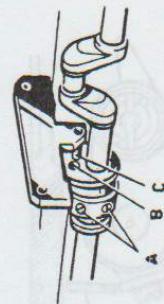


Fig. 20

FEED DOG / NEEDLE BAR TIMING

Perfect timing between these two parts is essential because the *feed dog must begin* its movement above the needle plate at the very same moment in which the needle, starting from its highest position, commences its descent. Furthermore, the *feed dog must end* its movement just before the needle enters the fabric.

A good mechanic is expected to carry out this adjustment in a practical way, that is: to loosen the two screws A (fig. 20) which fasten the eccentric to the upper shaft, to turn slightly said eccentric in either direction (taking care that no axial movement occurs, otherwise, the eccentric fork could develop a bind) and, tighten the screws again. In order to carry out a perfect adjustment, the following special gauges should be used (supplied on request).

The eccentric has a hole B in its side (fig. 20), whilst the gauge has a small pin C. When the small pin has been inserted into the hole and the gauge rests on a fixed part of the machine (the upper part of the arm), the needle must be in its lowest position and the link D (fig. 21) must be vertical.

The adjustment by means of the gauge will be very easy to carry out.

The procedure is the following:

- loosen the two screws A which fasten the eccentric;
- place the gauge as explained above;
- turn the balance wheel by hand until the needle has reached *its lowest position*;
- fasten the eccentric screw which can now be reached;
- remove the gauge;
- turn the balance wheel by hand and tighten the other screw.

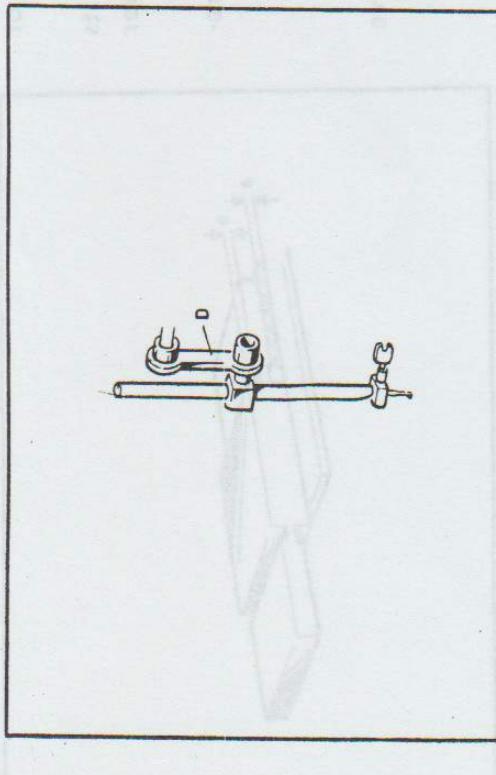


Fig. 21

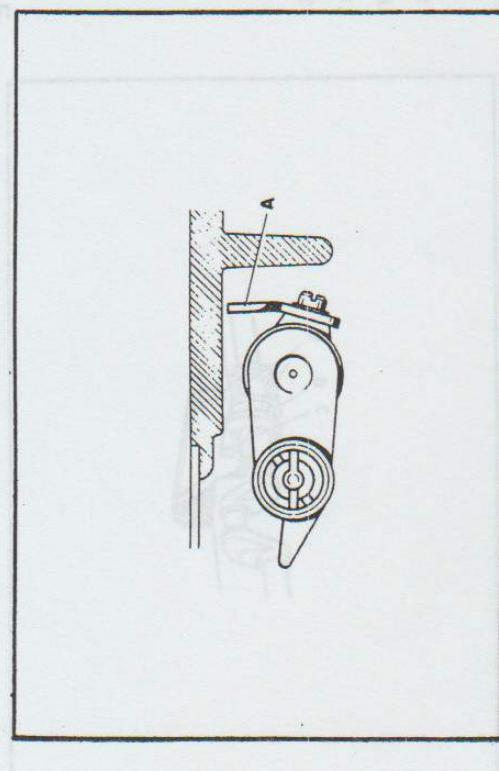


Fig. 22

DROP FEED ADJUSTMENT

When the feed mechanism is lowered in order to eliminate its operation (as in the case of embroidery work with a hoop), it must not descend past a certain limit, otherwise, it cannot be re-inserted in its working position.

The movement of the disconnected lifting shaft must therefore be adjusted and, in order to do it – according to the various sewing machine models – it will be necessary to move the small finger A (fig. 22) or the screw B (fig. 23) adjusting the feed shaft either nearer to, or farther from the base of the sewing machine.

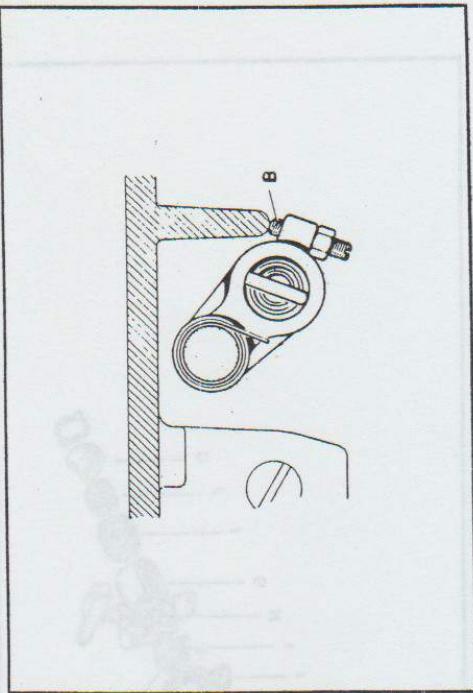


Fig. 23

UPPER TENSION

FUNCTIONING

The tension of both the upper and lower threads – namely, the resistance that the thread must meet when passing either between the discs or under the bobbin case spring – is essential for the locking of the stitch.

The discs of the upper tension must always be in a good condition and have no grooves or scratches. To check this, it will be necessary to dismantle the discs, to look them over carefully and to check the contact between the working surfaces.

These surfaces should match perfectly. If not, the discs are defective and must be replaced.

There are various tension devices, but they are all based on the same principle.

We shall describe hereunder the type which is most widely used on our machines.

When the group is assembled, the tension axle A (fig. 24) – which is fastened to knob B by means of two screws C – is screwed into the threaded locking nut D which, in turn, rests on the two

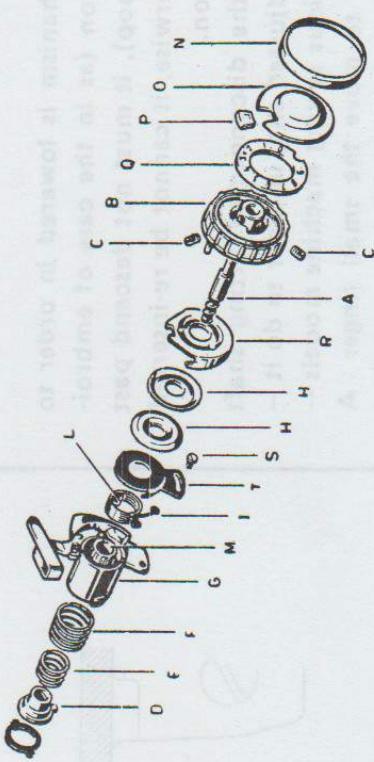


Fig. 24

springs E and F and can move on its axis, thus loading the springs without rotating, owing to a small tab which slides into a slot of part G. Knob B, which is pulled by the two springs, will discharge this pressure between the discs H, thus producing the desired resistance when the thread is passing through.

The presser bar lever, when raised by means of lever B (fig. 25), will push the threaded pin A, thus eliminating the pressure between the two discs.

The check spring I (fig. 24), which is equipped with a small folded tail L, must be inserted onto the notched sleeve M of part G.

The more the small tail L is turned counterclock-



Fig. 25

wise the stronger will be the tension of the check spring.

The adjustments to be carried out on the tension group are the following:

1) With the presser bar lever set in the position as per figs. 13 and 14, the discs must remain closed (sewing position).

The tension axle A (fig. 25) therefore, must be a few tenths of a millimeter away from the disc-opening lever B.

On the other hand, with the lever set in the position as per fig. 15, the discs must be opened by means of the disc-opening lever.

The adjustment is carried out by loosening the screw C (which fastens the complete group to the arm) and by shifting the group either towards the inside or the outside of the arm, until the desired position is reached.

Make sure that the group has not rotated around its axis and then tighten screw C.

2) With the tension knob set on 0 a very slight tension should be noted when inserting a thread between the discs.

If this is not the case (and it may happen only when the tension knob is replaced), loosen screw C (fig. 25) and take the group out.

Then proceed as follows:

- with a pocket-knife blade or a specially prepared small hook remove outer ring N (fig. 24) by prying it off.

It will then be possible to extract also parts O-P-Q;

- slightly loosen the two C;
- looking at the tension group from the front, turn tension axle A clockwise with a screw-driver in order to increase the tension between the discs. Turn it counterclockwise in order to decrease the tension;
- reassemble knob B without parts N-O-P-Q, inserting first parts R-H-H and subsequently checking the tension according to the procedure explained above, whilst set on 0.
- If necessary, the operation should be repeated until the desired adjustment is obtained.
- Finally, the screws must be tightened again:
 - mount the entire tension group on the machine arm and fasten the screw C (fig. 25).
 - Assemble parts N-O-P-Q (sig. 24).

TAK-E-UP-LEVER SPRING (CHECK SPRING)

The take-up-lever spring has been devised for two important purposes:

- to maintain the upper thread until needle eye completely enters the fabric;
- to provide the length of thread which is required, at the final stage, for making the stitch, thus allowing the take-up-lever to lock it with greater smoothness.

We have already dealt with the possibility of adjusting the initial load of the take-up-lever spring by shifting the small tail L of the spring (fig. 24) on the notched sleeve M.

This operation may be required only when the machine has been in use for many years and the spring has lost some of its original elasticity.

We will deal hereunder with the *spring movement*. By loosening screw S (fig. 24) and by rotating the small plate T clockwise, the movement of the

spring is reduced, whereas it is increased when the small plate is rotated counterclockwise. Two limitations affect this adjustment, and they are represented by the length of the slot in the small plate T.

It is a usual practice to reduce the spring movement when the machine is mainly destined to work on thick fabrics, and to increase the movement when the machine has mainly to work on fine fabrics (particularly when overlocking).

ADJUSTMENT

The upper shaft (fig. 26) has, at its left end, the pinned counterweight B which must work as a shoulder against the bushing C forced onto the arm.

At the right end there is a second bushing D fastened to the shaft by means of a pointed screw E and of a cylinder screw F.

The bushing B must also work as a shoulder against part G of the arm.

Adjustment of the play will be carried out by slightly loosening the two screws E-F and by shifting bushing D. Play on the upper shaft must be the smallest possible, for the sake of smooth performance.

In case of replacement, the upper shaft must be extracted from the left side of the arm. This latter operation requires the use of a special tool, such as a long rod to knock out head bushing C (fig. 26).

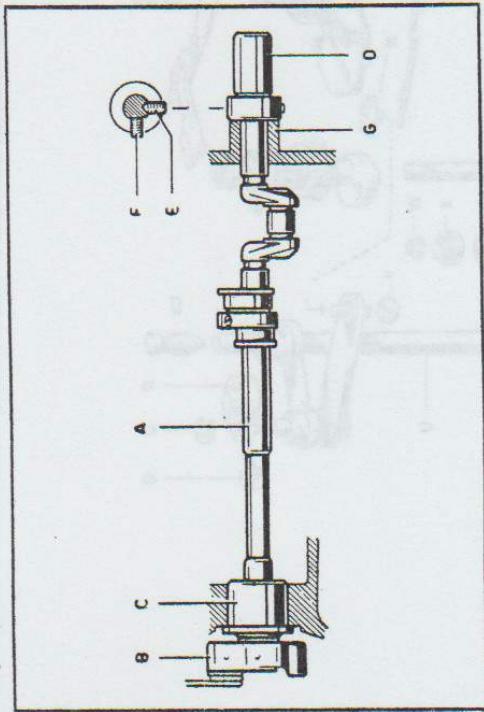


Fig. 26

BOBBIN WINDER

The possible adjustments are the following (fig. 28):

- 1) Should it be necessary to adjust the position of the rubber ring A (either because it is worn out or because it is too close to the balance wheel), loosen screw B and push bushing C either upwards or downwards. When the correct position is obtained, tighten screw B.
- 2) Tighten or loosen screw E in order to increase or to reduce the pressure of the small pin D.
- 3) In order to wind more or less thread onto the bobbin, simply loosen screw F, displace small plate G in the desired direction and then tighten screw F again.

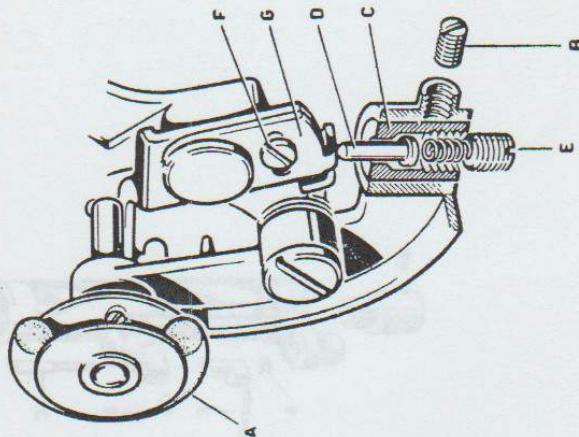


Fig. 27

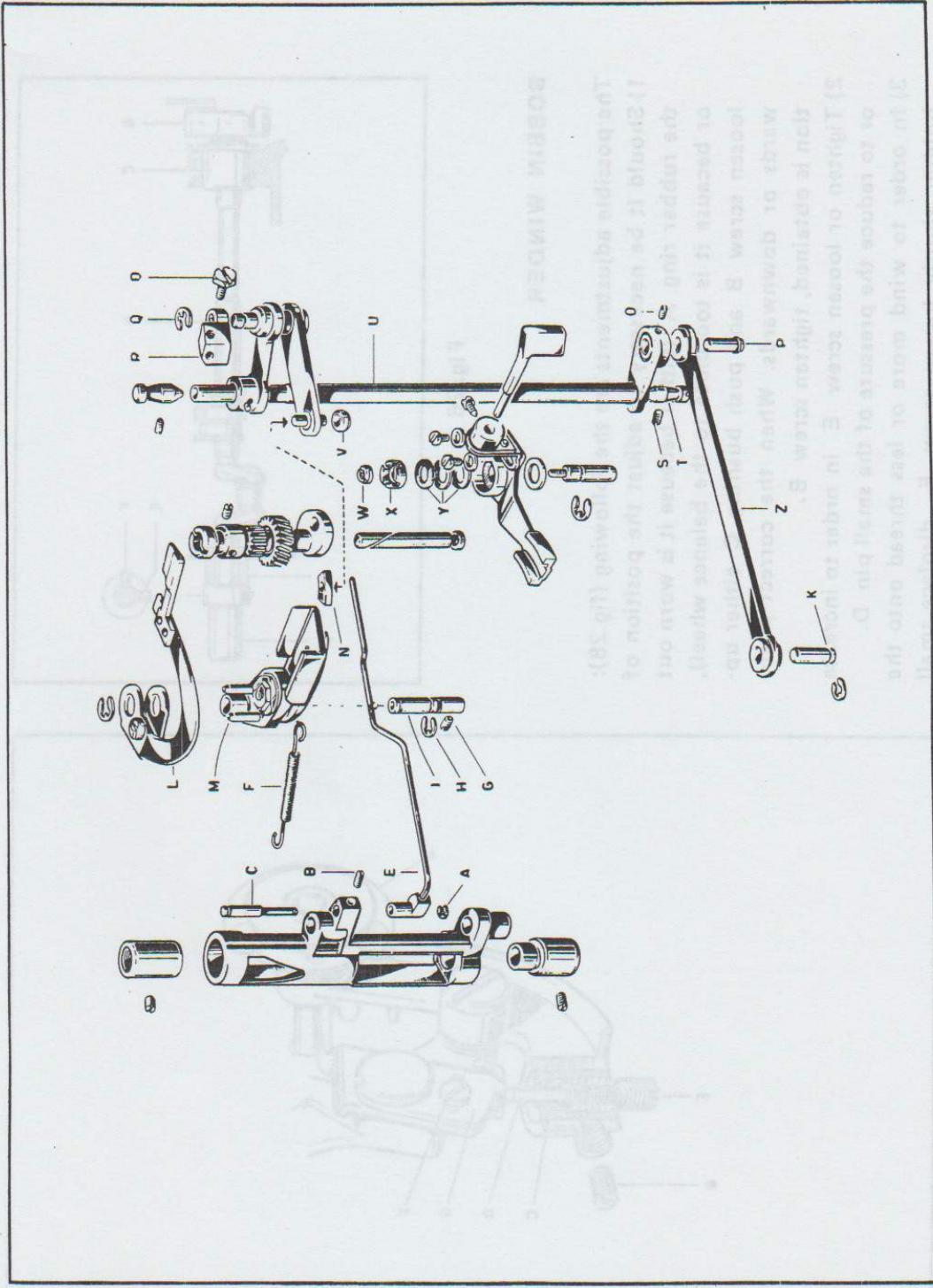


Fig. 28

PART II – ZIGZAG STITCH SEWING MACHINES

Almost all the instructions given in Part I of this manual generally apply to these sewing machine models also.

In Part II, therefore, we will deal exclusively with those subjects which refer to our zigzag sewing machines.

The operations which may become necessary on the zigzag group concern:

- 1) Dismantling of the oscillation lever **M** (fig. 28) in order to replace ball bearings or to adjust excessive clearance.
- 2) Replacement of worn out sector **N** and roller **V** (fig. 28).
- 3) Adjustment of the zigzag group lever friction.
- 4) Replacement of the zigzag eccentric group.

We will describe hereunder the operations required for the extraction or the adjustment as per the above points (fig. 28):

- remove upper cover, front plate and zigzag plate;
- remove benzing washer **A**, loosen screw **B** and extract pin **C** from the top;
- loosen screw **D** and extract rod **E** towards the left;
- in order to facilitate the re-assembly operations,

- measure distance **H** (fig. 29) between upper parts of pin **A** and upper edge of machine;
- release spring **F** (fig. 28) at its left end;
- loosen screw **G**;
- extract benzing washer **H** through zigzag window by means of a suitable hooked implement, which is easy to make;
- find a long and suitable screw and screw it into upper part of pin **I**.

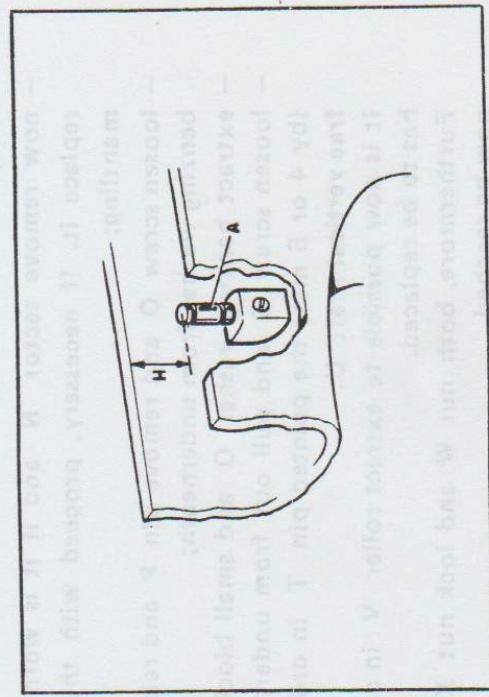


Fig. 29

This screw will be used as an extractor of the pin in question.
When carrying out this operation, it is advisable to hold lever L down by means of a screwdriver, otherwise this lever could hinder the extraction;

- extract lever L passing rear part between shaft and head frame.
- Extract also oscillating lever M through same passage.

If this is the defective part, it will be easy to dismantle it and to replace some ball bearings or to adjust the ball bearing axial clearance by adjusting the nut which holds the ball bearings in their seat;

- now remove sector N and if it is worn out, replace it. If necessary, proceed with the dismantling;
- loosen screw O and remove pin P and relevant benzing washer from underneath;
- extract benzing washer Q and small block R;
- loosen screw S and pull out from underneath (by 4 or 5 mm) the pointed pin T in order to free vertical shaft U.

It is now possible to extract roller V in case it has to be replaced.

Furthermore, both nut W and lock nut X can now be reached.

The nut W controls the pressure on the spring

washers Y and, consequently, the friction of the zigzag lever.

The lock nut prevents the nut from becoming loose.

The dismantling of the zigzag eccentric group should not present further difficulties.

The re-assembly must be carried out by repeating the above described operations in the opposite sequence.

Special care must be taken in the adjustment of the heights of the machine parts: eccentric A, sector C, roller D (fig. 30), as they must operate on their sides only, and not on the bottom of their relevant seats.

If the re-assembly is not carried out properly, the machine will bind and become noisy.

To begin the regulation of these adjustments set the height of the vertical shaft U (fig. 28) in such a way that the connecting rod Z (which at its left end will have to rotate freely around its pin K without too much axial play) is on the same level as the lower plane of the lever of the vertical shaft U, to which it will be joined by means of the pin P, which should go in easily.

Once this adjustment has been carried out, it will become easy to follow the sequence of operations and to adjust the height of the various parts by acting on the relevant screws and pins, leaving a clearance of approximately 1/64" (0,3 to 0,5 mm).

TIMING NEEDLE BAR SWING FOR ZIGZAG

It is absolutely necessary that these two groups are perfectly timed in order that the needle may:

- 1) begin its lateral movement as soon as it is out of the fabric in its upward movement;
- 2) end its lateral movement a little before it re-enters the fabric in its descent.

This control has to be carried out as follows:

- position needle displacement lever in central notch and zigzag lever completely to the left;
- rotate balance wheel and bring needle bar completely upwards (its highest position);
- shift zigzag lever repeatedly and rapidly from left to right and viceversa.

If the timing is correct, the needle will not make any lateral movement and will remain stationary.

If the needle moves, the timing must be corrected since this shows that the eccentric is out of adjustment slightly with respect to one of the two positions (fig. 31) which it should have after the correct adjustment is made.

The following operation will have to be carried out:

- loosen the two screws A (fig. 32) and, holding the balance wheel firm to prevent the needle bar moving from its highest position, with your fingers rotate gear B together with gear C and relevant eccentric D until the latter is brought to its correct position.

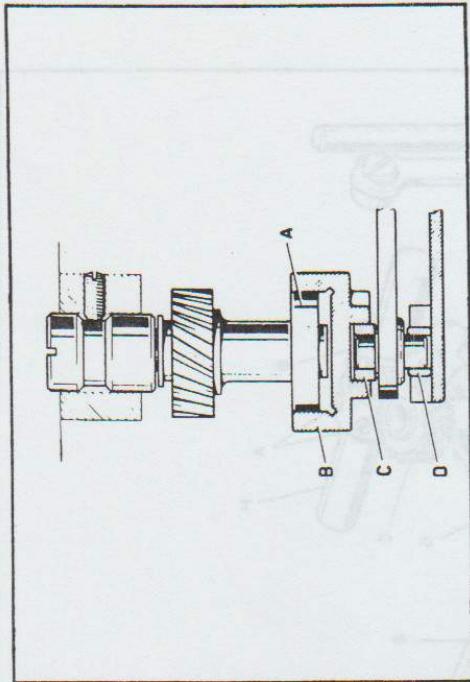


Fig. 30

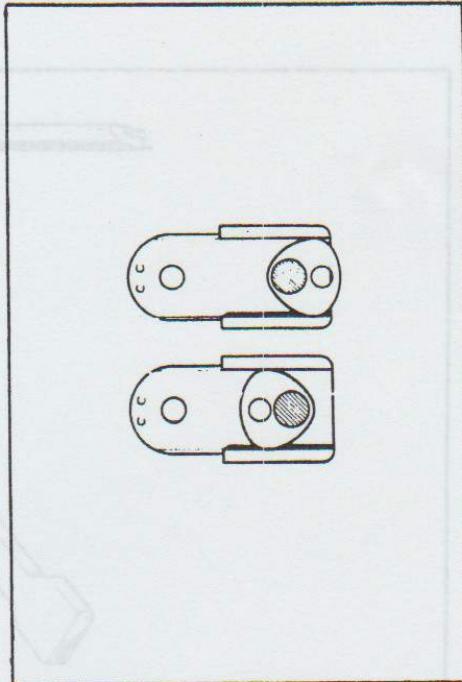


Fig. 31

After having tightened one of the two screws A, the control described above should be checked before tightening the second screw. This operation, which a good mechanic can easily carry out can, however, be executed more easily by means of:

GAUGE FOR TIMING ZIGZAG ECCENTRIC

This gauge consists of two parts, namely:

- a small plate E (fig. 32),
- a fork F.

Proceed as follows:

- if the machine is equipped also with an automatic device plate remove it;
- remove the zigzag small plate and install small plate E in its place.
- Put the needle displacement lever in notch G, which corresponds to the needle central position;
- bring the zigzag lever completely to the left;
- in order to make the operation easier, put the eccentric in the position shown in fig. 33, name-

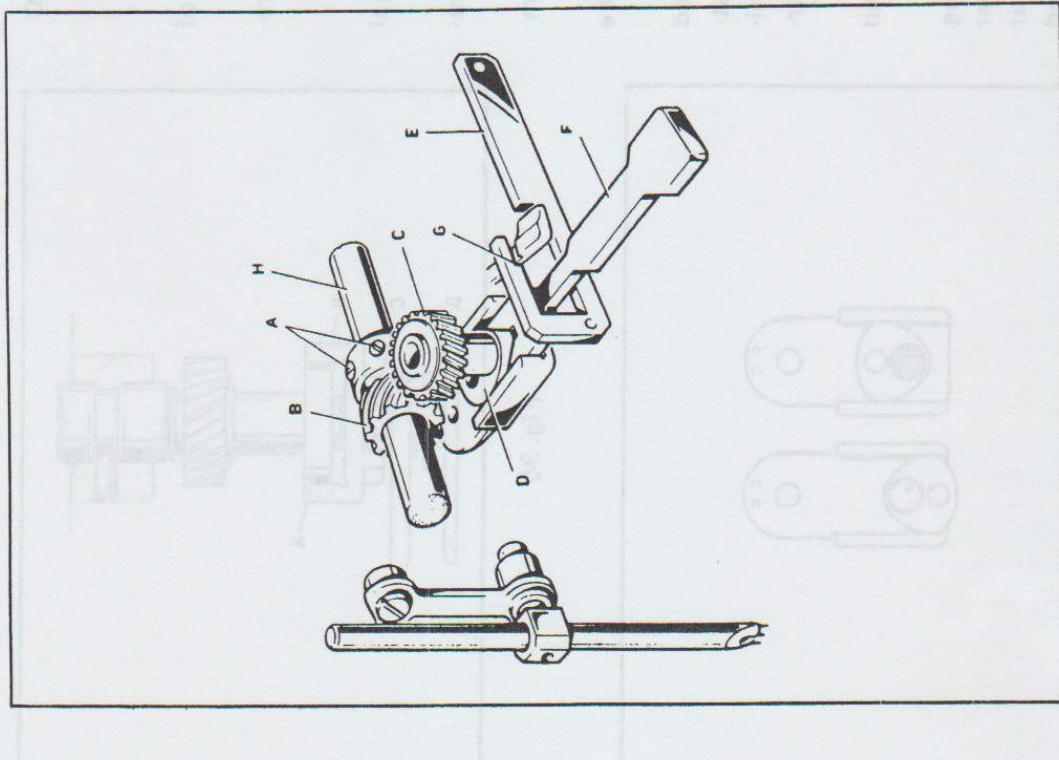


Fig. 32

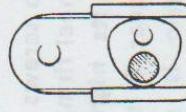


Fig. 33

- ly, rotated towards the right with respect to its correct position;
 - insert fork into oscillating lever, which will stand completely to the right, and hold it well pressed against the eccentric;
 - now rotate the balance wheel by hand until the position shown in fig. 32 is reached, namely, until the V of the fork corresponds perfectly with the two V-shaped sectors of the eccentric.
- In this position the balance wheel should not rotate and, if the timing is correct, the needle bar will be in its highest position.

If this is not the case, proceed as follows:

- loosen the two screws A;
- rotate balance wheel until the needle bar is brought completely upwards; upper shaft H will rotate within gear B which, having become idle, will remain stationary;
- tighten the two screws A.

NEEDLE BAR CENTERING

- Proceed as follows (fig. 32):
- extract zigzag plate and replace it with that of the gauge E (fig. 32);
 - put needle displacement lever in notch G (needle in its central position);
 - rotate the balance wheel and bring the needle into the needle plate slot.

If the needle is not equally distant from both sides of the needle plate slot, introduce a screwdriver into gauge window and reach screw (fig.28); loosen said screw and displace needle bar support together with rod E until desired centering is obtained, then tighten screw D again.

- In order to ascertain whether the centering in question has been properly carried out, proceed as follows:
- remove gauge and replace zigzag plate;
 - insert needle plate for straight sewing, the hole of which is more to the left;
 - insert a No. 100-110 needle;
 - bring needle displacement and zigzag levers completely towards the left;
 - lower the needle; it must be perfectly centered in the needle plate hole.
- In these conditions are not met, carry out the necessary adjustments after loosening screw D.

NOTE – On completion of these operations, it is essential to carry out once again the needle-shuttle timing.

NEEDLE-SHUTTLE DISTANCE

For the timing of these groups please refer to the instructions given in Part I for straight sewing. The only important variation is that on zigzag machines, when we must adjust the shuttle carrier, we have to loosen screw A (fig. 34) in order to free it.

the most important assembly of all is the main bearing which has two shallow spool bearings and three cylindrical ones which support the main shaft. It is best to have a straight or zigzag bearing. If you want a straight bearing, it is better to have a bearing with a central bearing and two outer bearings. This is because the central bearing is more difficult to assemble than the outer ones. The outer bearings are easier to assemble and are more reliable. The main bearing is assembled by first fitting the outer bearing into the housing and then fitting the inner bearing into the housing. The main bearing is then fitted into the housing.



Fig. 34

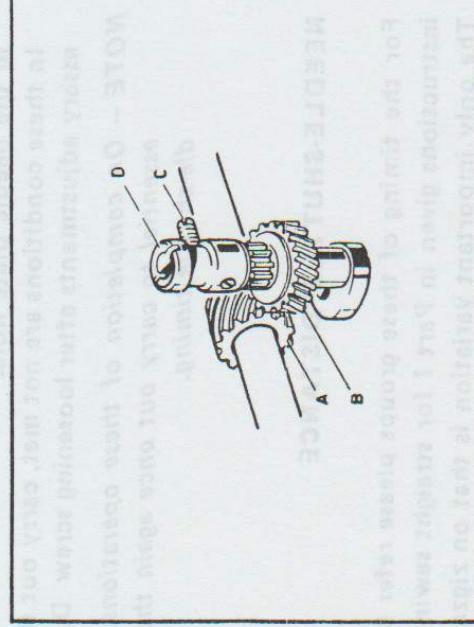


Fig. 35

WORKING TESTS

At this stage it will be advisable to test the machine in order to ascertain that, when sewing either straight or zigzag, it is not noisy and that it works properly.

Should the machine be noisy, all points should be checked for excessive play and all movements lubricated. The bearing should be cleaned and oiled.

GEAR PLAY

Should there be noise, caused by an excessive clearance between the two gears A-B (fig. 35), proceed as follows:

- loosen screw C;
 - slightly turn bushing D clockwise; in this bushing axle of gear B is eccentrically positioned and it will thus mesh gears A and B closer together.
- The clearance between the two gears must be reduced to a minimum compatible with the smooth running of the machine;
- tighten screw C again.

In order to correct this defect proceed as follows:

- ascertain, by moving the zigzag lever rapidly from left to right and viceversa, that it moves freely without binding.
- Check, when said lever reaches its left position, that the lower sliding sector strikes the two pins which limit its travel in the oscillating lever;
- if this is not the case, again check the adjustments of the various groups and adjust them until the desired conditions are reached.
- Be sure that the stop pin is present in the lower channel of the oscillating lever as this sometimes accounts for zigzag on the straight stitch.

ZIGZAG ON A STRAIGHT STITCH

It may be that on incorrectly adjusted machines, although the zigzag lever has been brought completely towards the left, namely on zero, the needle still executes a very small zigzag.

If the machines in question are those prepared for the assembly of the automatic device, the trouble might be caused by an incorrect position of the eccentric of the zigzag hand control. This matter will, however, be dealt with in Part III of this manual.

PART III

DISASSEMBLY AND ASSEMBLY

PRESSER-BAR / NEEDLE-BAR SUPPORT UNIT

Disassembly (figs. 36-37)

- Remove the upper cover, the front plate, the foot, the needle and the needle plate;
- remove the light bulb;
- remove the two screws A;
- remove screw D;

- light-holder B will remain attached to the relevant cable;
- remove light-holder plate C;
- take off benzing ring Q (fig. 37);
- loosen grub screw O and take off pin N from above;

- press knob I and take off benzing ring G;
- turn knob I (clockwise) and take it off from above;

- loosen grub screw D and push presser-bar R downward;
- take off, from the upper opening of support L, pointer M and spring F;
- take off presser-bar R from above;

- loosen the two grub screws B and take off the two bushings C-H driving them downward by means of a small brass or aluminium bar and a hammer;
- remove complete support L from its housing.

Assembly (figs. 38-37-36)

- Lay in its proper place support D with relevant guide B on the arm, inserting joint E in the knee and guide B in the ground surface on the arm;
- insert bushing C from above and bushing A from below;
- push bushing C downward until its upper part protrudes from the surface of the arm by about 3.5 mm;
- tighten grub screw B (fig. 37);
- push bushing A (fig. 38) upward until the end play of the support is eliminated, without impairing its revolving speed;
- tighten grub screw B (fig. 37);

Fig. 37

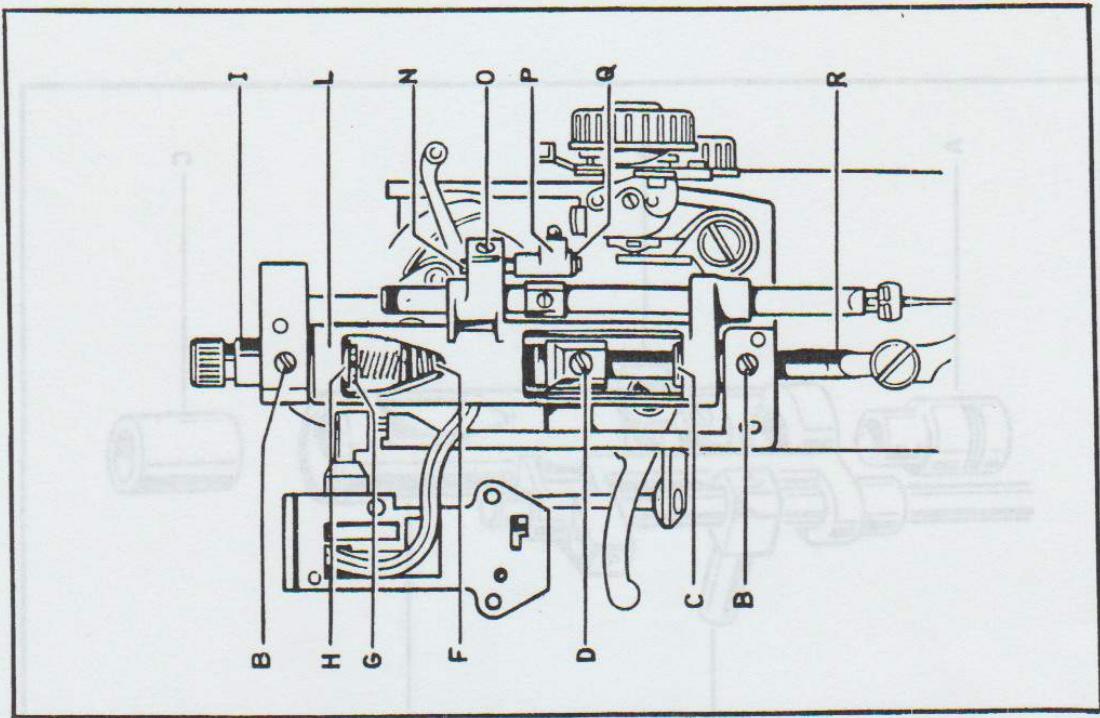
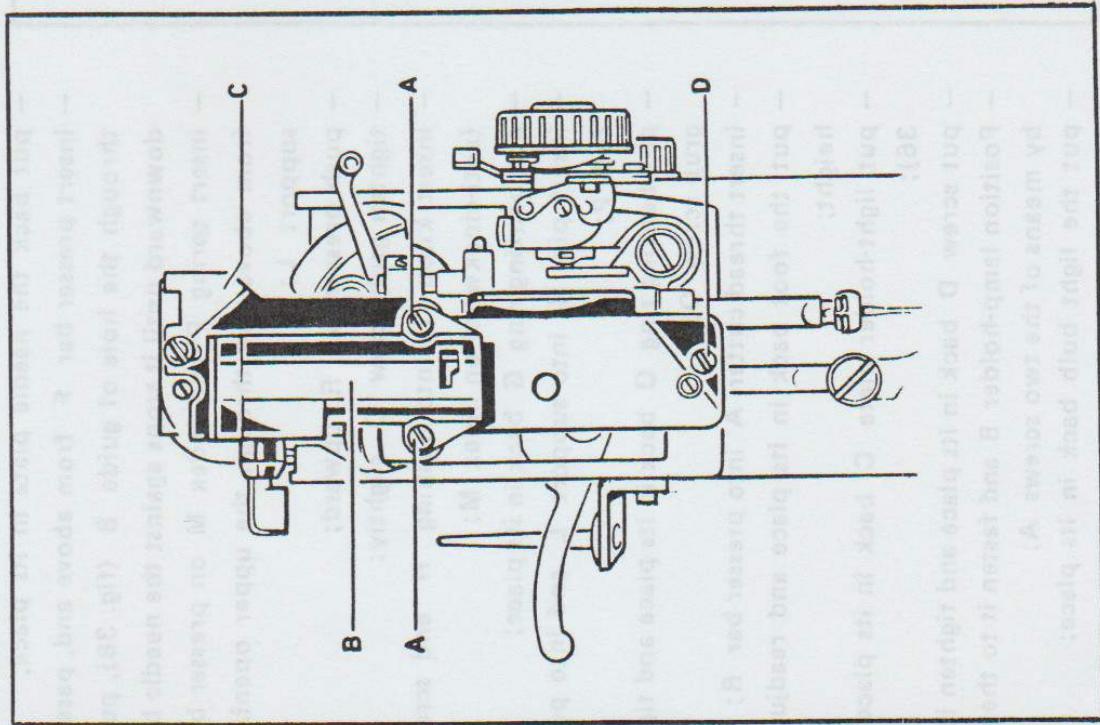


Fig. 36



- put back the needle plate in its place;
- insert presser bar F from above and, passing it through the hole of guide B (fig. 38), push it downward until it stops against the needle bar;
- insert spring F and index M on presser bar R from above and through the upper opening of support L;
- push presser bar R upward;
- tighten grub screw D slightly;
- insert knob I into bushing H and screw it (anti-clockwise) on index M;
- put benzing ring G back in its place;
- insert pin N into support L and into pulling rod P;
- put benzing ring Q back in its place and tighten grub screw O;
- insert thread cutter A into presser bar R;
- put the foot back in its place and readjust its height;
- put light-holder plate C back in its place (fig. 36);
- put screw D back in its place and tighten it.
- Position lamp-holder B and fasten it to the plate by means of the two screws A;
- put the light bulb back in its place;
- put the needle, the front plate and the upper cover back in their places.

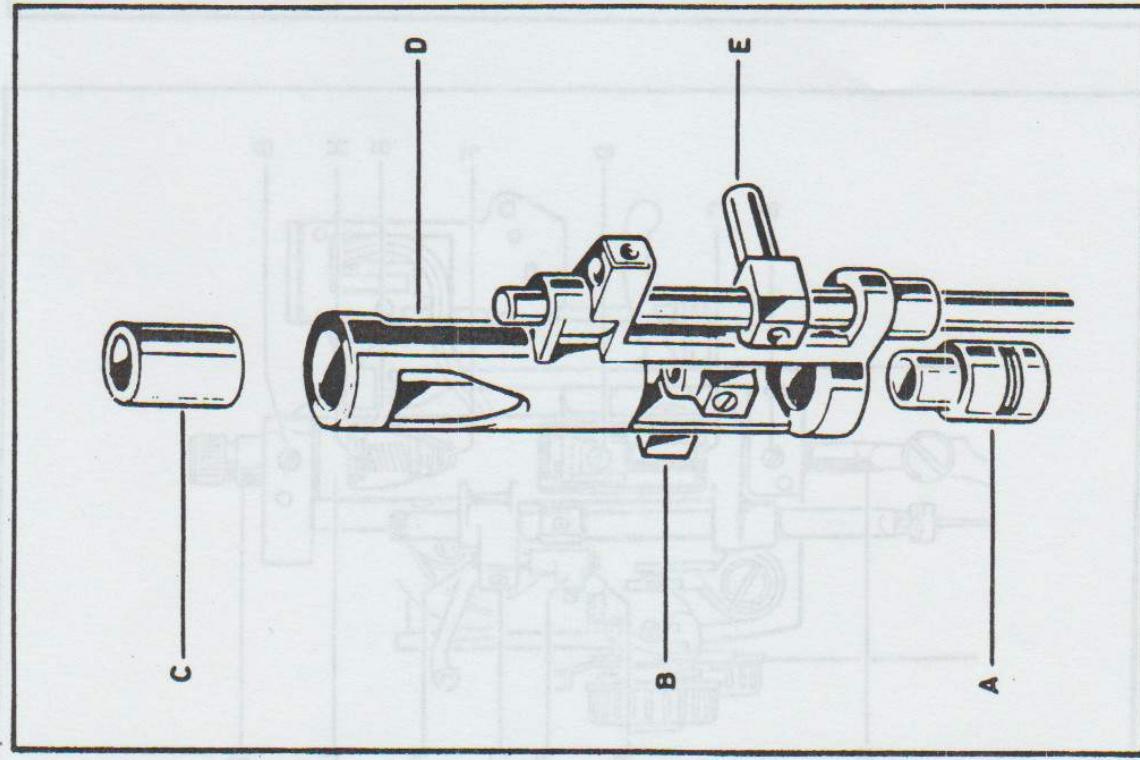


Fig. 38

AUTOMATIC GROUP NECCHI 515

Disassembly

- Remove the upper cover and the buttonhole hand grip (magic key);
- set the stitch length regulating knob on 4 and, pressing the reverse sewing knob thoroughly, disengage, with your finger, the pulling rod of the feed control lever;
- remove the three screws fastening plate P (fig. 39) to the arm;
- remove the plate from above.

If after removing the automatic device from machine you deem it necessary to strip it in its component parts (in order to replace some of them, for instance), proceed as follows:

- take screw E off (fig. 39), which is underneath gear D and accessible through one of its holes;
- remove spring F;
- remove benzing ring B (fig. 40) and relevant cam group with its pin A;
- loosen screw B (fig. 39);
- take off the lever operating the contact finger M for zigzag sewing;
- loosen grub screw G (fig. 41);
- take off pin C (fig. 39) by removing contact finger G for needle displacement and the lever operating the feed contact finger A;

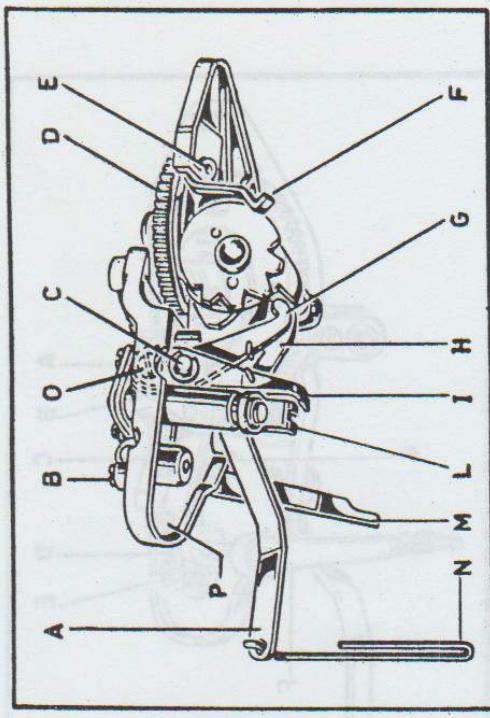


Fig. 39

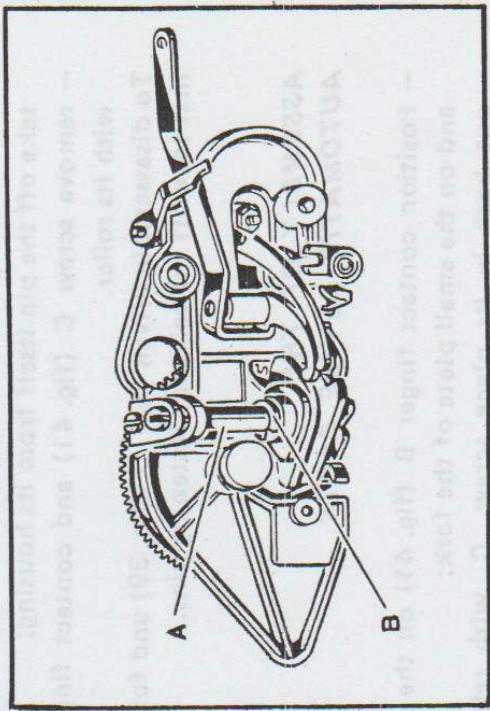


Fig. 40

- by means of pin A, connect the contact finger lever with the plate, placing the relevant washer between them;
 - tighten the grub screw of pin A;
 - position lever A of the contact finger for feed operation (fig. 39);
 - connect it with the boss on the plate by means of pin C, inserting contact finger G for needle bar operation and relevant lever;
 - tighten grub screw G (fig. 41) eliminating the end play and leaving the contact fingers free to move;
 - position contact finger D for zigzag sewing;
 - connect it with the two upper bosses on the plate by means of the pin of lever F for zigzag sewing;
 - tighten screw E slightly;
 - insert pin A (fig. 40) and relevant cams into the lower bosses on the plate;
 - put benzing ring B back in its place;
 - position spring F (fig. 39);
 - tighten screw E again in order to fasten spring F, taking care that the rectangular hook of the spring engages itself on the plate pin.
- This being done, insert the control knob in the special hole of pin A (fig. 40) and make sure, turning it to the left and to the right, that spring F (fig. 39) exerts a sufficient pressure on the toothed cam as to keep it motionless, while allowing it, on the other hand, to change its positions through a trigger-action movement.

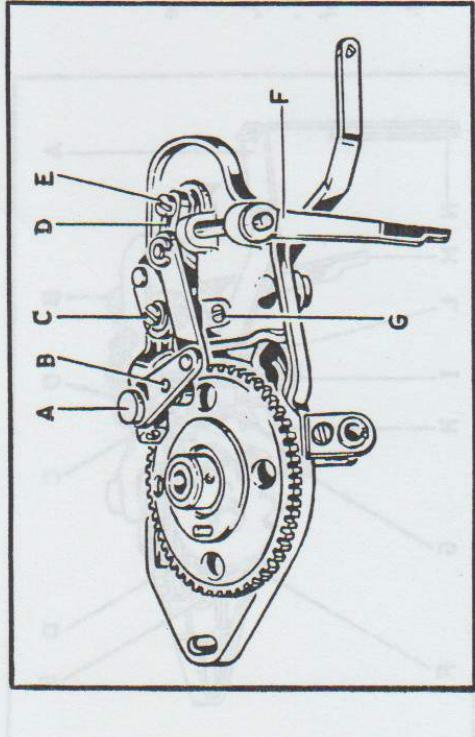


Fig. 41

- loosen the grub screw of pin A (fig. 41) and take off the pin itself from its housing;
 - remove screw C (fig. 41) and contact finger B with its roller.
- To disassemble driven gear D (fig. 39) and fork L, first take off the relevant fastening pins.

ASSEMBLY OF THE AUTOMATIC DEVICE PARTS

- Position contact finger B (fig. 41) on the plate and on the small plate of the fork;
- put back in its place screw C with relevant washer;

- If this is not the case, proceed as follows:
- loosen screw E;
 - displace spring F until you have obtained the right position;
 - insert pulling rod N into the hole existing on the end of the lever controlling the feed contact finger A.

ASSEMBLY OF THE COMPLETE AUTOMATIC DEVICE ON THE ARM

- Place the needle displacement and zigzag levers to the right;
- position the plate on the arm in order to have the following conditions:
 - 1) fork E (fig. 42) engaged on pin H, integral with the needle bar positioning lever;
 - 2) lever F to the left of pin H;
 - 3) lever D to the left of lever G.
- Tighten screw E slightly (fig. 43);
 - bring the zigzag lever to zero and the needle displacement lever to the left;
 - bring the needle bar to its lower dead centre;
 - bring the needle displacement lever to the farthest right;
 - position gauge symb. 979102010-00 (10.2.1) on driven gear G (fig. 43);

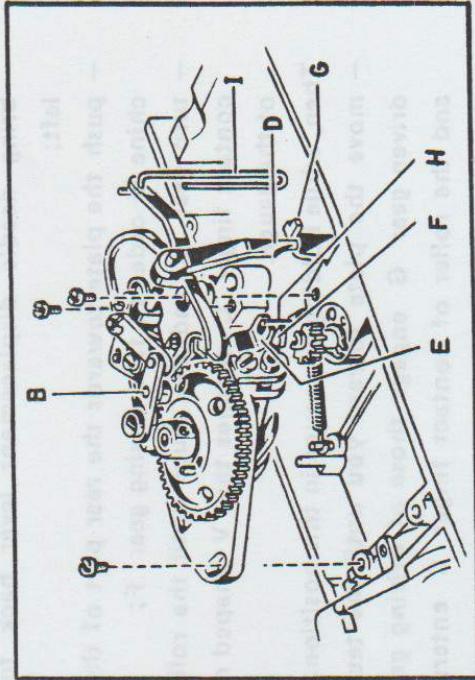


Fig. 42

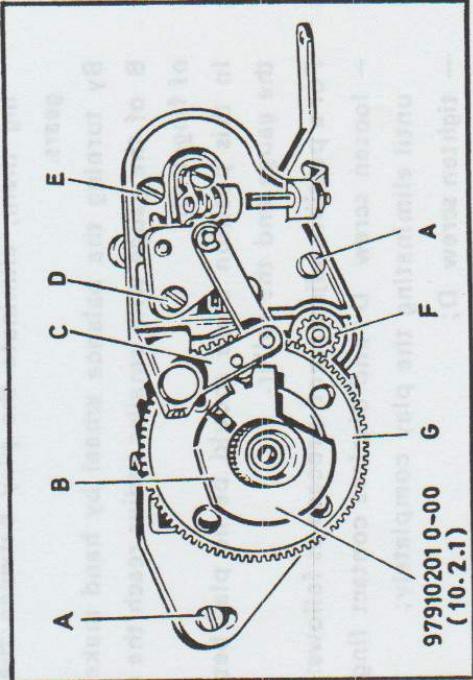


Fig. 43

- bring needle displacement lever back to the left;
 - push the plate towards the rear part of the machine in order to free driving gear F;
 - turn gear G and the gauge until the roller of contact finger C reaches the V shaped notch of the gauge.
- Then, while holding the gauge in this position:
- move the plate toward you until the teeth of driven gear G engage those of driving gear F and the roller of contact finger C enters into the V notch of the gauge;
 - tighten screw E thoroughly;
 - screw the two screws A again and, by tightening them, eliminate the play between the two gears.

By turning the balance wheel by hand make part B of the gauge with smaller radius reach the roller of finger C.

In this position there should be no play between the gauge and the roller.

For a possible adjustment, proceed as follows:

- loosen screw D and displace contact finger C until eliminating the play completely;
- tighten screw D;
- push the reverse sewing knob thoroughly and,

with a finger, engage pulling rod I (fig. 42) on the stitch regulating lever.

With zigzag lever on zero and the needle displacement lever to the left:

- insert the adjusting grip in the special hole on the arm, bringing the zero mark on the grip near the reference mark on the arm.
- While keeping, by means of a screwdriver, lever D (fig. 42) against lever G, bring contact finger D (fig. 41) near the cam;
- tighten screw E thoroughly;
- loosen adjusting screw O between lever I and contact finger G (fig. 39); the spring, by stretching itself out, positions contact finger G and lever I;
- tighten adjusting screw O;
- put the upper cover back in its place.

BUTTONHOLE DEVICE OF THE NECCHI 513

Our model 513 has a built-in device for the rapid execution of buttonholes.

It consists of a group of cams operated by hand by means of the "magic key" and of a system of contact fingers and levers.

The whole group is supported by a plate assembled on the arm.

We give you hereunder the instructions for disassembling and reassembling this plate.

*DISASSEMBLY OF THE COMPLETE
DEVICE HOLDING PLATE*

- Remove the upper cover and the adjusting grip;
- bring the stitch length regulating knob on 4 and, by pressing the reverse sewing knob thoroughly, disengage, with a finger, the pulling rod of the feed control lever;
- remove the three screws that fasten plate P (fig. 44) to the arm;
- remove this plate, taking it off from above.

If after removing the unit from machine you need to disassemble it in its component parts (in order to replace one of them, for instance), you should proceed as follows:

- take off screw E (fig. 44) and remove spring F;
- remove benzing ring B (fig. 45), then take off the unit with pin A;
- loosen screw B (fig. 44);
- take off lever M controlling the zigzag contact finger;
- remove zigzag contact finger H;
- loosen grub screw G (fig. 46);
- take off pin C (fig. 44) and remove the needle displacement contact finger G and lever A controlling the feed contact finger.

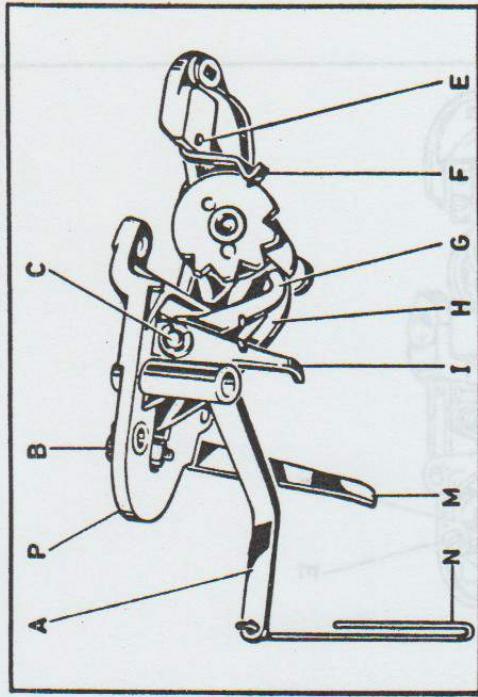


Fig. 44

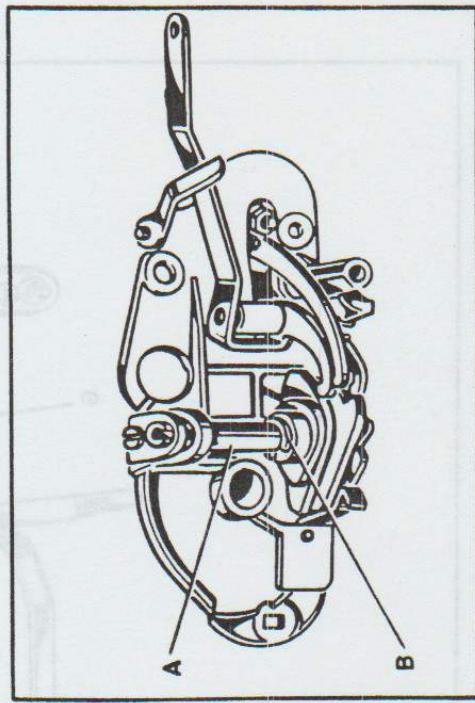


Fig. 45

ASSEMBLY OF THE DEVICE PARTS

- Position lever A controlling the feed contact finger (fig. 44);
 - insert pin C and contact finger G;
 - tighten grub screw G (fig. 46) so as to eliminate the end plays and let the contact fingers free to move;
 - position zigzag contact finger D;
 - insert zigzag control lever M in the plate and into contact finger D;
 - tighten screw E slightly;
 - insert pin A (fig. 45) and its cams into the special holes on the plate;
 - put benzing ring B back in its place;
 - position spring F (fig. 44);
 - retighten screw E for fastening spring F, taking care that the rectangular hook of the spring gets engaged on the reference pin of the plate.
- This being done, insert the adjusting grip in the special hole of pin A (fig. 45) and make sure, by turning it to the left and to the right, that spring F (fig. 44) exerts a sufficient pressure on the toothed cam so as to keep it motionless, while allowing it, on the other hand, to shift positions through a trigger-action movement.
- If this is not the case:
- loosen screw E (fig. 44);
 - displace spring F until reaching the right position;
 - insert pulling rod N in lever A for controlling the feed contact finger.

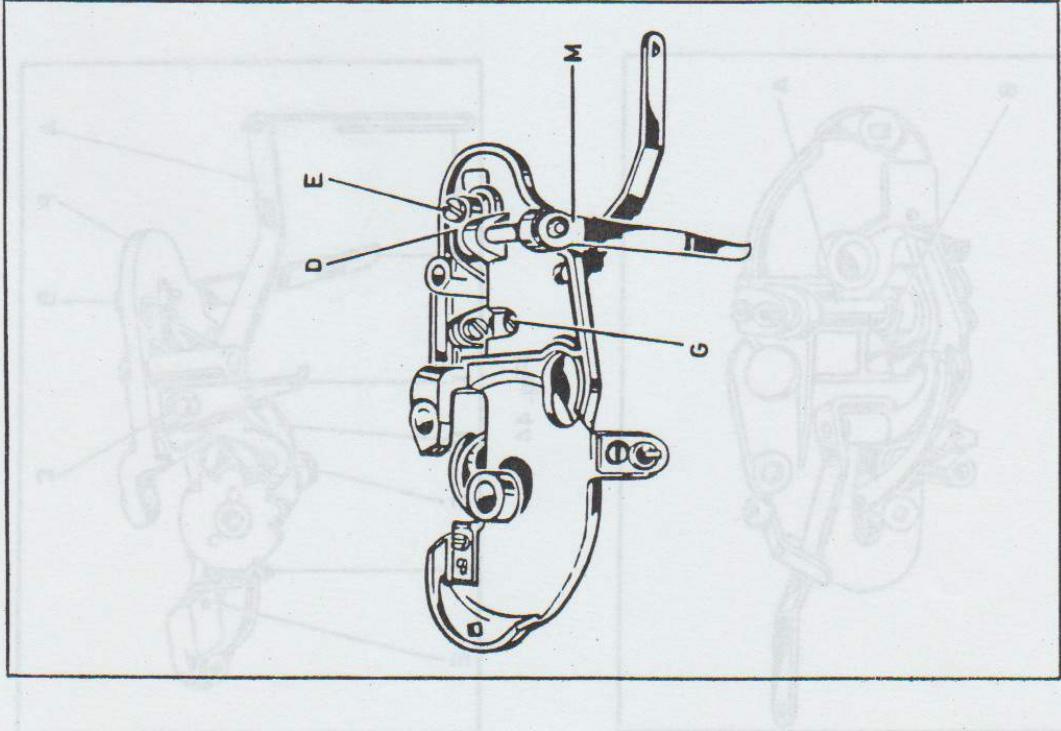


Fig. 46

**ASSEMBLY OF THE DEVICE
HOLDING PLATE ON THE ARM**

- Place the needle displacement and the zigzag width levers to the right;
 - position the plate on the arm so as to obtain the following conditions (fig. 47):
 - 1) lever F to the left on pin H;
 - 2) lever D to the left of lever G;
 - retighten the three screws A, thus fastening the complete plate to the arm;
 - press the reverse sewing knob thoroughly and, with a finger, engage the pulling rod on the stitch length regulating lever.
- With the zigzag lever on zero and the needle displacement lever to the left:
- insert the adjusting grip in the special hole on the arm, stopping the zero mark on the grip near the reference mark on the arm;
 - while keeping, by means of a screwdriver, lever D (fig. 47) against lever G, bring contact finger D (fig. 46) near the cam;
 - tighten screw E;
 - loosen the adjusting screw between lever I and contact finger G (fig. 44): the spring, by stretching itself out, positions contact finger G and lever I;
 - tighten the screw which fastens the lever to the contact finger, making sure that no play exists between contact finger G and the cam and between lever F (fig. 47) and pin H;
 - put the upper cover back in its place.

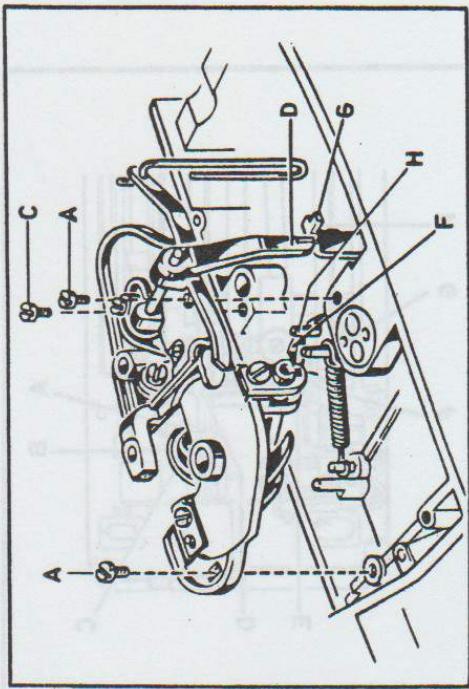


Fig.47

- UPPER SHAFT – BALANCE-WHEEL GROUP**
- Disassembly (figs. 48-49)*
- Remove the upper cover, the front plate, the foot and the needle;
 - remove the presser-bar/needle-bar group;
 - remove the automatic working group;
 - take off taper screws C, E and I (fig. 48), after loosening nuts A, G and L;
 - take off nuts F (fig. 49) and remove small caps E and U;
 - take off pulling rod M from above;
 - loosen the two grub-screws O;
 - displace feed eccentric D toward to machine

- loosen grub-screw T and, using either a hammer or a punch, push pin H of the link thread take-up lever to the exterior (fig. 50);
- by hitting with the hammer on the special extactor placed on bushing A, make this come out toward the machine nose, thus removing the complete upper shaft E.

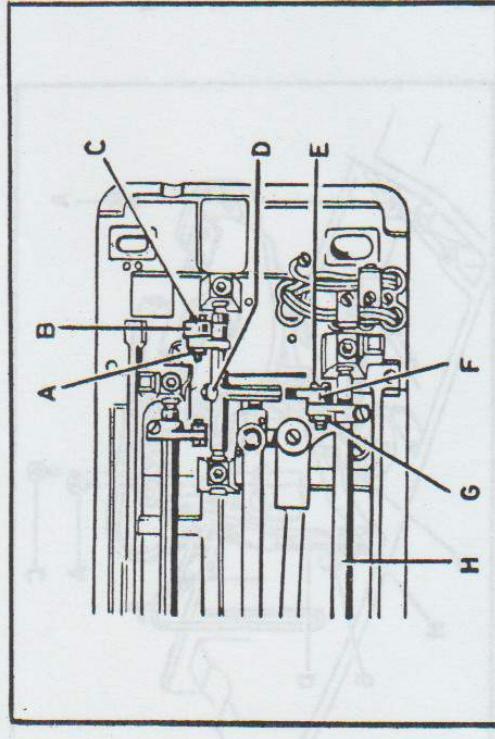


Fig. 48

- nose in order to disengage eccentric lever N from the pulling rod of the stitch length regulating device;
- take off eccentric lever N from below;
 - loosen grub-screw P fastening the eccentric group and turn it in order to move it away from gear C;
 - loosen the two screws of knob I and remove it by unscrewing it;
 - take the belt off the motor pulley;
 - remove balance-wheel H and relevant equalizer;
 - loosen the two grub-screws L;
 - take off balance-wheel cap G;

- insert, from the machine nose, upper shaft E (fig. 50) with bushing A, adjusting ring B, gear C and feed eccentric D;
- using a hammer or a brass rod, push bushing A to the interior until its collar F stops against the machine casting;
- adjust the end play of upper shaft B (fig. 49) by tightening the grub screws A of cap G;
- insert pin H into connecting rod L (fig. 50) and into the machine casting;
- push pin H onward until eliminating the end play of connecting rod L almost totally;
- tighten grub screw T (fig. 49);
- put balance wheel H and the equalizer back in their places;
- tighten knob I as well as the two screws;
- position connecting rod M on the upper shaft;

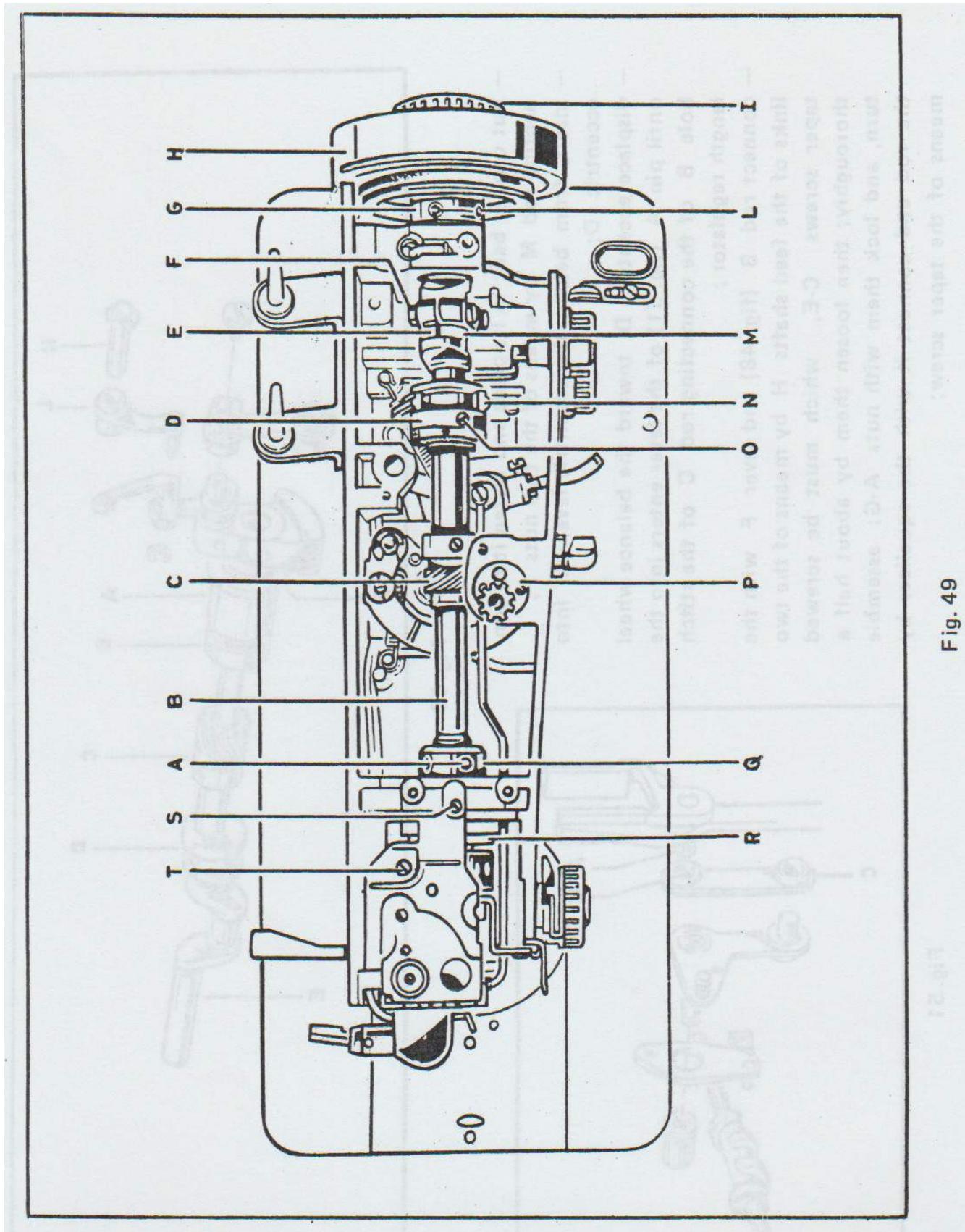


Fig. 49

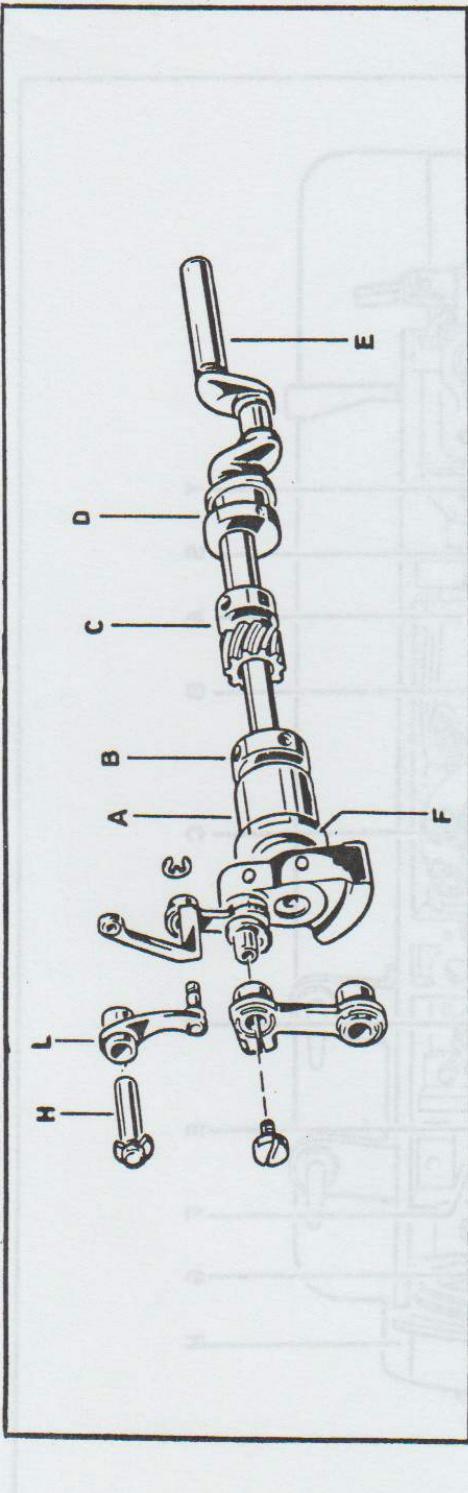


Fig. 50

- put cap E back in its place and fasten it to connecting rod M by means of the two nuts F;
- insert, from below, the eccentric lever N into eccentric D;
- displace eccentric D toward the balance wheel until pin A (fig. 51) of the lever enters into the hole B of the connecting rod C of the stitch length regulator;
- connect rod B (fig. 48) and lever F with the links of the feed shafts H by means of the two taper screws C-E, which must be screwed thoroughly; then loosen them by about half a turn, and lock them with nuts A-G; assemble the rod and connect it with the equalizer by means of the taper screw;

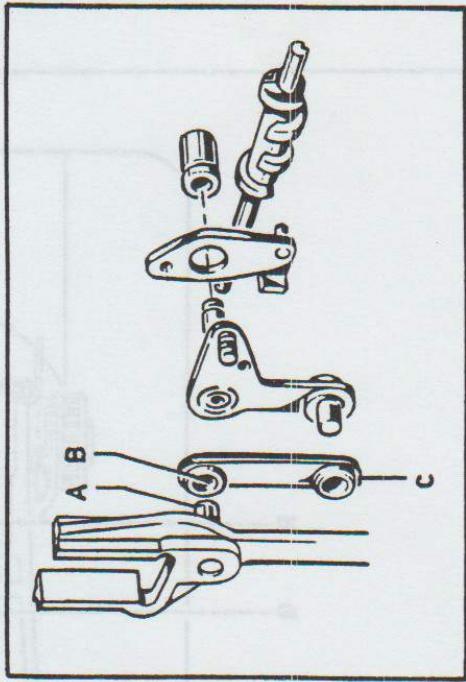
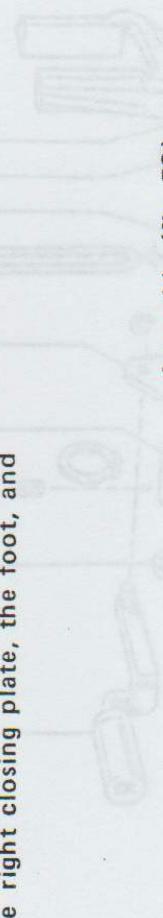


Fig. 51

- assemble the presser-bar/needle-bar group;
- draw eccentric group P near gear C (fig. 49);
- tighten the screw that fastens the eccentric group P;
- execute the needle/feed timing;
- execute the needle/zigzag timing;
- assemble the automatic group;
- put back in their places: the front plate, the upper cover, the right closing plate, the foot, and the needle.



Assembly (fig. 52)

- take off the complete knob S of the stitch length regulating device from the exterior;
- displace limiter N with ring and washers H-I;
- remove benzing ring F;
- take off bushing E, built-in in the machine casting, lever C and connecting rod B;
- remove hand control lever D with reverse sewing knob G.
- Insert the reverse sewing knob G from inside the arm;
- position lever D on bushing E;
- insert stitch length regulating lever C and connecting rod B from the inside;
- assemble benzing ring F, thus fastening the whole group;
- position ring T on limiter N in order that the pointed one of the two grub screws M enters into the notch existing on the spindle of the limiter;
- engage the pointed grub screw M slightly;
- position limiter N with its ring T and washer I, with their concave surfaces facing the arm, in order that pin P enters between the two coils O of limiter N;

STITCH LENGTH REGULATING GROUP

Disassembly (fig. 52)

- Remove the upper cover;
- take off the belt from the motor pulley;
- bring the stitch length regulating knob on 4 and, pressing the reverse sewing knob G, disengage, with a finger, pulling rod R from lever C and spring Q;
- remove the eccentric lever F and the connecting rod (fig. 48);
- loosen the two grub screws M and the two screws L of adjusting ring T;

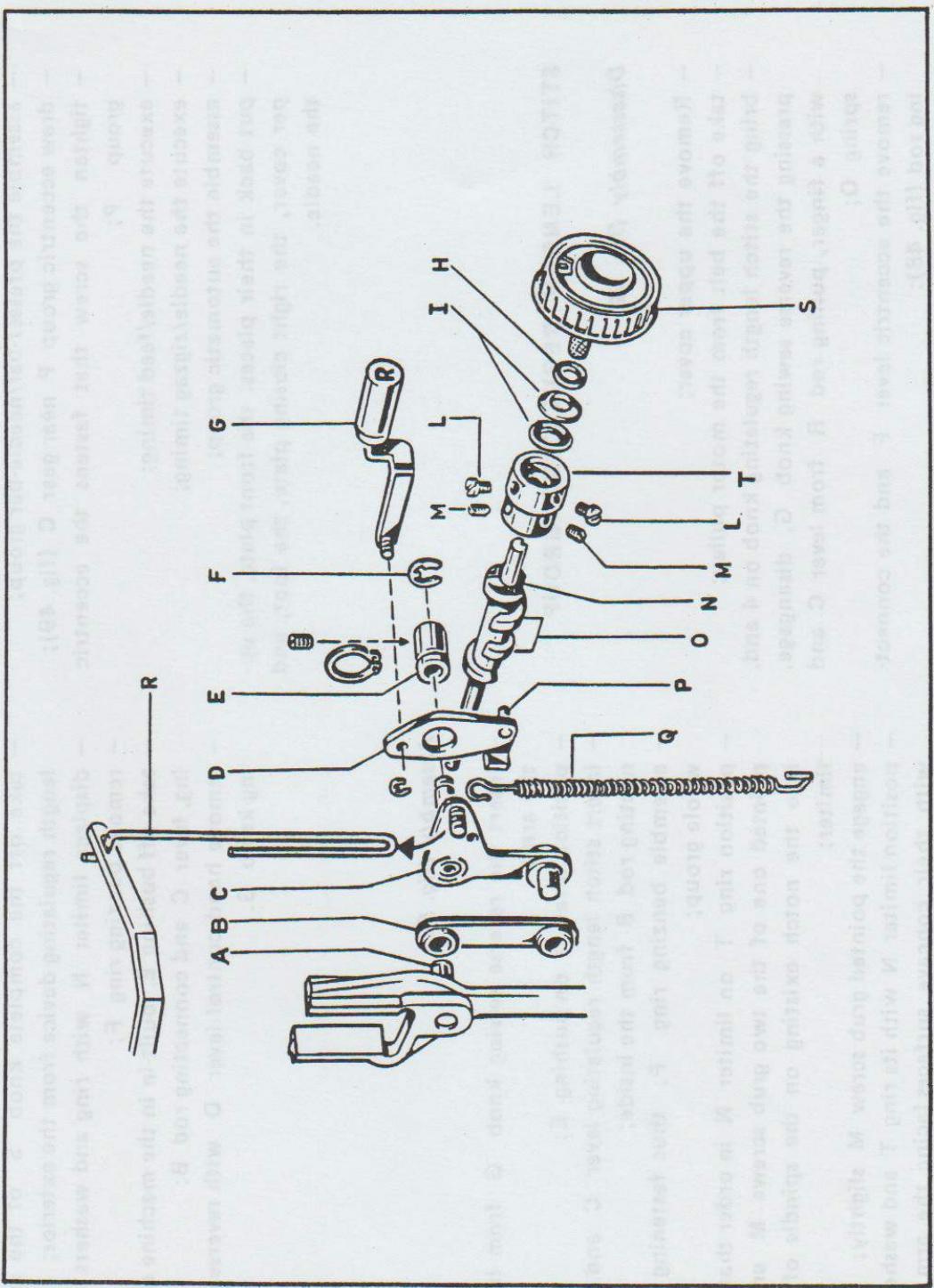


Fig. 52 : Tranh minh họa chi tiết bộ phận

- insert stitch length regulating knob S, placing washers H between the machine casting and washers I, inside the arm;
 - push the stitch regulating knob to the interior until its pin enters into ring T;
 - engage the two screws L slightly;
 - engage the stitch length regulating knob slightly;
 - put lever F and connecting rod B back in their places;
 - hook spring Q;
 - hook pulling rod R;
 - execute the needle/feed timing;
 - set the feed to zero;
 - put back in their places: the motor belt, the right cover, and the upper cover.
- EQUALIZER/SHUTTLE RACE GROUP**
- Disassembly (fig. 53)*
- Remove the foot, the needle and the shuttle with bobbin case;
 - eject the elastic pin O by means of a punch or a hammer;
 - loosen grub screw C;
 - take off shuttle race spindle A, thus removing link D with square block E and adjusting ring B;
 - remove taper screw I after removing nut L;

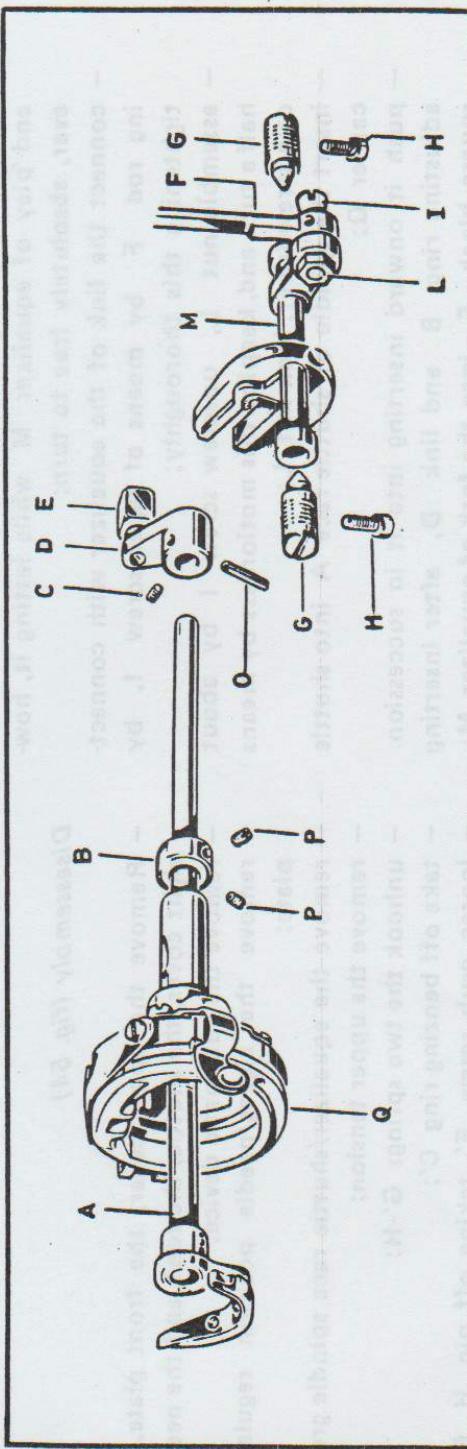


Fig. 53

- loosen the two screws H;
 - push the two pointed pins G to the exterior;
 - remove equalizer M.
- Assembly (fig. 53)**
- Position equalizer M, inserting eccentric N into the lever which controls the lifting device lever;
 - insert the two pointed pins G from the exterior;
 - execute the centering of the lever controlling the lifting device with respect to eccentric N and the link of the equalizer with respect to connecting rod F;
 - tighten the two grub screws H, eliminating the end play of equalizer M while letting it, however, absolutely free to turn;
 - connect the link of the equalizer with connecting rod F by means of taper screw I, by tightening this thoroughly;
 - assemble nut L, unscrew screw I by about half a turn and keeping this motionless by means of a screwdriver, lock nut L;
 - insert the spindle of shuttle race A into shuttle carrier Q;
 - push it onward inserting into it in succession: adjusting ring B and link D, after inserting square block E into the fork of equalizer M;
 - engage grub screw C slightly;

- tighten the two grub screws P of adjusting ring B, thus eliminating the end play of the spindle of shuttle race A;
 - make sure, by turning the balance wheel by hand, that the machine runs smoothly.
- Disassembly (fig. 53)**
- Place gauge symb. 979105000-00 (10.5) on the shuttle carrier, and after finding the timing position, insert pin O into the hole of link D and into the hole of spindle A as far as it will go;
 - tighten grub screw C;
 - put back in their places: the shuttle with bobbin case, the foot, and the needle.
- ZIGZAG GROUP**
- Disassembly (fig. 54)**
- Remove the upper cover, the front plate, the right cover, the shuttle, the foot, and the needle;
 - remove the automatic device;
 - remove the zigzag/needle position regulating plate;
 - remove the equalizer/shuttle race spindle group;
 - remove the upper tension;
 - unhook the two springs G'-H;
 - take off benzing ring C';
 - loosen grub screw E' taking off pin H from above;

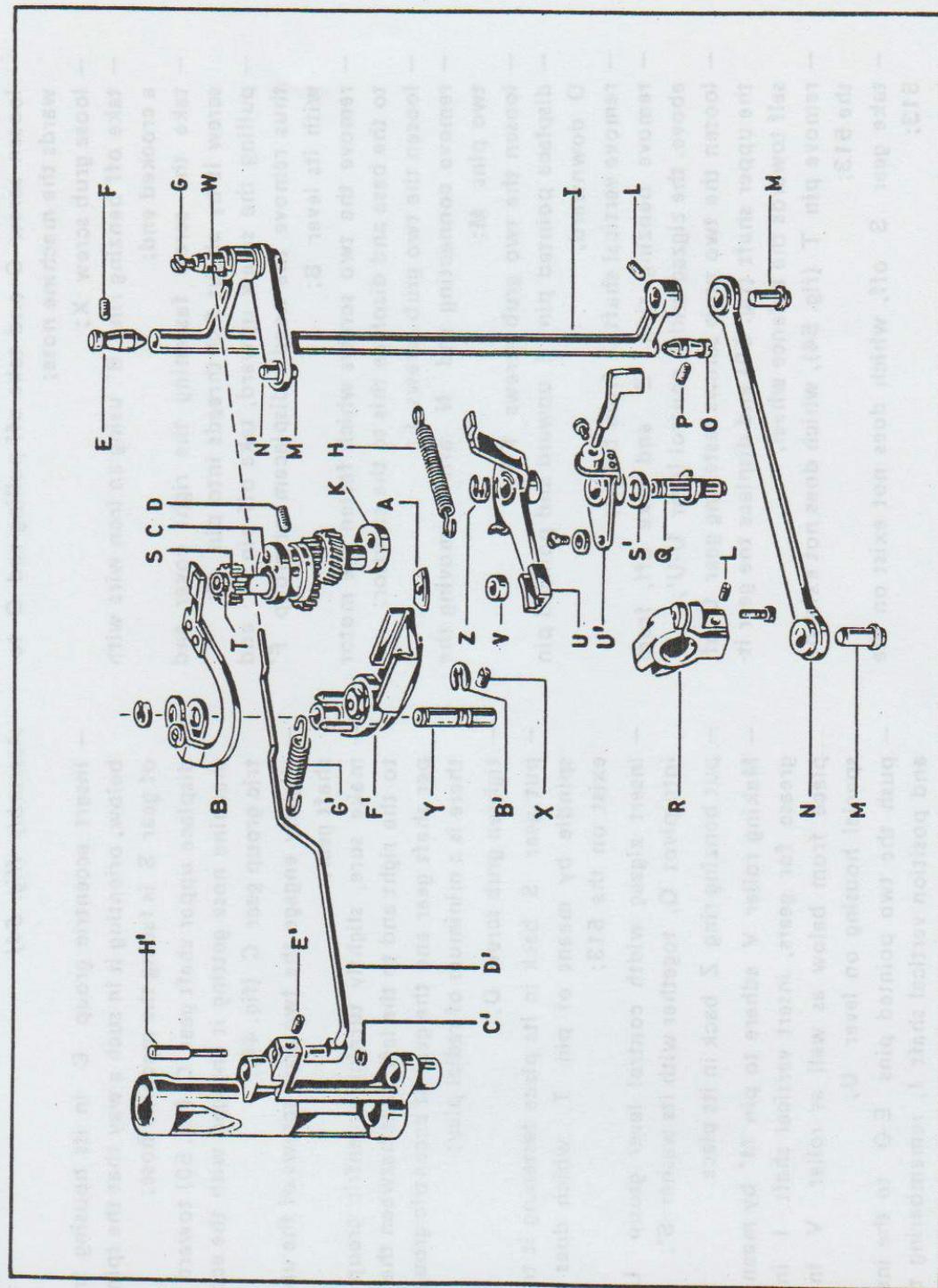


Fig. 54

- Assembly (fig. 54)
- loosen screw C and take off pulling rod D towards the machine nose;
 - loose grub screw X;
 - take off benzing ring B' using an iron wire with a crooked end;
 - take the screw fastening the right cover and screw it by about 2-3 threads into pin Y;
 - pulling the screw upward, take off pin Y and thus remove the needle displacement group F' with its lever B;
 - remove the two screws which fasten the motor to the base and displace this to the exterior;
 - loosen the two grub screws L;
 - remove connecting rod N after removing the two pins M;
 - loosen the two grub screws F-P;
 - displace pointed pin E upward and pointed pin O downward;
 - remove vertical shaft I from below;
 - remove benzing ring Z and take off, from above, the zigzag width control lever U-U';
 - loosen the two grub screws fastening gear C of the upper shaft (fig. 50) and displace the gear itself towards the balance wheel;
 - remove pin T (fig. 54), which does not exist on the 513;
 - take gear S off, which does not exist on the 513;
 - loosen grub screw D;
 - take off the eccentric group C from below.
 - Insert eccentric group C in its housing from below, orienting it in such a way that the spindle of gear S is facing the machine nose;
 - displace upper shaft gear C (fig. 50) toward the machine nose getting it engaged with the eccentric group gear C (fig. 44);
 - slightly engage the two grub screws of the upper shaft gear;
 - make sure, slightly turning eccentric group C to the right and to the left, that between the upper shaft gear and the gear of eccentric group C there is a minimum of radial play;
 - tighten grub screw D;
 - put gear S back in its place fastening it to its spindle by means of pin T, which does not exist on the 513;
 - insert zigzag width control lever group U-U' into pivot Q, together with its washer S';
 - put benzing ring Z back in its place.
 - Making roller V adhere to pin M' by means of grease for gears, insert vertical shaft I in its place from below as well as roller V in its special housing on lever U;
 - push the two pointed pins E-O to the inside and position vertical shaft I, remembering that roller V must be free to move without, on the other hand, pressing against lever U;

- tighten the two grub screws F-P and eliminate the end play of the vertical shaft;
- connect vertical shaft I with link R of the shuttle carrier by means of connecting rod N, by inserting the two pins M into the connecting rod and into the holes of shaft I and of link R respectively;
- tighten the two grub screws L;
- position lever U centering it on the arm and sector A on pin N;
- turn the balance wheel by hand until the larger section of three-lobe eccentric K is turned to the inside.
- Position needle displacing group F' with lever B' and spring G' in such a way as to make sector A with its ground side turned to the inside enter into the lower race of needle displacing group F' and the three-lobe eccentric enter into the upper race;
- using, as above, the screw of the right cover, insert pin Y into needle displacing lever F' and into the machine casting;
- using the tool for benzing rings symb. 828049806, put benzing B' back in its place and into the groove of pin Y;
- divide the play between sector C (fig. 55) and lower race and between three-lobe eccentric A and the upper race of needle displacing lever group B;
- tighten grub screw X (fig. 54);
- insert pulling rod D' through the machine nose into the hole W of the vertical shaft pin;
- insert pin H' into the support and into the pulling rod D';
- put benzing ring C' back in its place;
- tighten grub screw E';
- engage screw G' slightly;
- hook the two springs H and G;
- assemble the plate regulating the zigzag and needle position;

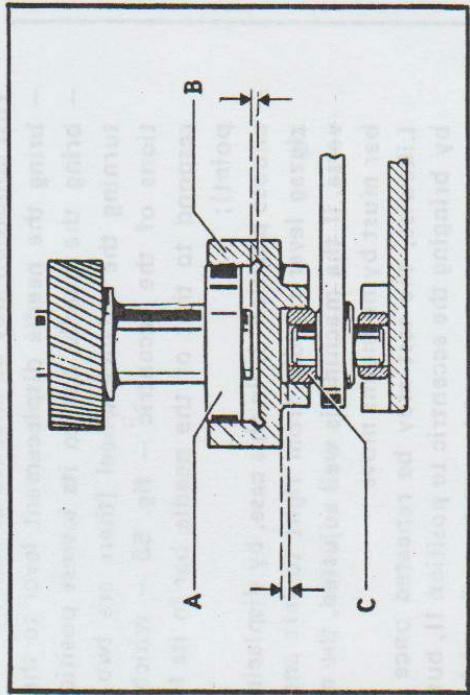


Fig. 55

- assemble the equalizer/shuttle race spindle group;
- execute the zigzag timing;
- assemble the upper tension;
- assemble the automatic device;
- put back in their places: the motor, the front plate, the upper cover, the right cover, the shuttle, the foot, and the needle.

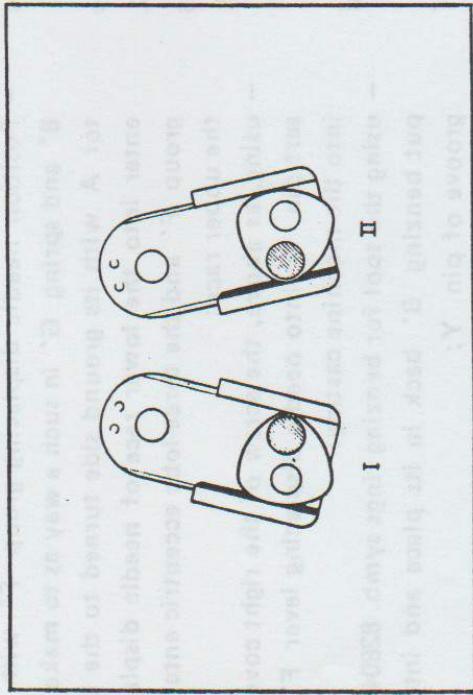


Fig. 56

In order to have perfectly symmetric designs the zigzag width must be equally divided as regards the central position of the needle. This condition may be checked as follows:

- bring the needle displacement lever to the left;
- bring the needle bar to its lowest position by turning the balance wheel (there are two positions of the eccentric — fig. 56 — which correspond to that of the needle bar in its lowest point);
- choose position I; in this case, by displacing the zigzag lever rapidly from right to left and vice versa, if the machine is well adjusted, the needle bar must by no means move.
- Likewise, the test may be repeated once again by bringing the eccentric to position II, but with needle in lower position and on the right, i.e. with needle displacement lever on the right.

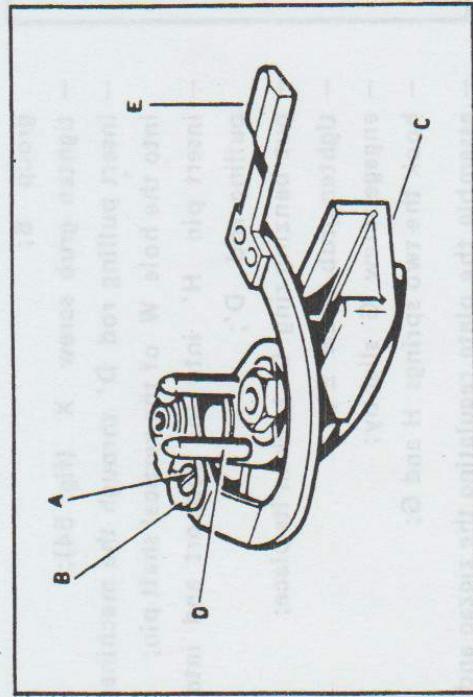


Fig. 57

If in this position the needle moves, proceed as follows:

- loosen screw A slightly (fig. 57);
- turn eccentric B to the right or to the left, until you have obtained the desired conditions, then tighten screw A again.

With this operation you have merely adjusted the rotation limit to the left of oscillating lever C, as its fixed pin D runs foul of eccentric B, which is held in its place by lever E.

Now it is the whole oscillation angle of lever C that is made symmetric with respect to the central position of the needle.

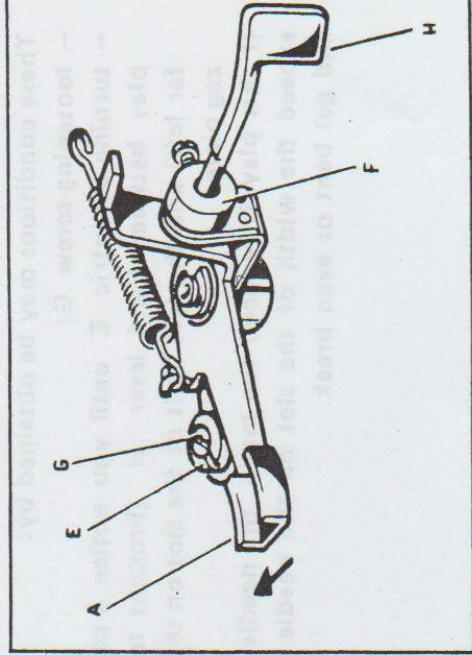


Fig. 58

ZIGZAG WIDTH ADJUSTMENT

The limitation of the race in the direction of the arrow of lever A (fig. 58) for the automatic control of zigzag is well defined as it is bound with that of sector B (fig. 59) which, running underneath oscillating lever C (seen from below for clarity's sake), stops against fixed pins D.

The eccentric placed on the hand control lever H (fig. 58) must not hinder the movement of A, otherwise it would cause a residual zigzag.

On the other hand, lever F for the hand control of zigzag must be free to run from left to right so as to obtain a zigzag comprised between $4.7 \div 5.2$ mm.

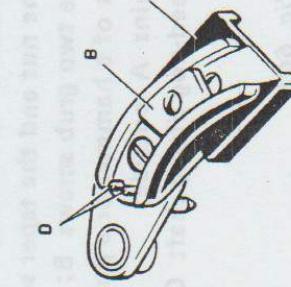
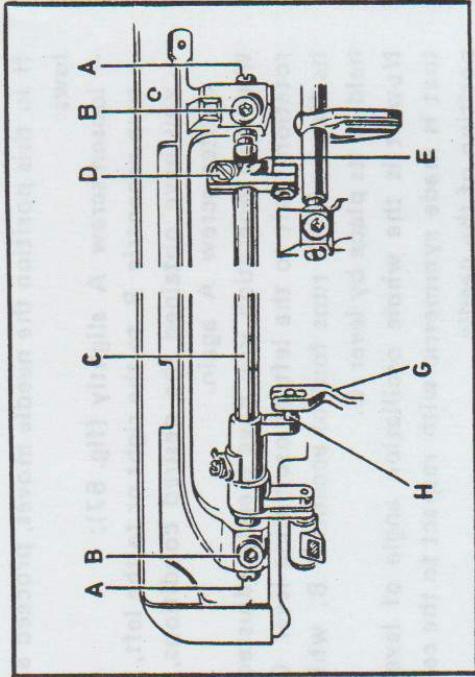


Fig. 59

These conditions may be obtained by:

- loosening screw G;
- turning eccentric E until you notice a certain play between hand lever H (brought to the far left) and the left limit of the slot on the zig-zag plate.
- If this play is reduced too much, the needle may exceed the width of the slot on the needle plate and get bent or even break.



FEED-DOG LIFTING SHAFT GROUP

Disassembly (fig. 60)

- Loosen screw D of link E;
 - remove the nut and the taper screw of link E;
 - loosen the two grub screws B;
 - by means of a hammer or a punch, push the two pointed pins A outside;
 - remove feed-dog lifting shaft C.
 - push the two pointed pins A into the housings of shaft C;
 - tighten the two grub screws B and eliminate the end play of shaft C without causing any hindrance to its movement.
- Join the connecting rod of the feed-dog lifting unit with the link by inserting the relevant taper screw and nut.
- Position feed-dog lifting shaft C on the base;
 - insert the fork of lever E on eccentric F and roller H on fork G and center them;
 - Adjust the height of the feed-dog teeth.

Assembly (fig. 60)

FEED SHAFT / SHUTTLE CARRIER GROUP

Disassembly (fig. 61)

- Remove the foot, the needle, the needle plate, and the shuttle;
- remove the shuttle race shaft;
- loosen screw B;
- take off shuttle carrier group N to the outside;
- take off needle-plate holding hook M after removing the screw that fastens it to the machine casting;
- remove taper screw D after unscrewing nut H;
- loosen the two grub screws F;
- push the two pointed pins E outside;
- remove feed-dog shaft L.
- tighten the two grub screws F, and eliminate the end play of the shaft itself.
- Assemble shuttle carrier group N, inserting it into the machine casting and link I;
- slightly engage screw B;
- join connecting rod G with the link of the feed-dog shaft with taper screw D, which must be tightened strongly;
- screw nut H again, and unscrew screw D by about half a turn and, keeping it motionless with a screwdriver, lock nut H;
- assemble the shuttle race shaft;
- put the shuttle and the needle back in their places;
- adjust the distance between the needle and the shuttle;
- assemble the foot.

Assembly (fig. 61)

- Position feed-dog shaft L, inserting fork O into feed-dog shaft roller A;
- displace the two pointed pins E to the inside;
- slightly engage the two grub screws F;
- put needle-plate holding hook M back in its place, fastening it to the machine casting with its screw;
- assemble the needle plate;
- center the feed-dog with respect to the slot on the needle-plate, displacing shaft L either to left or to right, according to need;

IMPORTANT – It is advisable to follow each and every operation of assembly and adjustment, total or partial, by a practical sewing test, possibly using the material and the thread which are to be employed on the machine, in order to check and possibly perfect the servicing, according to the result of the sampling.

Finally, check once more the oil levels in the tanks and ensure that there is no leaking through the washers, especially in the area of sewing.

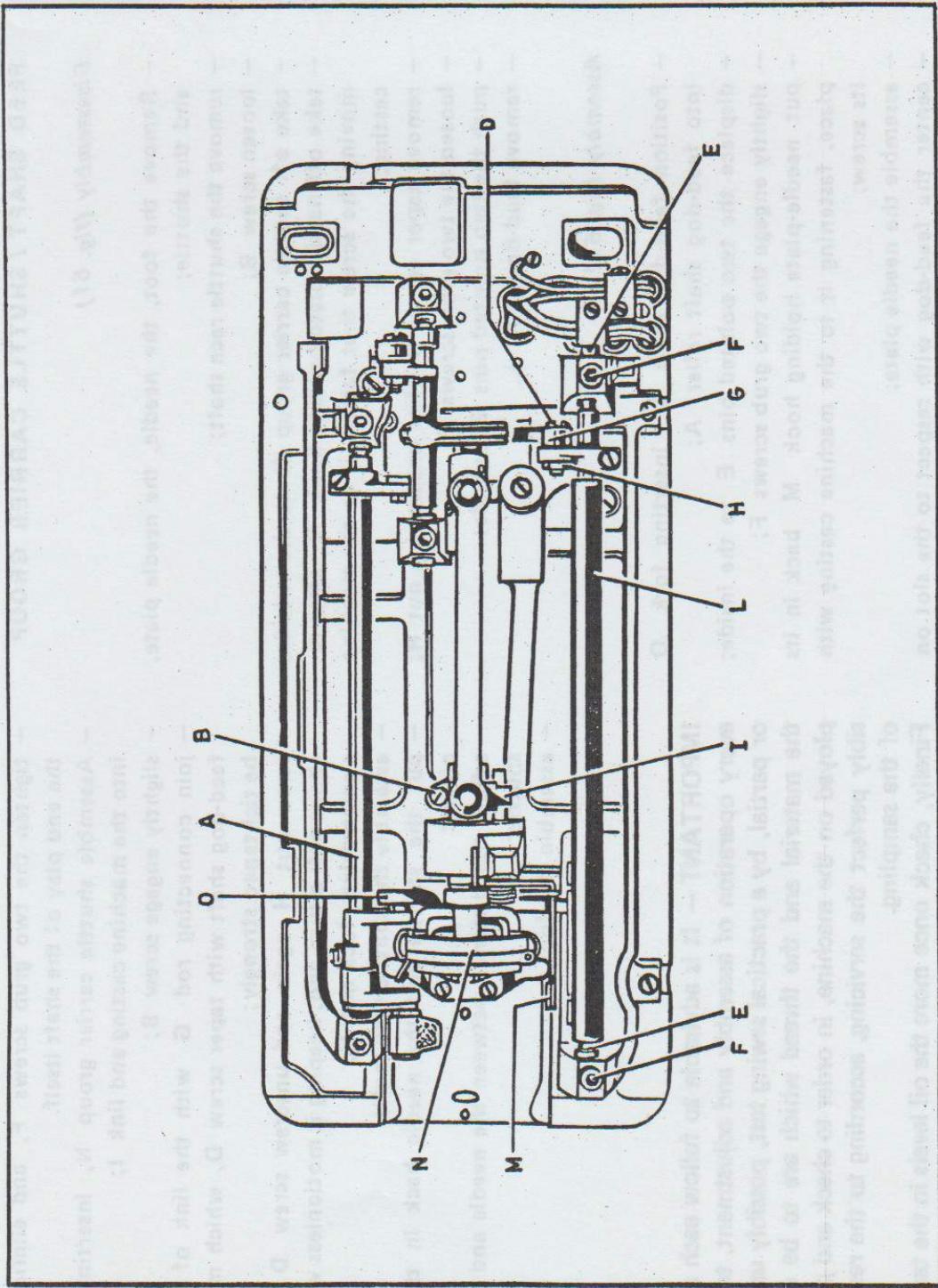


Fig. 61