SERVICE MANUAL

FOR

MODEL 360/260
KNITTERS

C O N T E N T S :

[1] BASIC

1. NAMES OF MACHINE PARTS

1-1 Machine Body

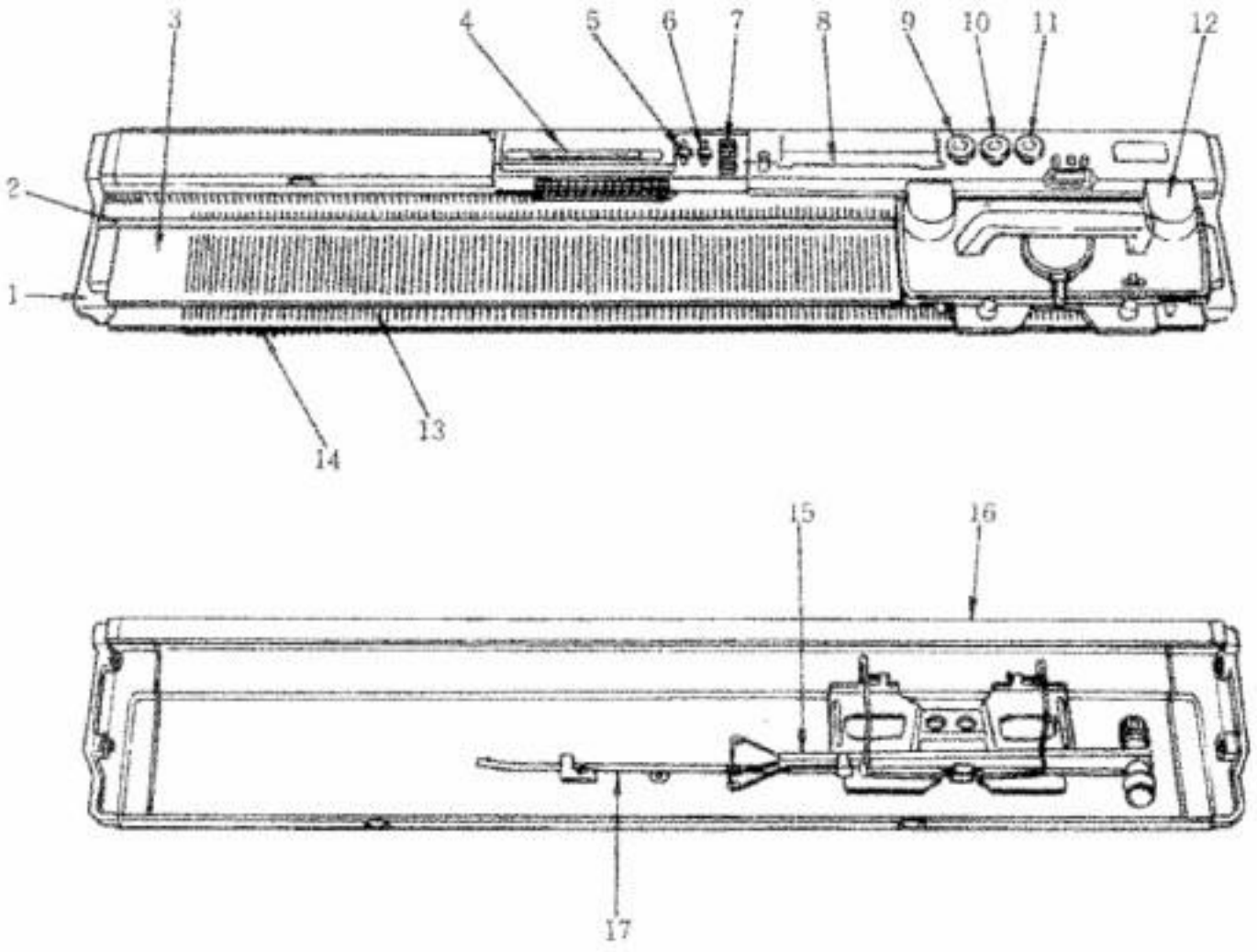


Fig. 1

1. Side Cover (L)
2. Carriage Rail
3. Needle Bed
4. PC Panel
5. Stop Knob
6. L Knob
7. Feeding Dial
8. KR Panel
9. Row Number Dial
10. Feeding Dial
11. Change Dial
12. Carriage
13. Needle
14. Sinker
15. Tension Complete
16. Top Cover
17. Yarn Rod Unit

1-2 Carriage (Inside)

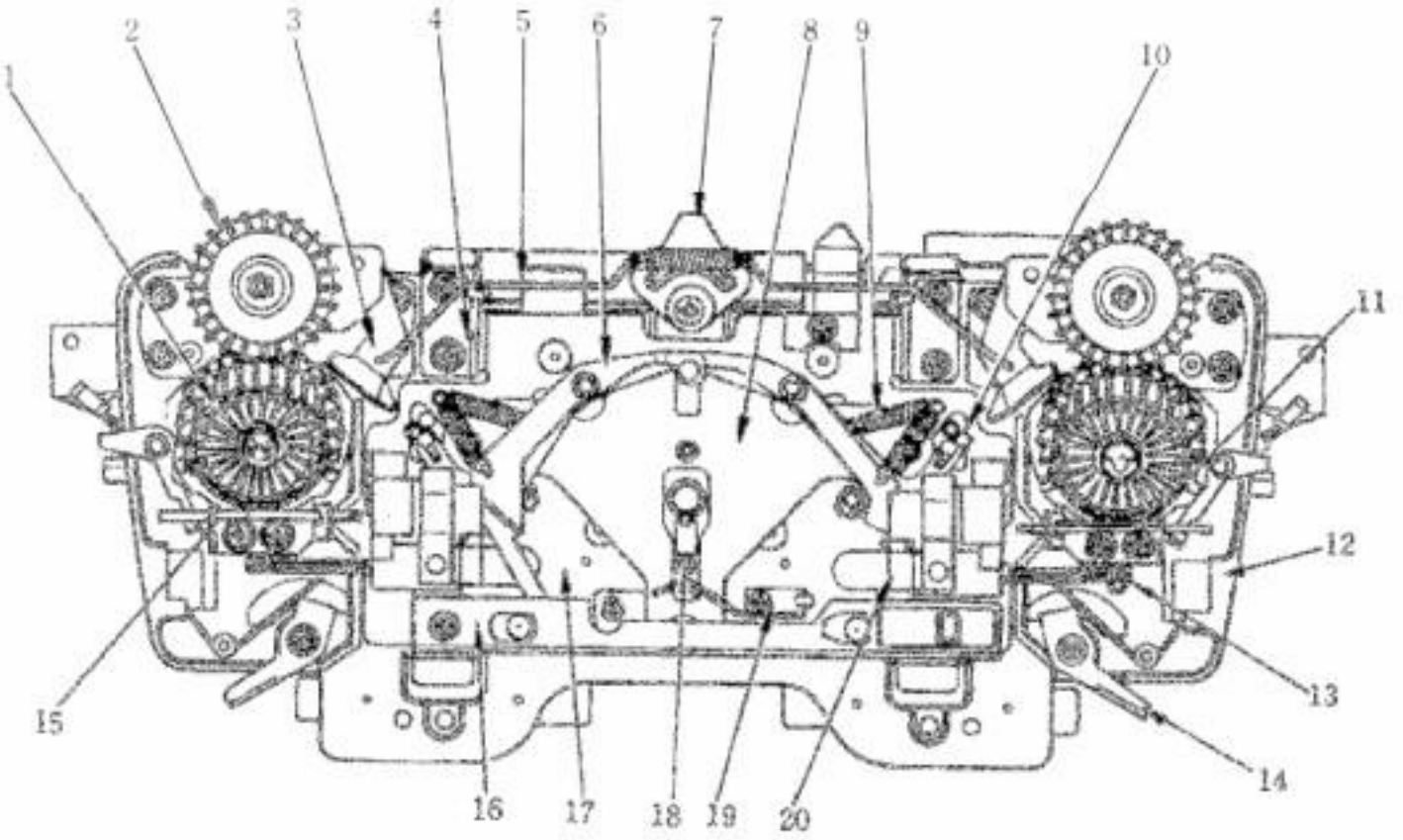


Fig. 2

1. Sub Drum
2. Main Drum
3. Sub Clear Cam (L)
4. Carriage Plate A Holder (L)
5. Clear Wire (L)
6. Rising Cam Lever (L)
7. Clear Cam
8. Travelling Plate
9. Sub Lever Spring
10. Cam Spring
11. Side Lever Spring A (R)
12. Carriage Plate B
13. Rising Spring Hanger
14. Russel Lever (R)
15. Side Lever Spring A (L)
16. Jam Release Plate
17. Carriage Plate A
18. Moving Plate Pin
19. Dial Spring
20. Handle holder (R)

1-3 Carriage (Back)

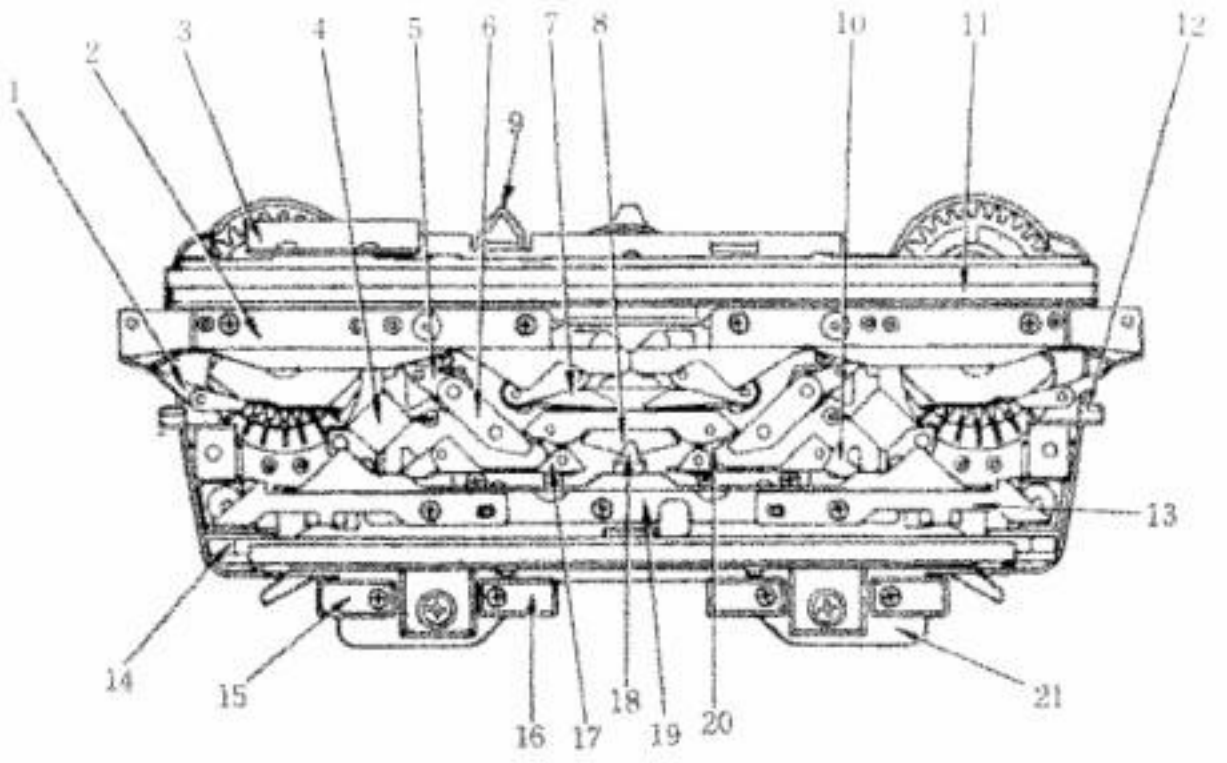


Fig. 3

1. Side Cam (R)
2. Guide Plate (R)
3. Driving Cam
4. Separation Cam (R)
5. Sub Cam
6. Main Cam
7. Knit-in Cam
8. Centre Cam
9. Feeding Plate
10. Rising Cam
11. Carriage Pipe
12. Guide Cam (L)
13. Russel Cam (L)
14. Slider
15. Magnet A
16. Magnet B
17. Middle Course Cam (R)
18. Lowering Cam C
19. Needle Guide
20. Lowering Cam C
21. Carriage Plate B

1-4 Arm

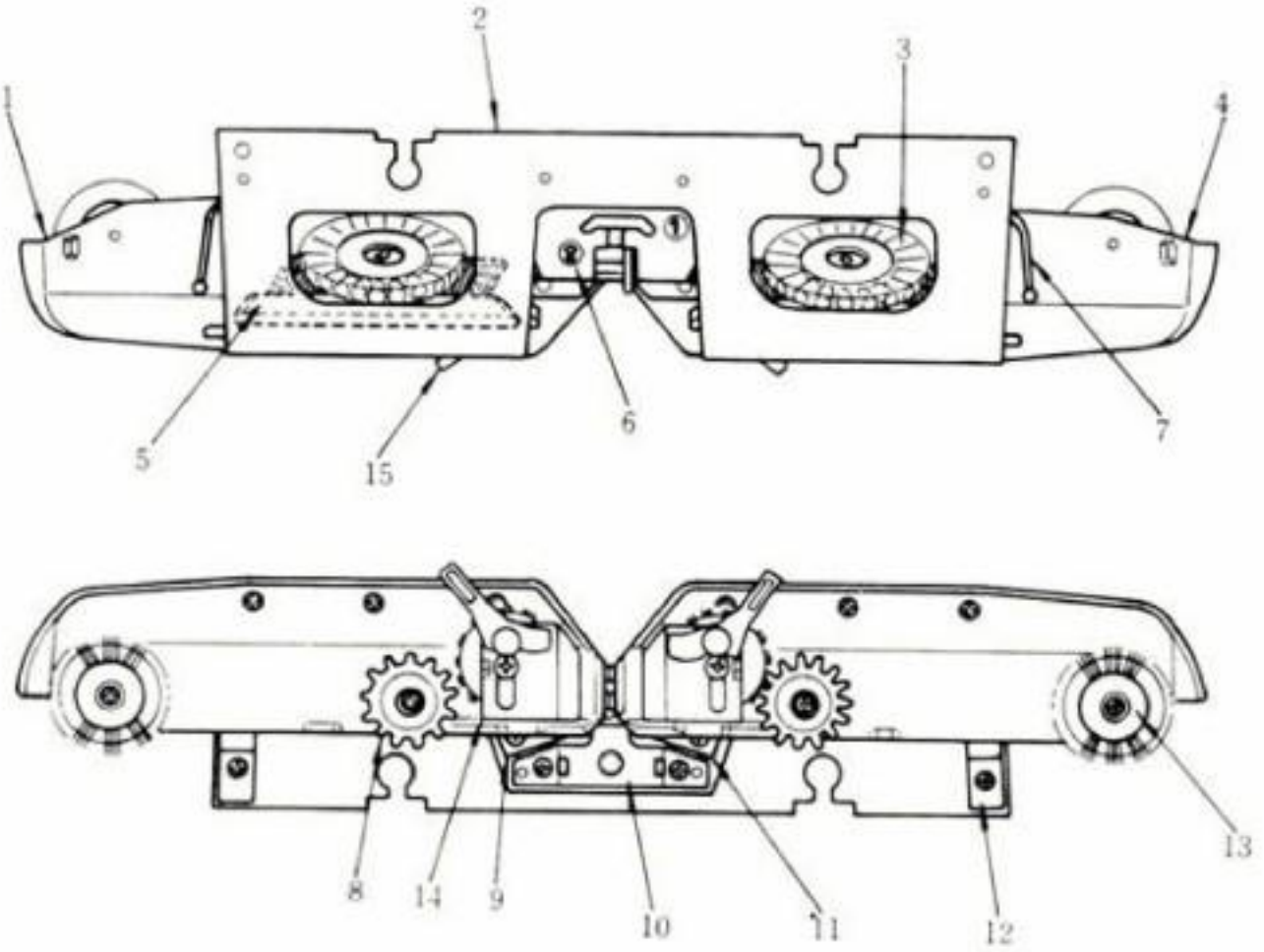


Fig. 4

1. Fabric Presser (L)
2. Arm
3. Weaving Brush
4. Fabric Presser (R)
5. Clearing Brush
6. Yarn Feeder
7. Yarn Holder (R)
8. Fabric Gear
9. Magnet (L)
10. Platting Yarn Feeder
11. Magnet (R)
12. Weaving Yarn Feeder (R)
13. Round Brush B
14. Tuck Brush Base(L)

2-1 How a Needle Forms A stitch

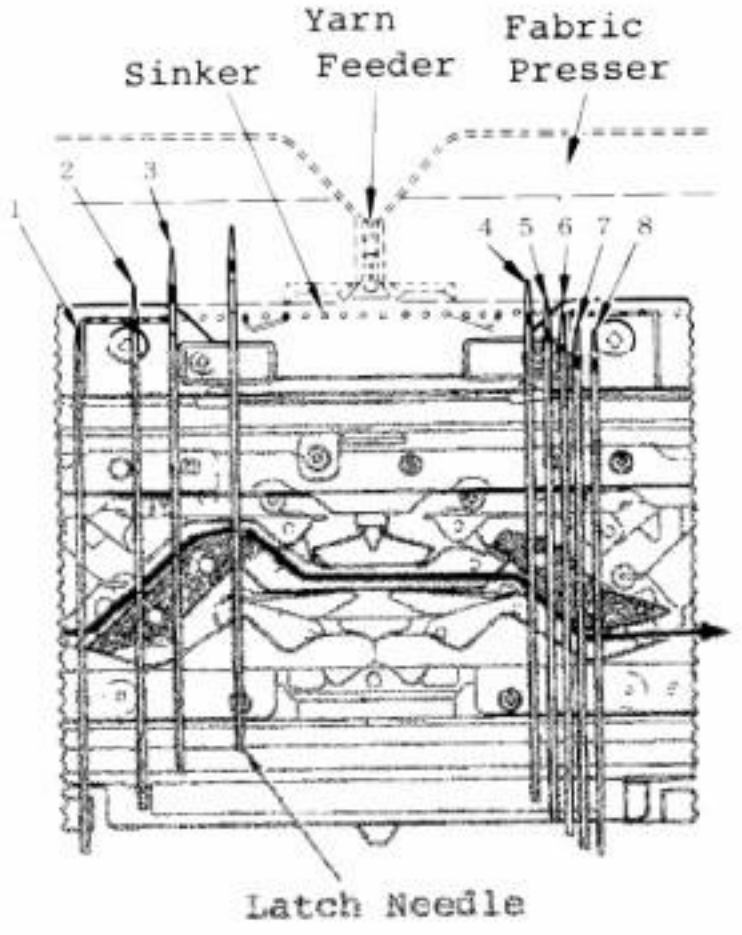


Fig. 5

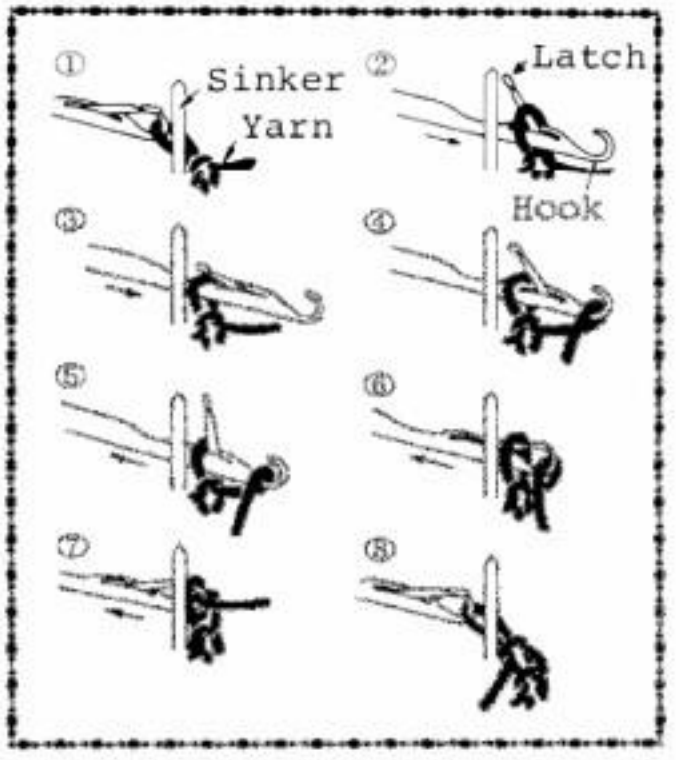


Fig. 6

1. An old stitch is hanging on the hook of a Needle.

2. The Needle is pushed forward by a Main and Sub Cam.
   The fabric is also carried forward but is stopped by the Fabric Presser and only the Needle is pushed forward getting its latch opened by the stitch.

3. As the Needle goes further forward, the stitch goes over and behind the latch.

4. Yarn is fed on the hook of the Needle through the Yarn Feeder to form a new stitch.

5. The Needle begins to move back as it is pushed by the other Main Cam.

6. As the Needle goes back, the fabric pushes the latch causing it to close.

7. When the Needle is led further Back, the latch closes on the hook completely, confining the yarn under it.

8. When the Needle is back in its original position, the old stitch slips from the hook, passing over the latch.
   (The Sinker Posts serve to make even the size of the stithces.)
   Now a new stitch is on the Needles.

3. MECHANISM OF NEEDLE SELECTION AND FUNCTION

3-1 Punch Card

A punch Card is make from vinyl chloride and has many punched holes that represents a pattern.

Fig.7

3-2 Pattern Unit

The Pattern Unit reads a pattern from a Punch Card and conveys it to the Main Drum on the Carriage.
When the Carriage is moved across the Needle Bed, the Feeding Lever, on the Pattern Unit, is raised by the Driving Cam, secured to the rear side of the Carriage, and the Touch Levers are moved by spring action.

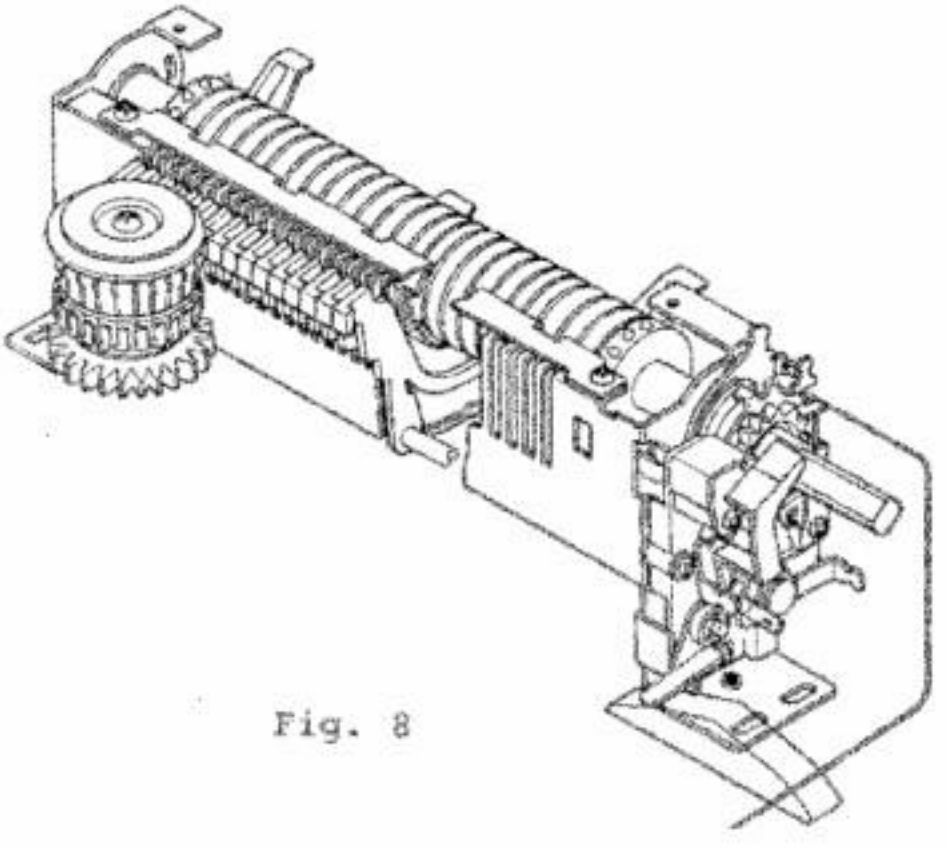


Fig. 8

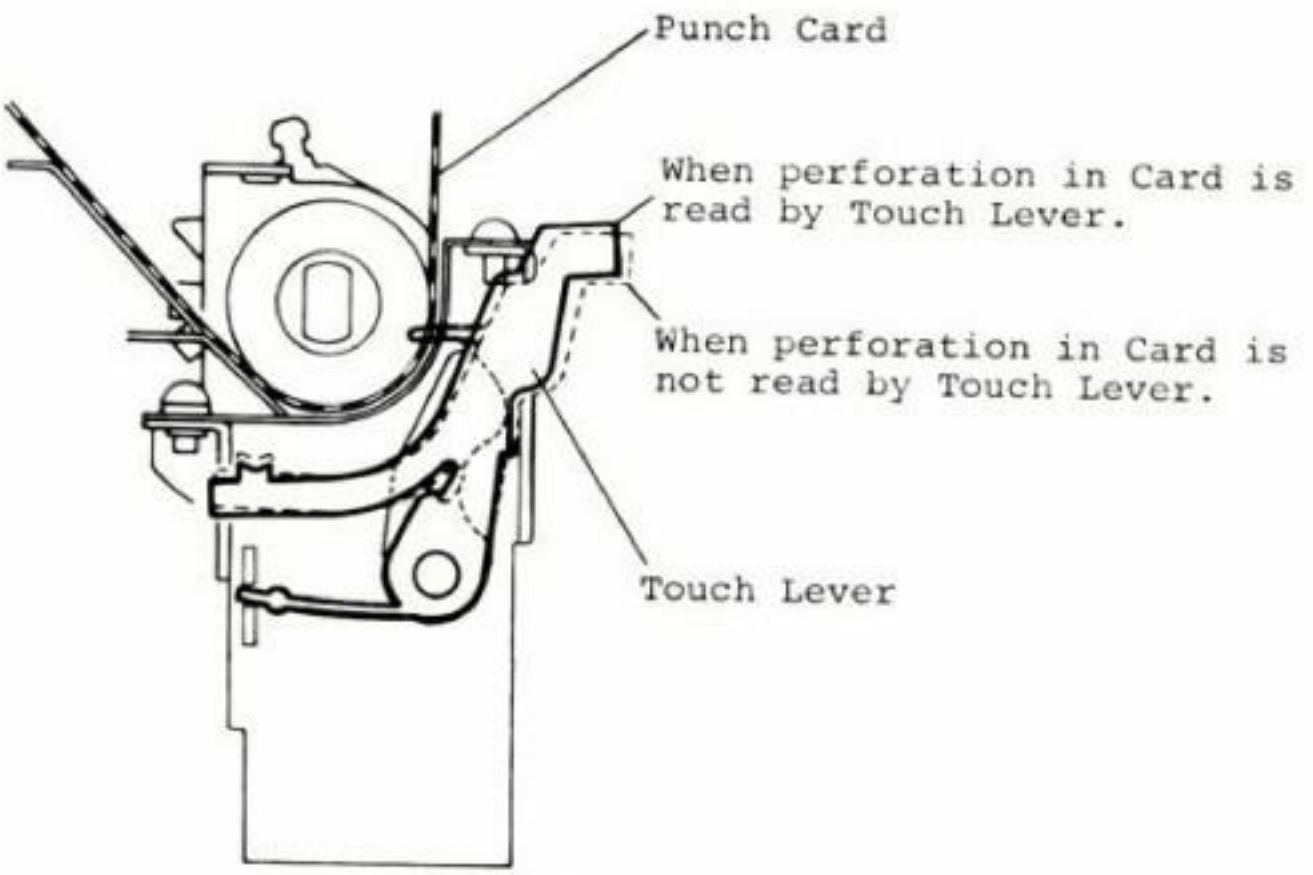


Fig. 9

3-3 Drum

The Drum reads and memorizes the pattern from the Punch Card transmitted by the Touch Levers, on the Pattern Unit, and according to its memory, selects the appropriate number of Needles.
The Drum can only memorize a pattern which requires up to 24 Needles. The range of Needle selection available from a Punch Card is from 2 to 24 stitches.
Those Touch Levers remaining in a lower position, hit respectively the upper parts of their corresponding Drum Pieces located in the Drum Unit, which brings about a convex-concave condition around the Drum.

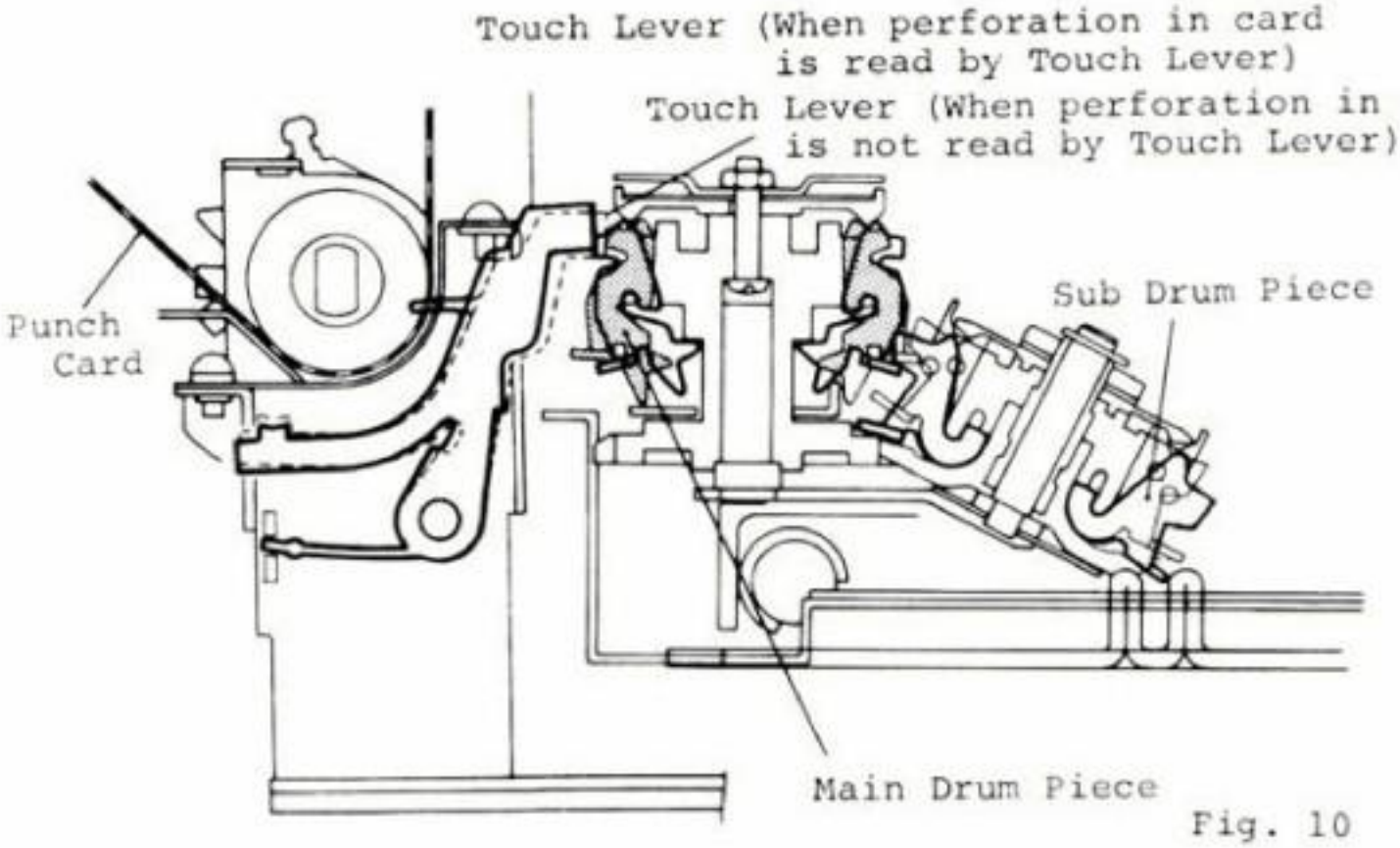


Fig. 10

Main Drum:

The Main Drum transmits to the Sub Drum, the patterns registered from the Touch Levers.

Sub Drum:

The Sub drum memorizes the patterns, conveyed via the Main Drum from the Touch Levers, and selects the Needles accordingly.

1. When the Scanning Finger of a Touch Lever finds and enters a hole in the Punch Card, that Touch Lever will be at a higher position and will not contact the upper part of a Main Drum Piece (leaving the lower part in an inactive position) and, therefore, does not activate the Sub Drum Piece. Accordingly, the lower part of the Sub Drum Piece remaining in a lower position, will push the butt of a corresponding Needle forwards so that it will proceed along the front edge of a Separation Cam, to be pushed more forward to the selected course.

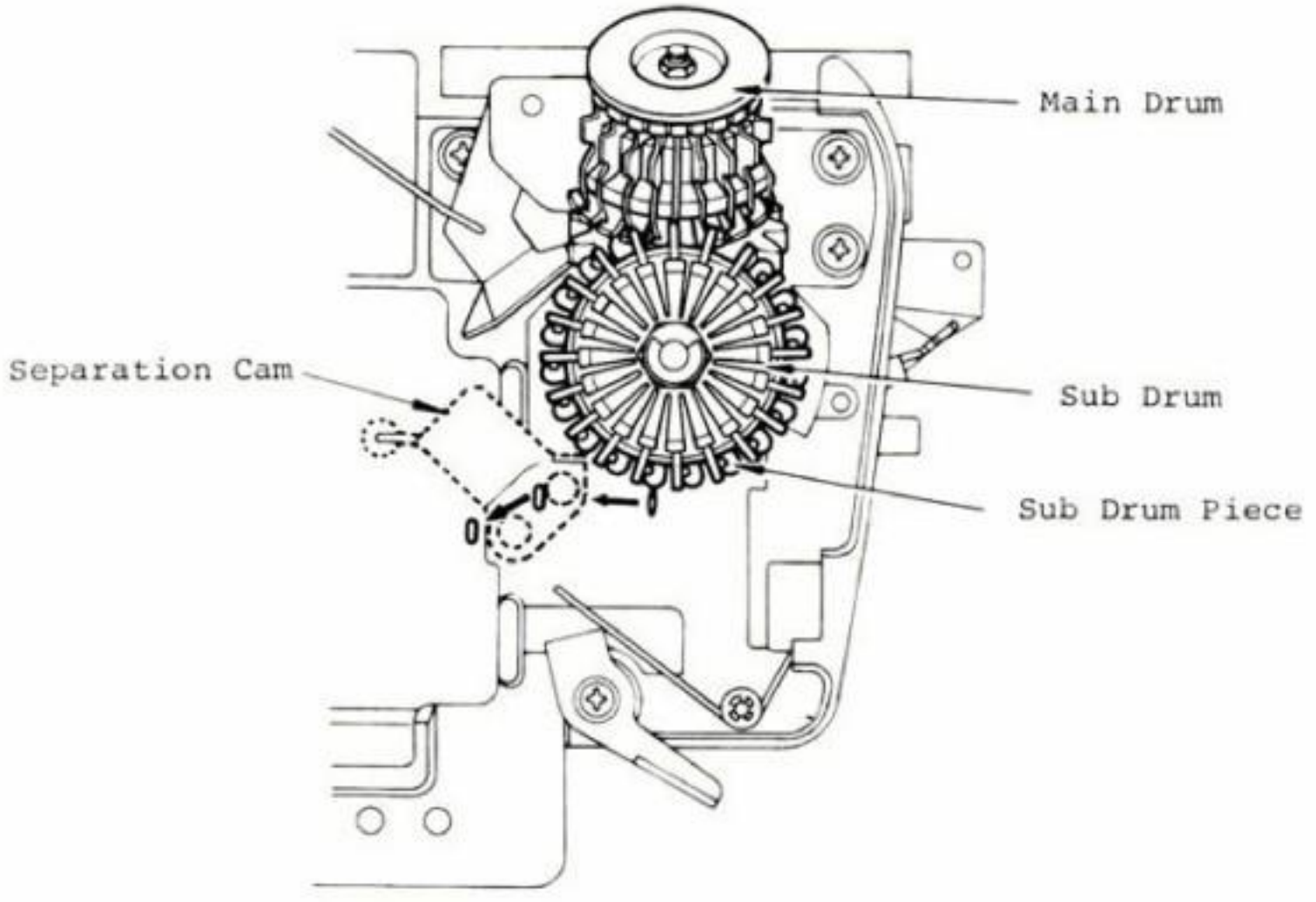


Fig. 11

2. When the Scanning Finger of a Touch Lever does not enter the hole of a Punch Card, the Touch Lever will remain in a lower position and push the upper part of a Main Drum Piece, making the lower part of the Piece come out to push the upper part of the Sub Drum Piece. The lower part of the Sub Drum Piece will not touch the Needle butt, but leave the Needle between the teeth of the Sub Drum Gear to be led behind the Separation Cam as illustrated below.

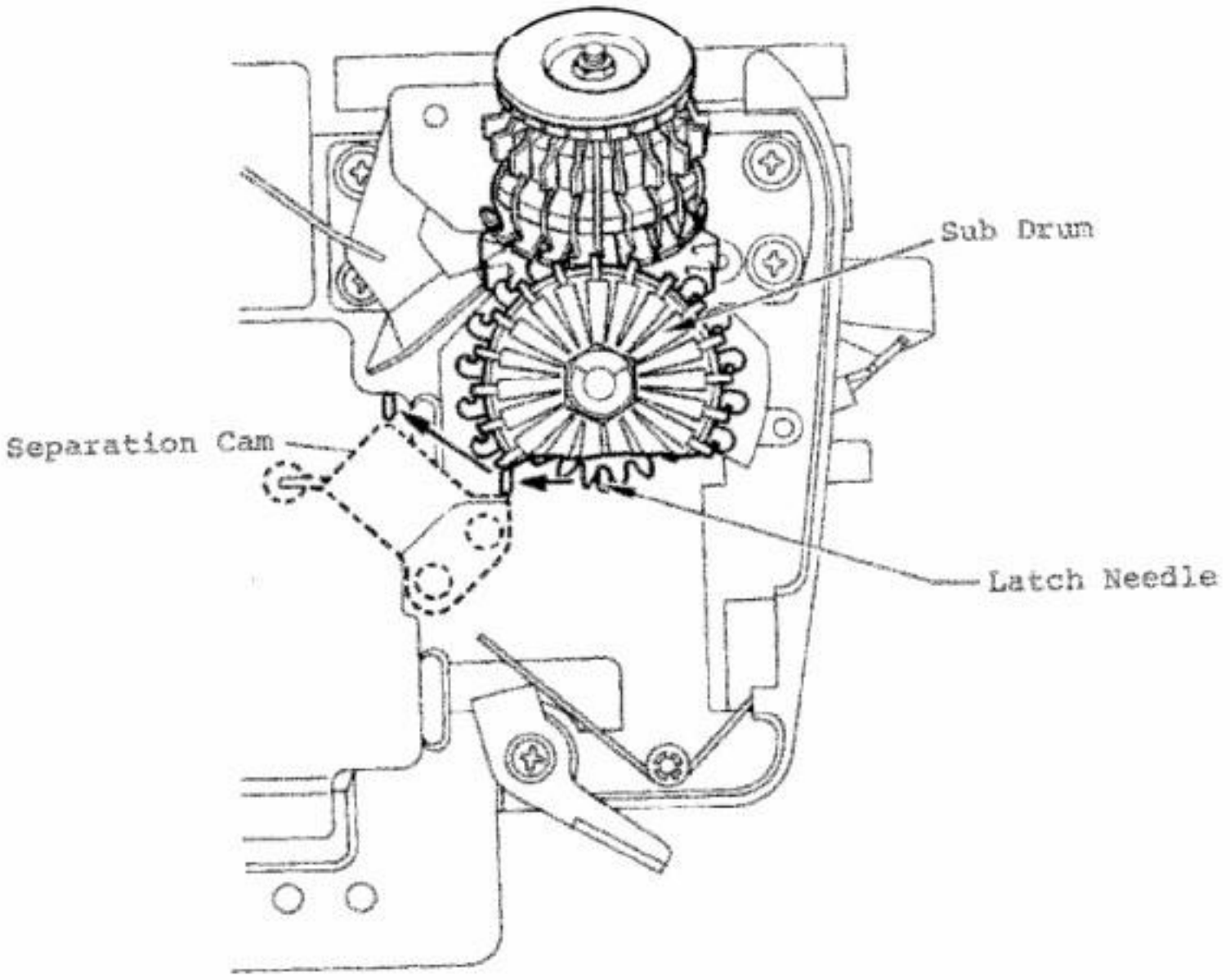


Fig. 12

[II] DISASSEMBLY, ADJUSTMENT, AND ASSEMBLY

1 DISASSEMBLY OF CARRIAGE AND MAIN BODY

1-1 Disassembly of Carriage (down to Carriage Cover)

1. Fold the Carriage Handle backwards as indicated in the figure below.

2. Remove the two Carriage Screws, both of which are located in a recess at the foot of both sides of the Handle. Use a ⊕ No. 1 Driver as shown in Fig. 13 below.

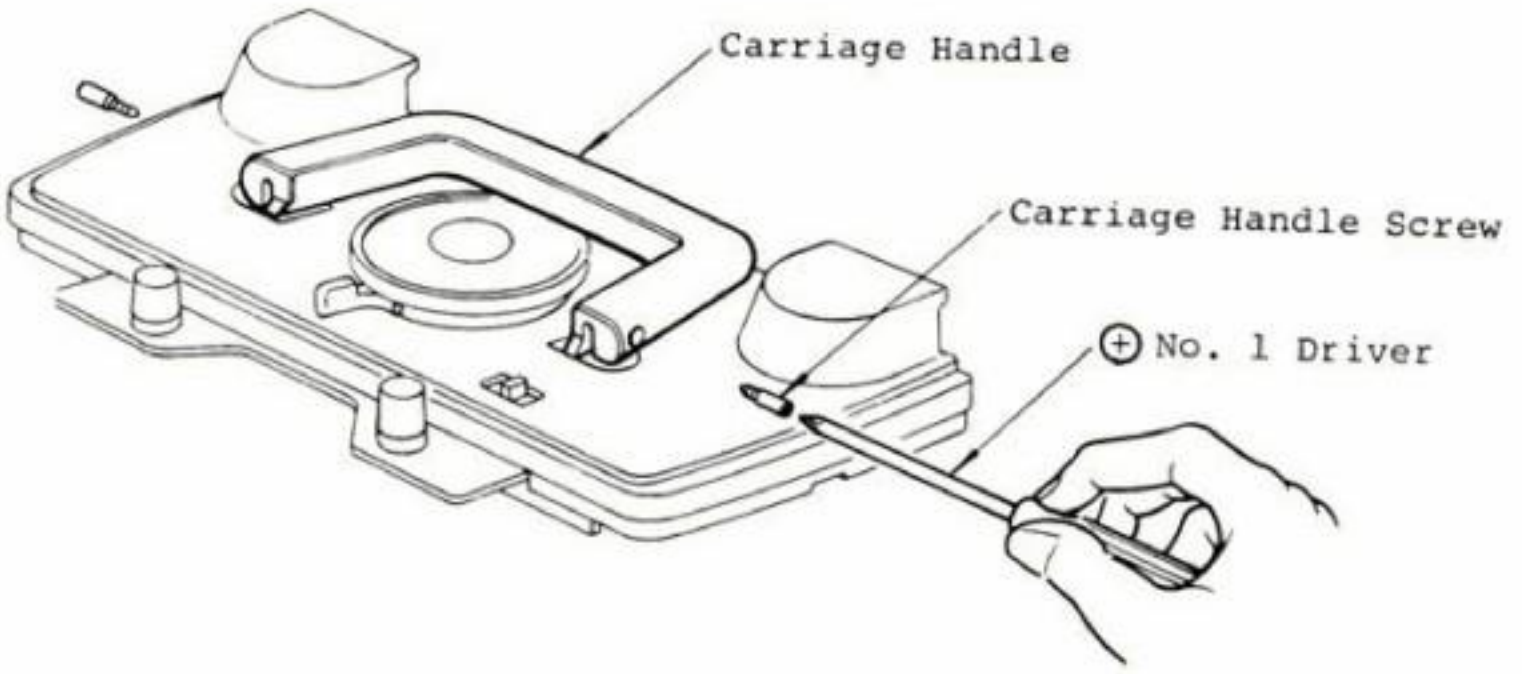


Fig. 13

3. Turn the Stitch Dial in an anti-clockwise direction until it stops and then remove it by lifting.

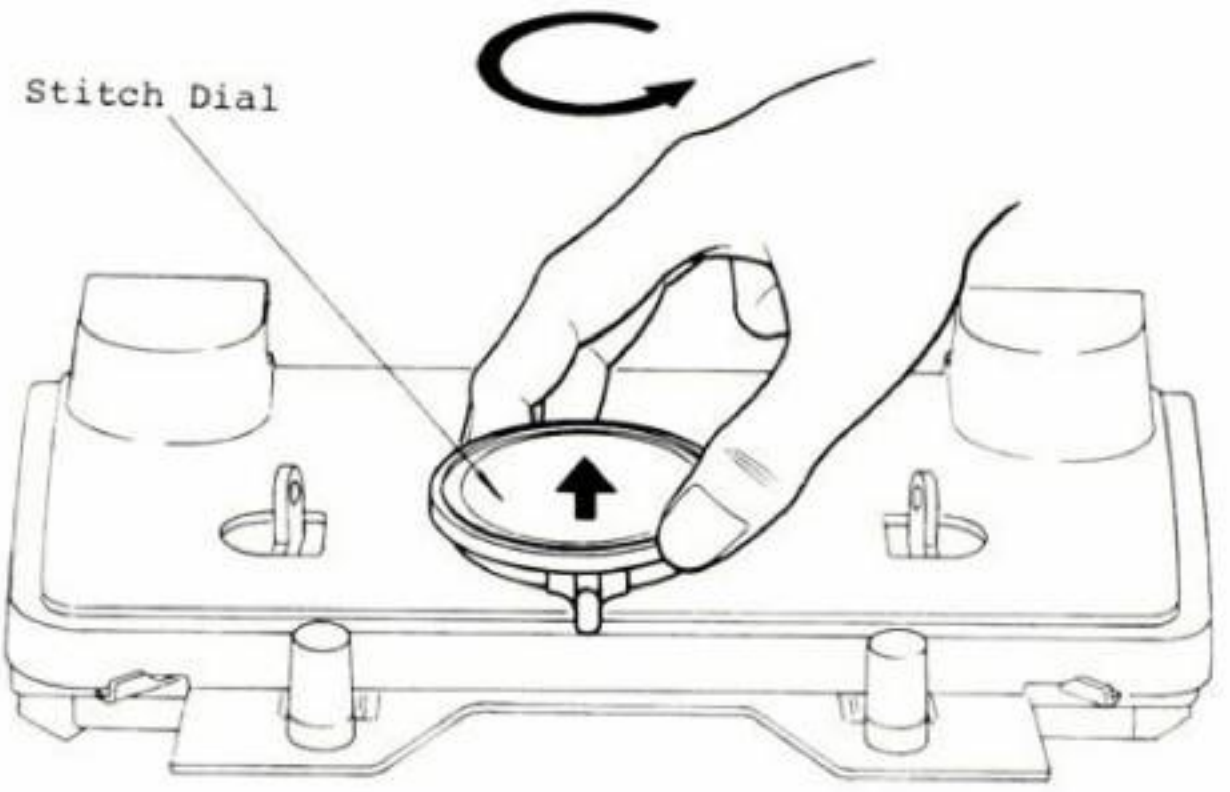


Fig. 14

4. Remove two ⊕ Binding Head Screw (3 x 6), each on the outside of the Handle Holders, on both sides of the Carriage cover A.

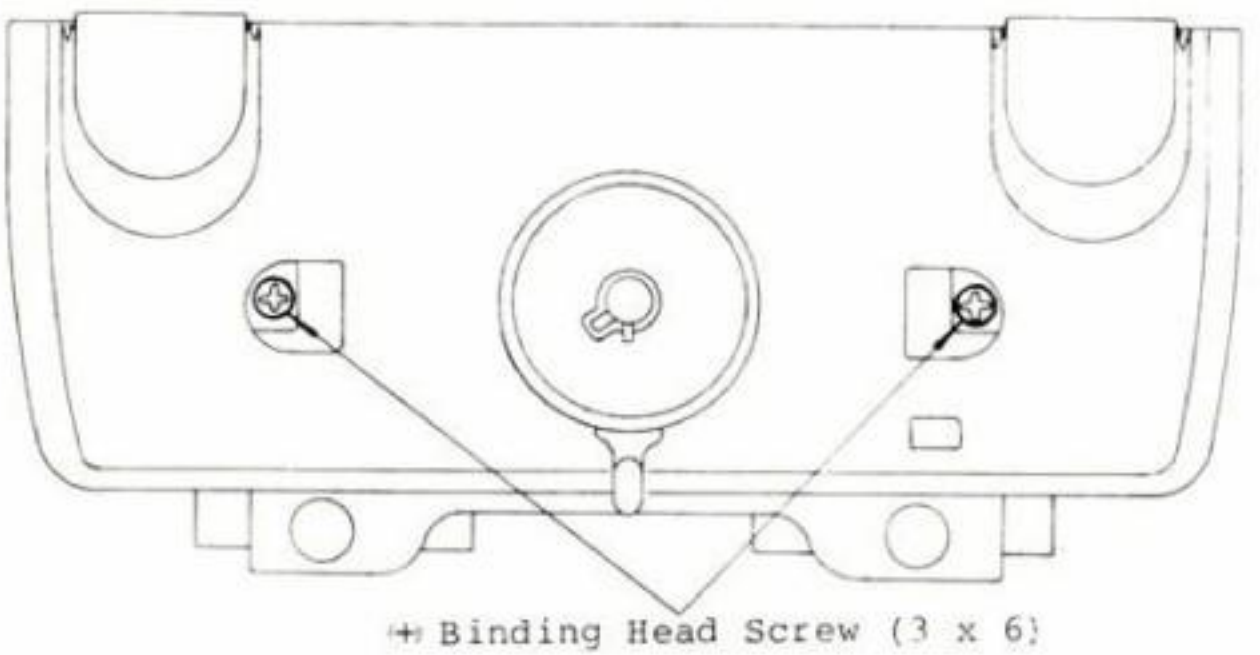


Fig. 15

5. Remove the Cam Lever while pushing out the Dial Spring with your finger. The Carriage Cover A will be removed at the same time.

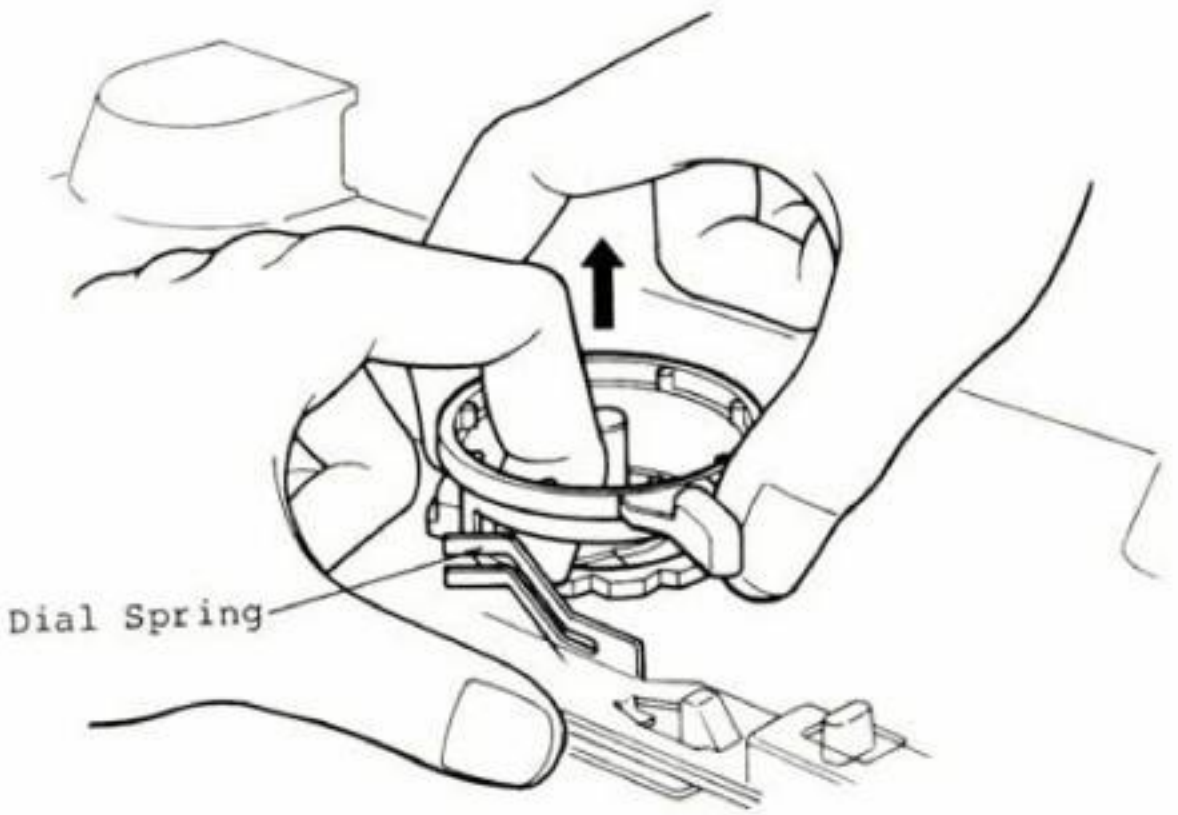


Fig. 16

1-2 Disassembly of Machine Body (down to Case Cover):

1. Turn over the machine body, as shown in Fig. 17, and remove two ⊕ Pan Head STT Screws (3 x 8) located between the two Rubber Pads.

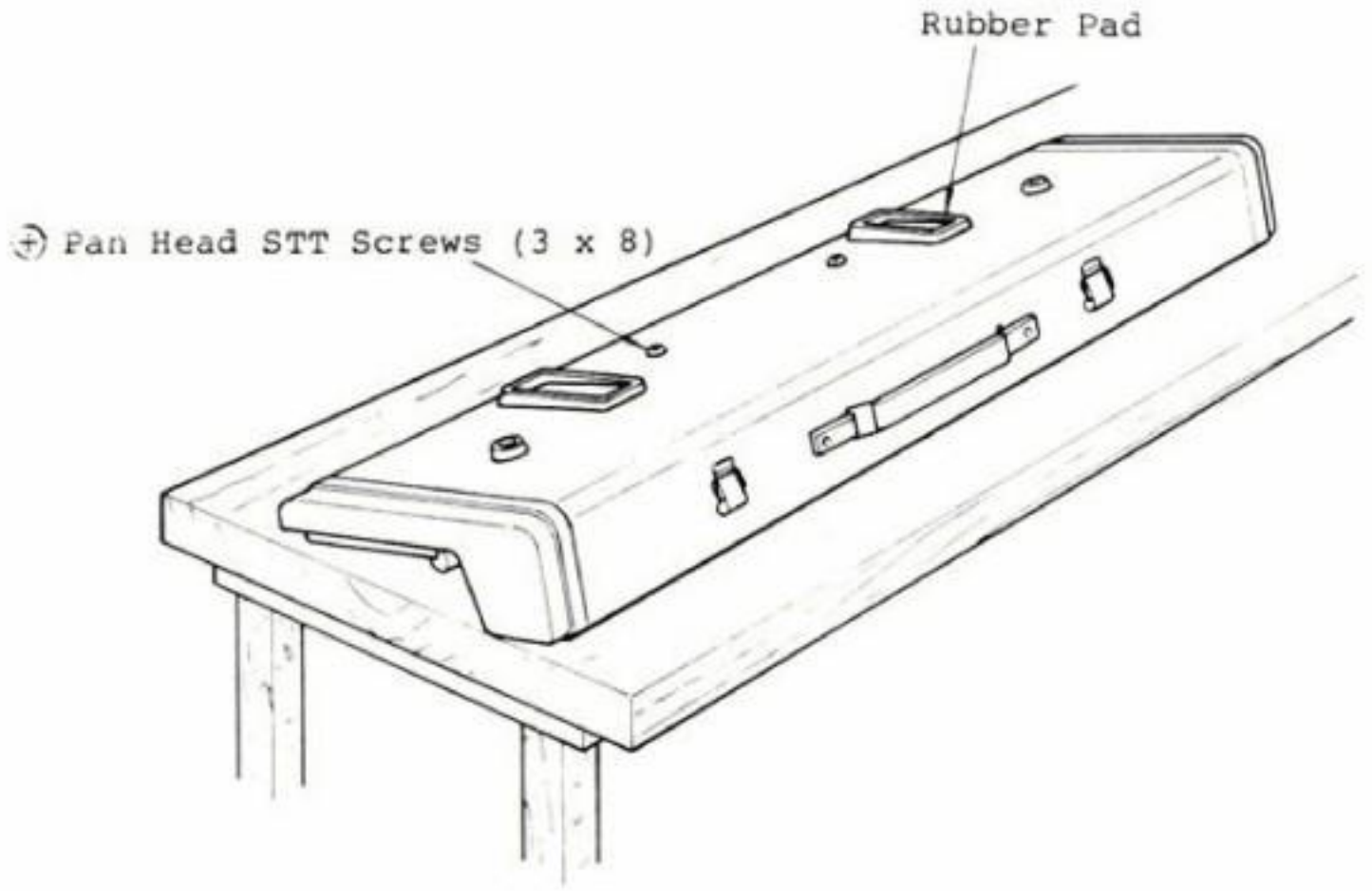


Fig. 17

2. Turn over the body to the top side, and with the tip of a - screw driver, lever up the dials of Row Number Dial, Feeding Dial and Change Dial at the top of the KR Panel.

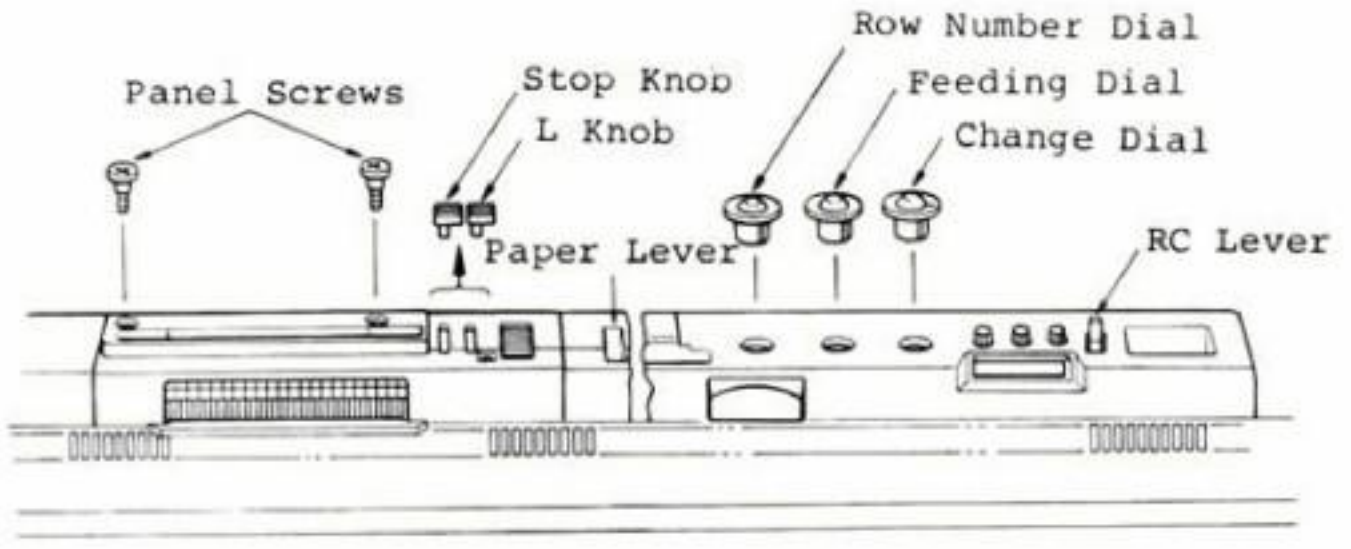


Fig. 18

3. Push forward both the Paper Lever and RC Lever.

4. Remove two Panel Screws from the PC Panel.

5. Lift up the PC Panel and the KR Panel at the same time, and remove the PC Panel from the KR Panel pulling left.

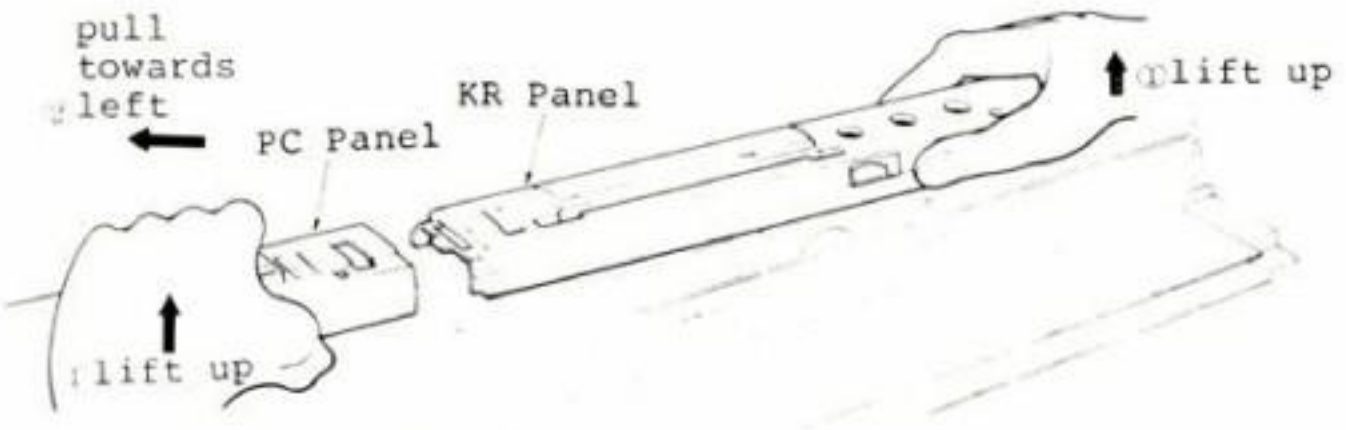


Fig. 19

6. To remove the KR Panel, slide it to the left, as indicated in Fig. 20, below.

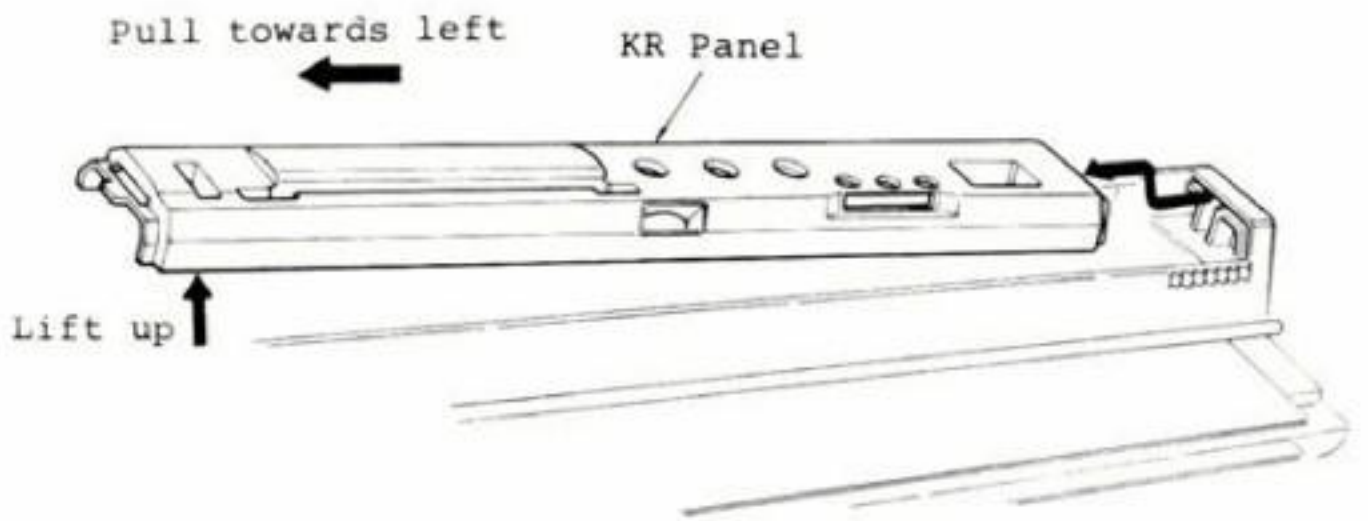


Fig. 20

7. To remove the AB Panel, lift up the right edge of the AB Panel and slide it to the right.

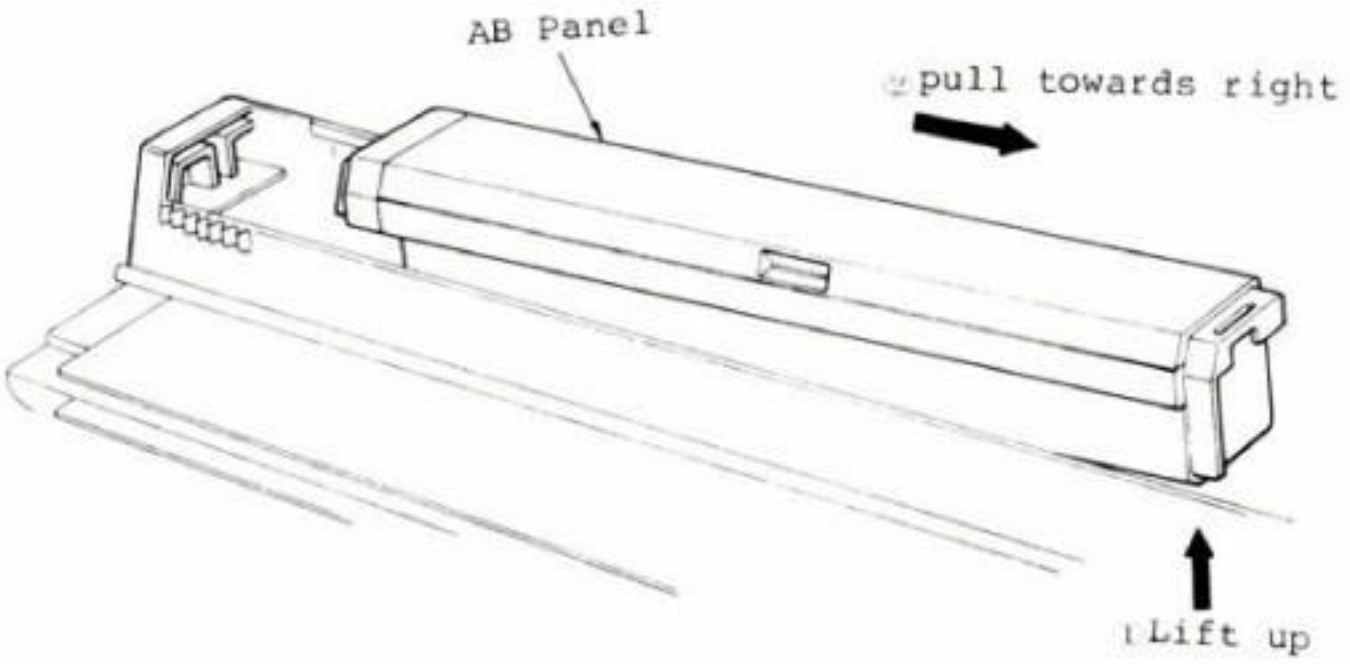


Fig. 21

9. Remove two ⊕ collar head STT screw(3x8) securing the Needle Bed Bracer A, (R) & (L).

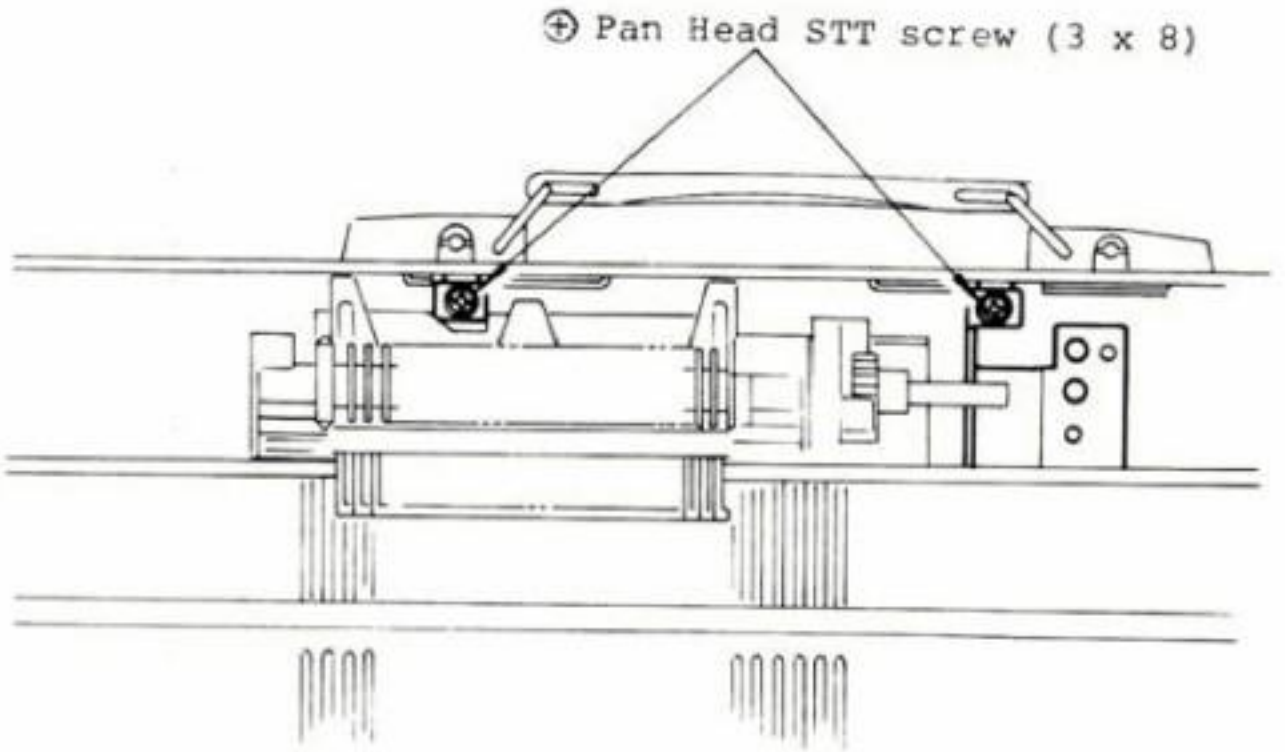


Fig. 22

9. Remove four ⊕ Special Flat Head S Tight Screws (4 x 10) and two + Binding Head Tapping Screw 2 (3 x 8) used to secure the Needle Bed and front edges of the Needle Bed respectively

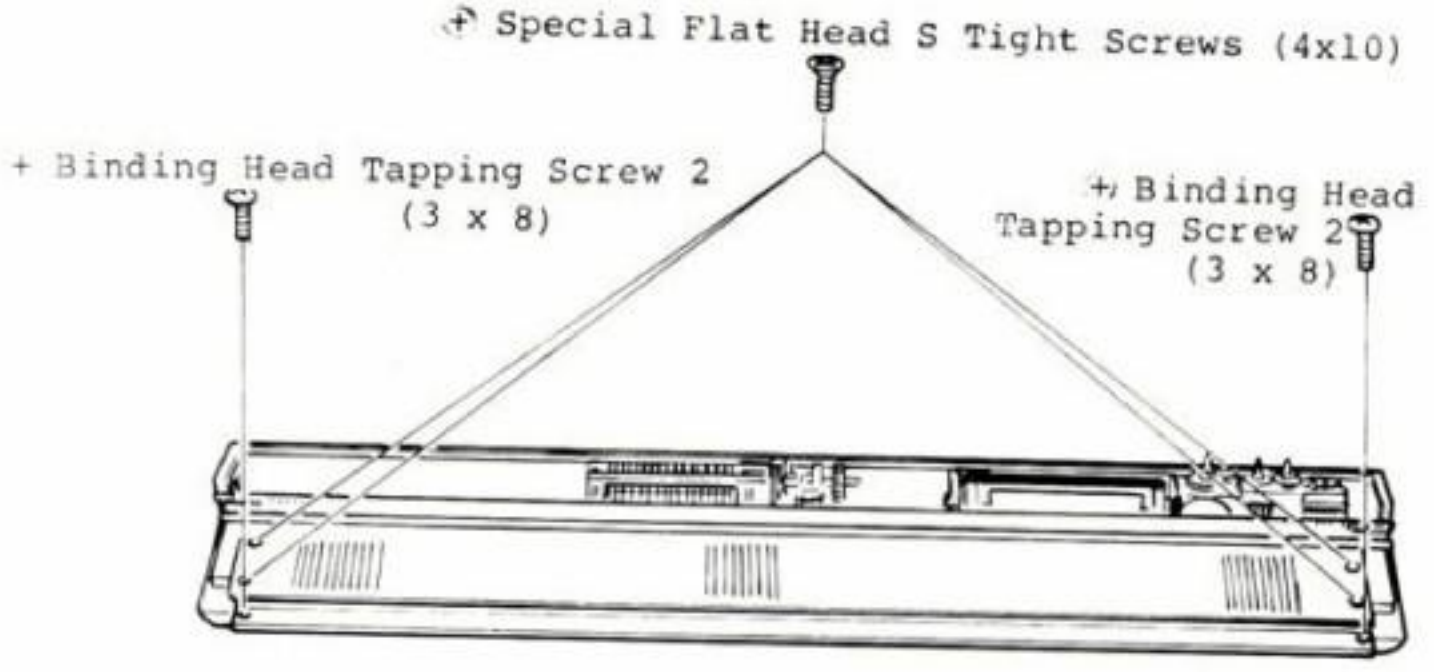


Fig. 23

10. Draw the Needle Bed towards you while lifting its front edge slightly. The Needle Bed will then become separated from the Case.

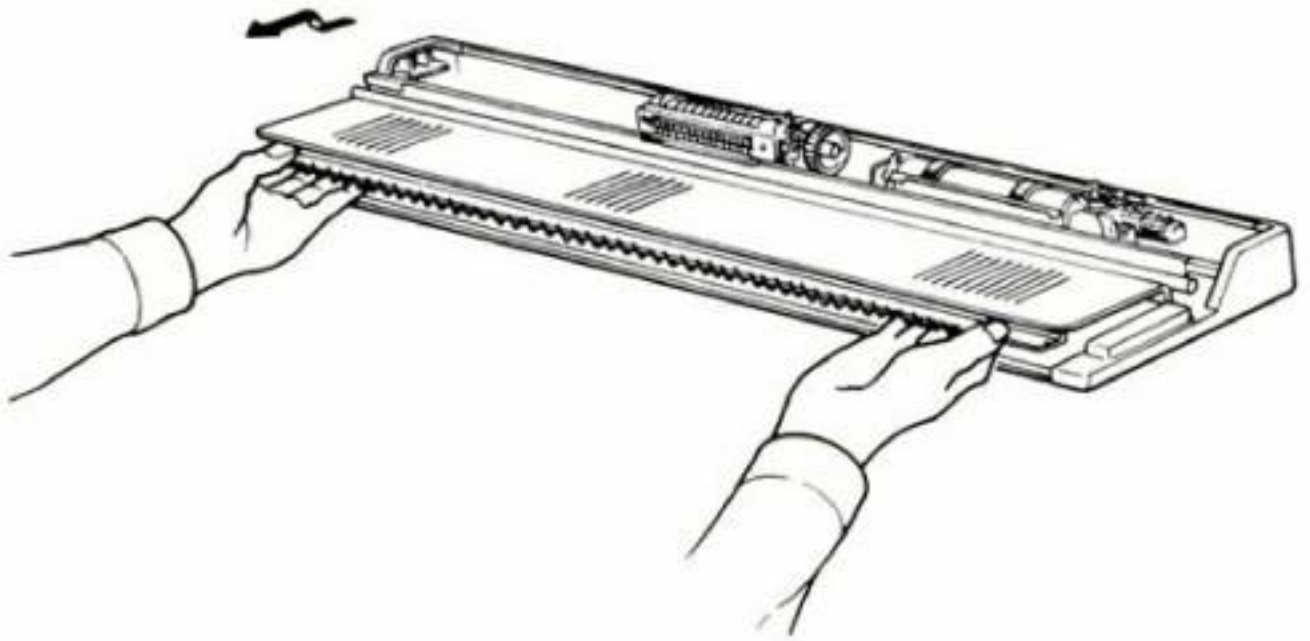


Fig. 24

2. CARRIAGE ADJUSTMENT

2-1 Drum Adjustment

Remove the S.P. Holder in the manner described below before adjusting the Drum Unit.

(Right Drum Unit as an example)

(1) Remove the ⊕ Binding Head STT screw (3x8) fastening the Side Lever Spring A (R), and take it off.

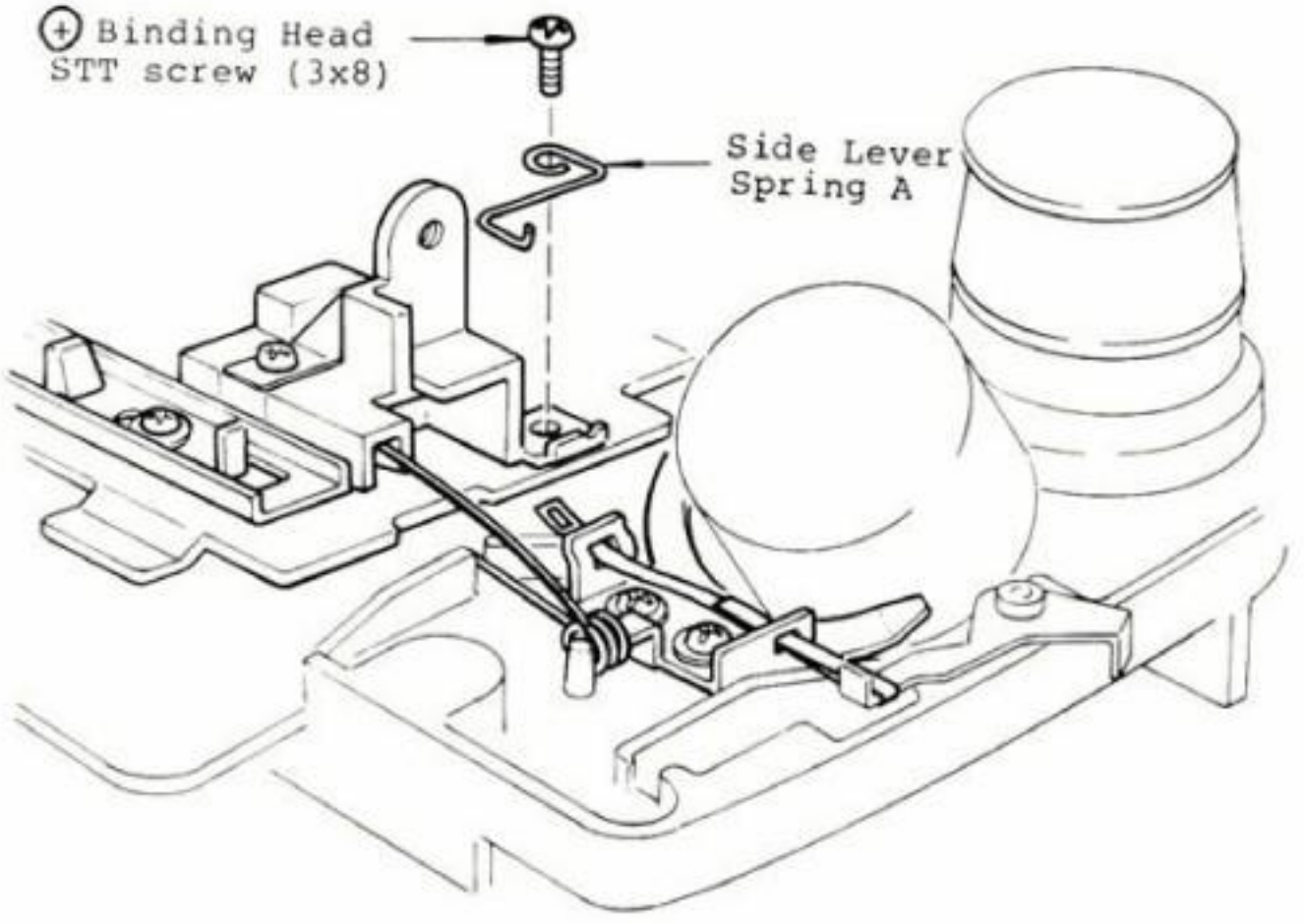


Fig. 25

(2) Push the left end of the Side Lever Spring B till its right end can be held by hand, and pull it out.

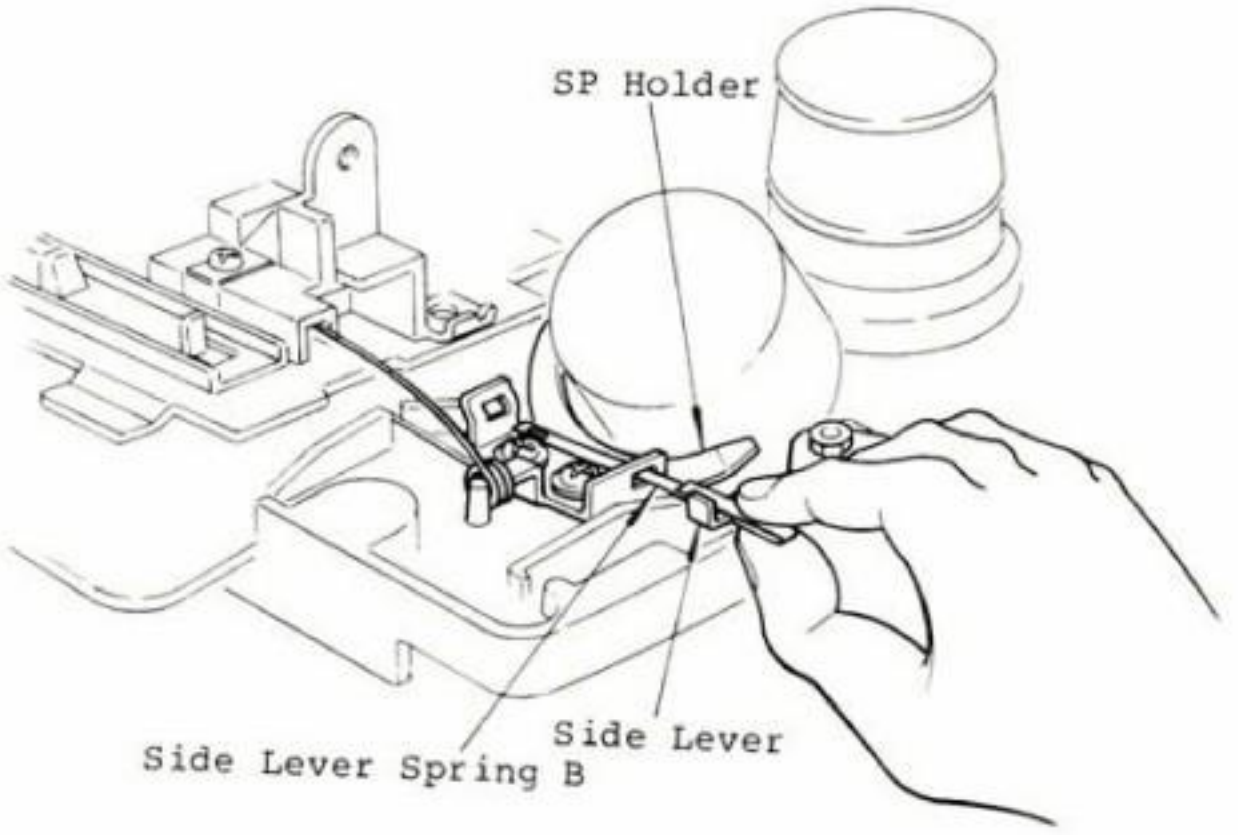


Fig. 26

(3) Push down the Raising Spring and remove it from that between the Handle Holder (R) and Jam Release Plate.

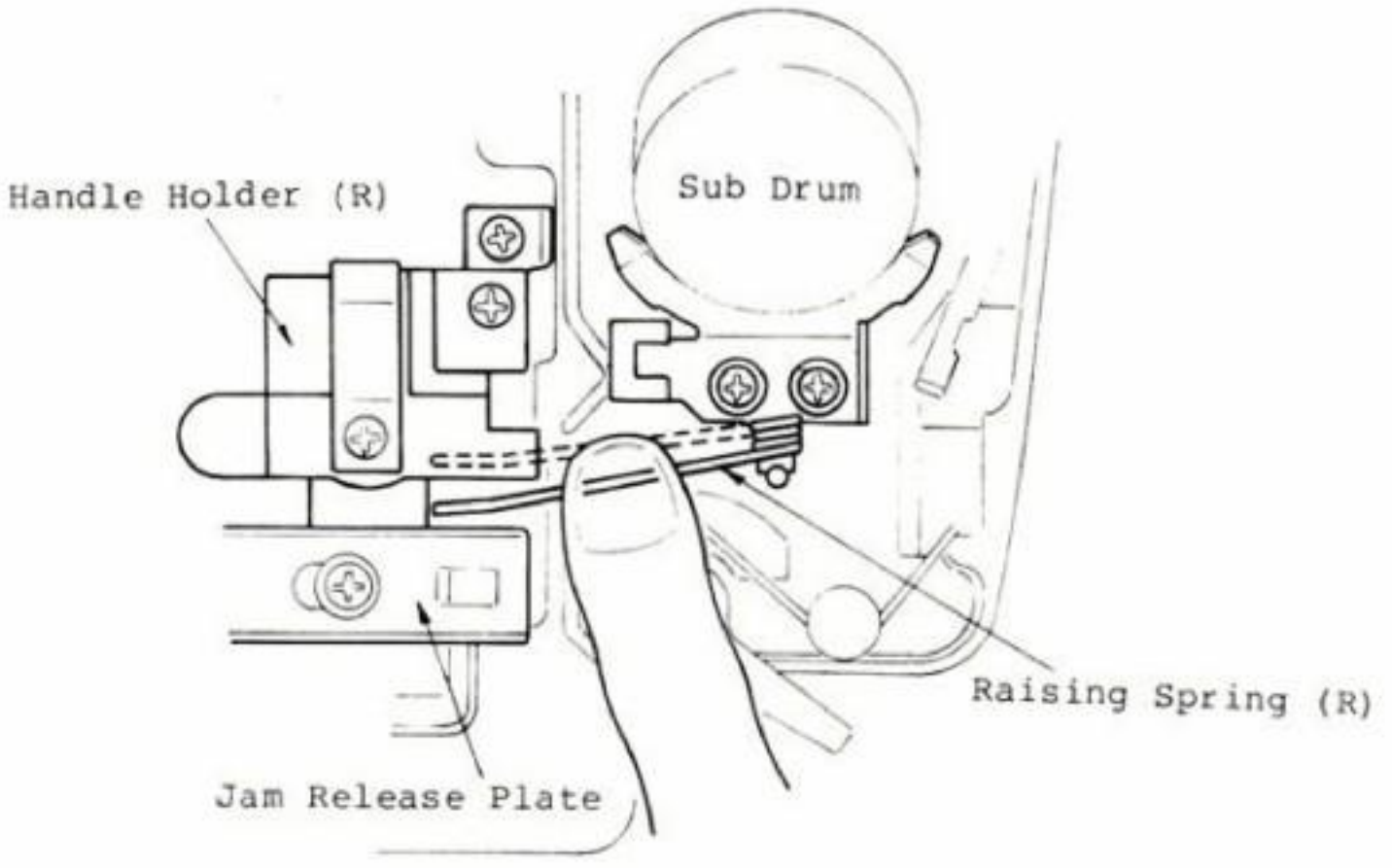


Fig. 27

4. Remove two ⊕ Pan Head Screws (3 x 6.5) that secure the SP Holder (R).

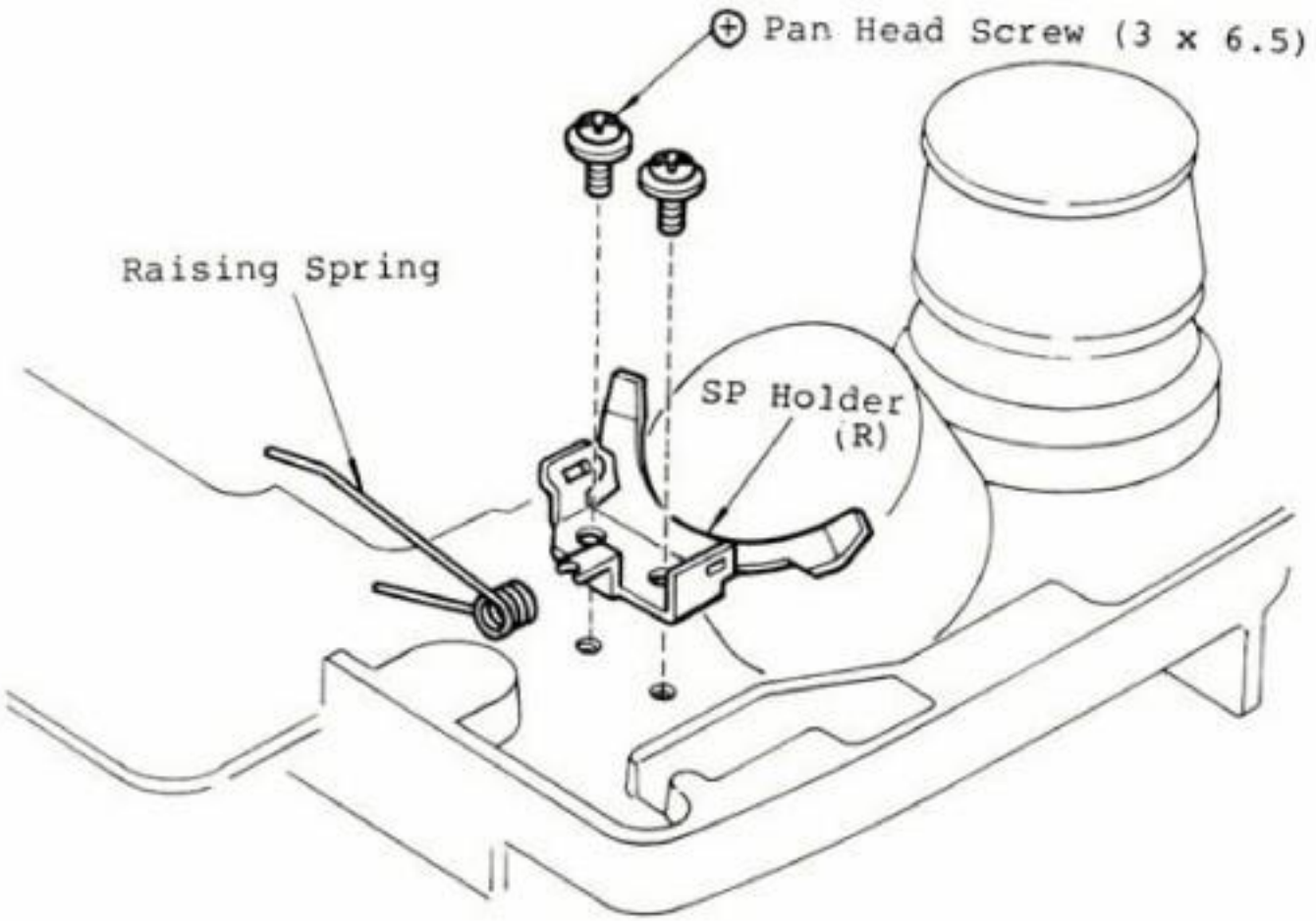


Fig. 28

5. Remove an E Snap Ring 4 which secures the Sub Drum using ⊖ Driver.

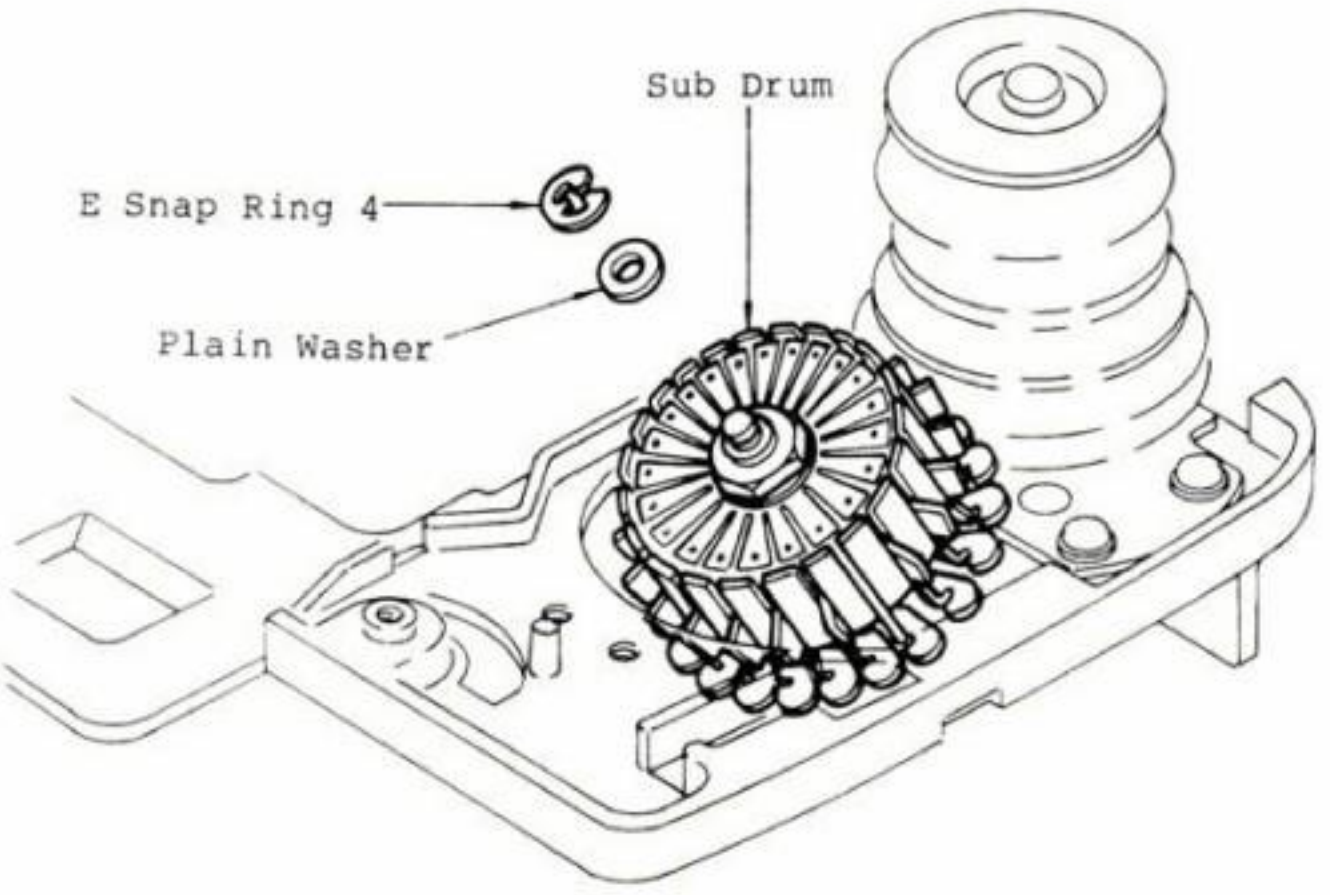


Fig. 29

6. Remove the Sub Drum and place the Drum Adjusting Gear onto the Drum Base.

7. Loosen three ± Special PW Binding Head Screws (3 x 7) and one + Binding Head Screw (3 x 4.5) which secure the Main Drum Drum Base.

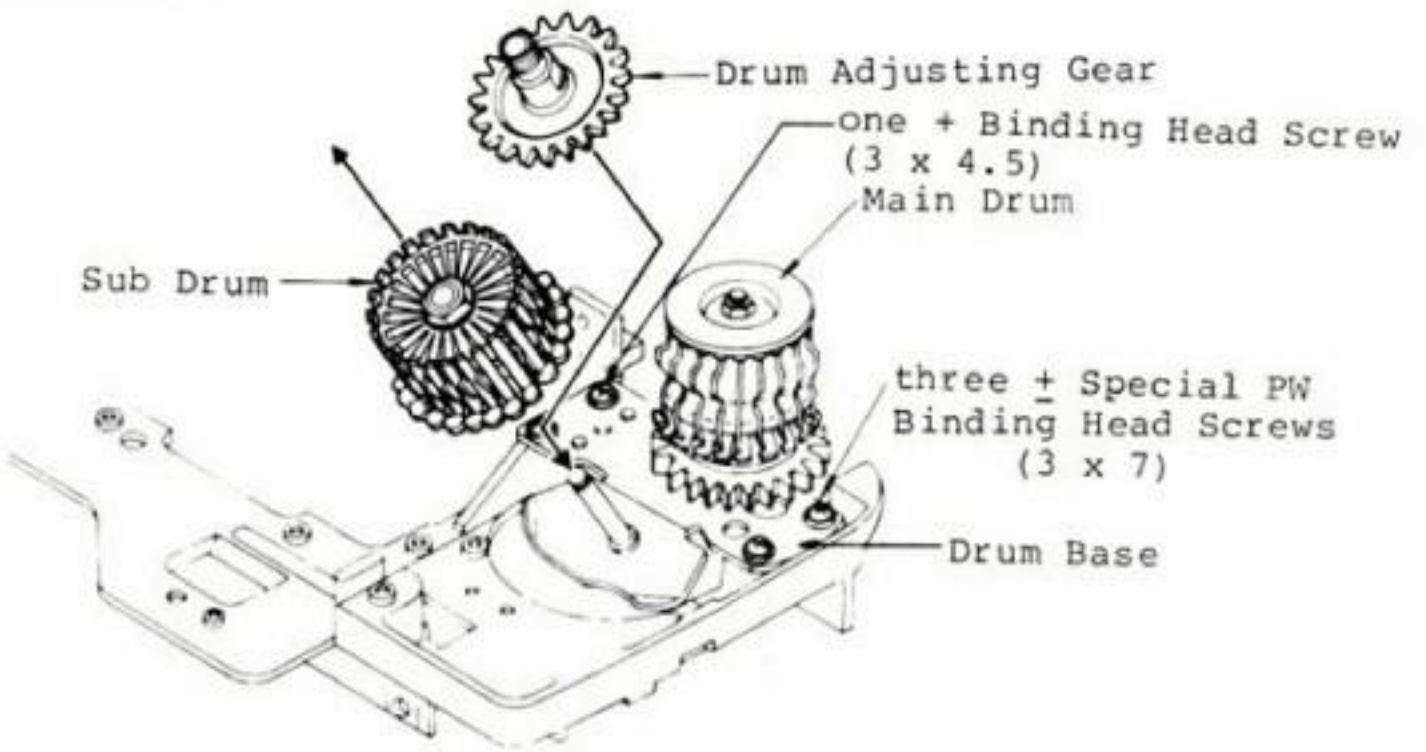


Fig. 30

8. Adjust the position of the Sub Drum so as the Sub Drum Axis and the Drum Adjusting Gear are aligned on the vertical line as indicated below.

Note: Backlash of the Main Drum against the Rack is about 0.2mm. on its circumference.

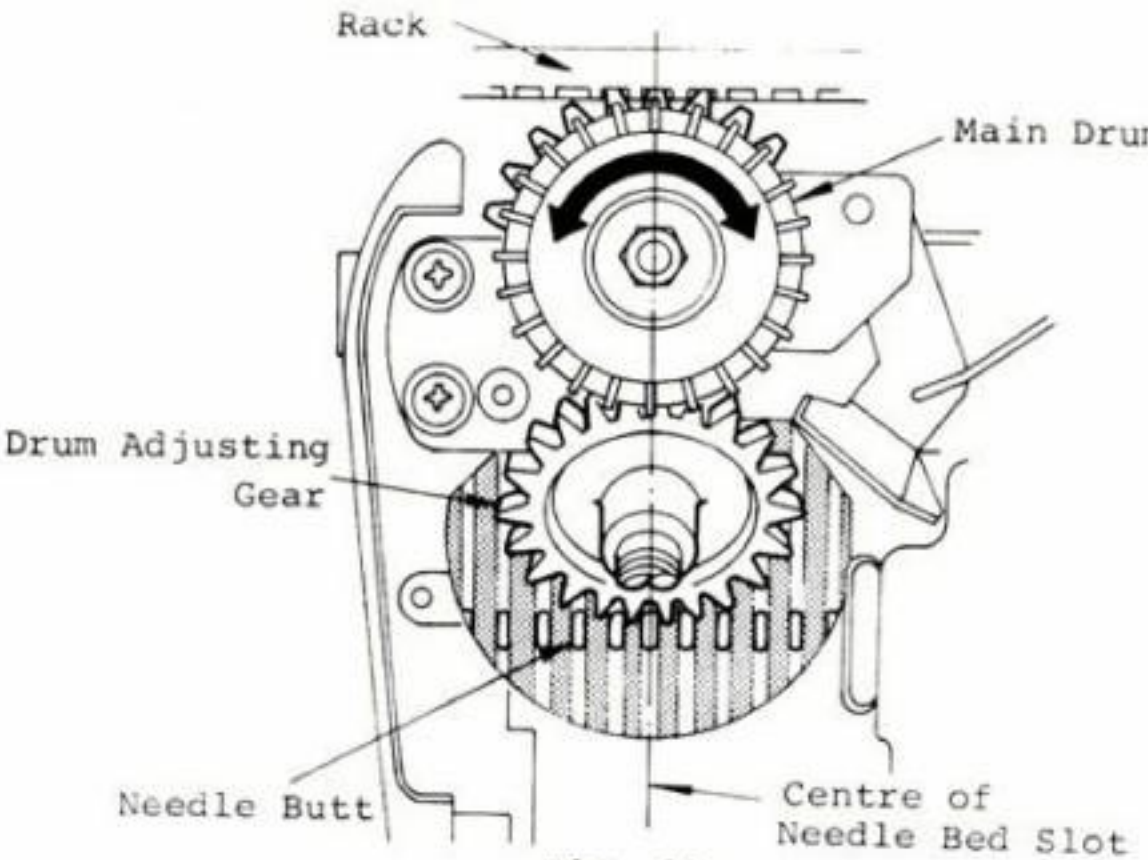
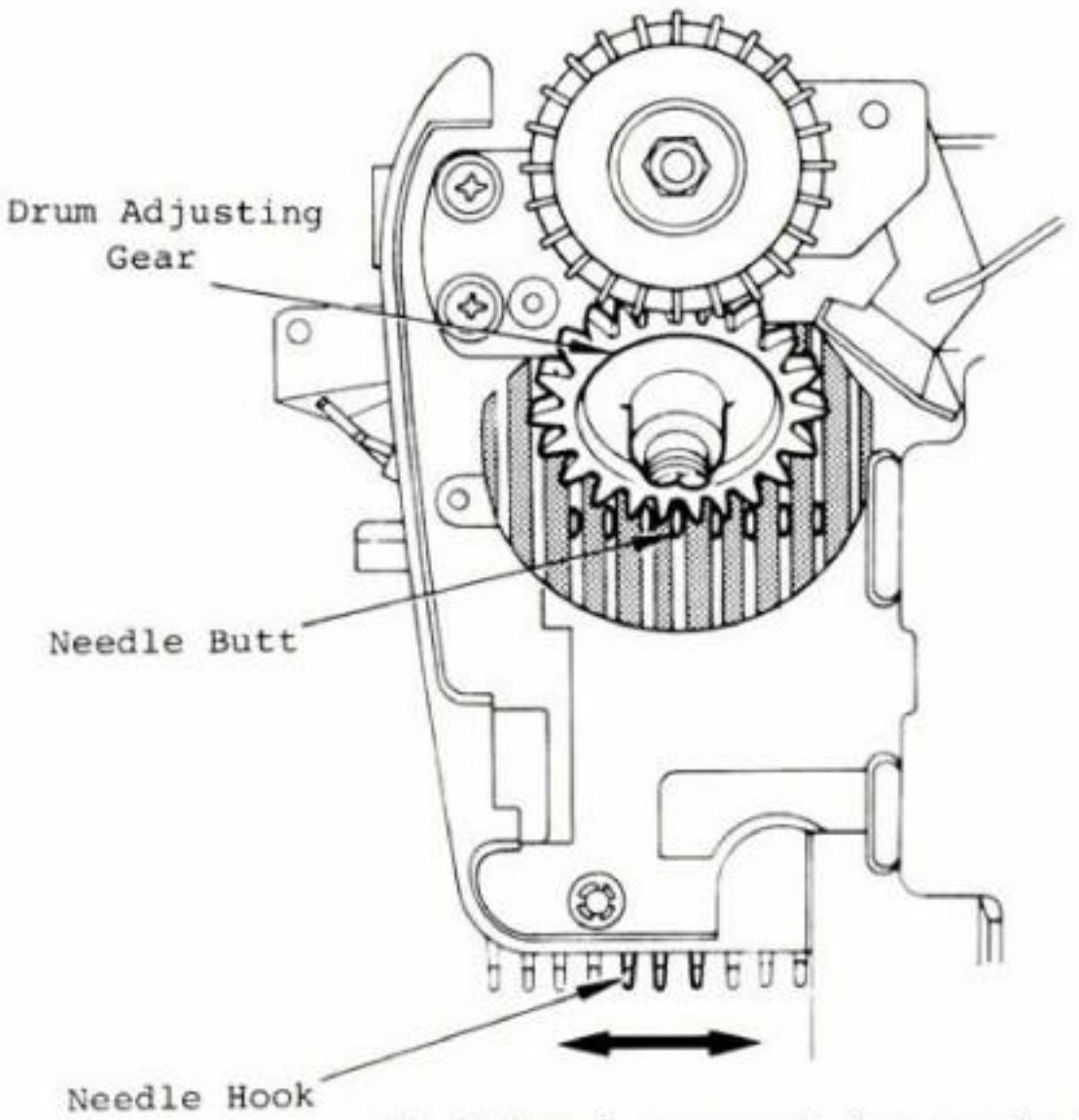


Fig. 31

9. After the adjustment has been made, secure the Main Drum Base to the Carriage Plate B with three ⊕ Special PW Binding Head Screws (3 x 7) and one ⊕ Binding Head Screw (3 x 4.5).
Push some Needles to between B and C position on the Needle Bed, to check to see whether or not the Needles move laterally when the Drum Adjusting Gear is engaged with the Needle butts.
The Needles should not move laterally.



No lateral movement is permissible when the Drum Adjustment Gear is engaged with the Needle butts.

Fig. 32

10 The Drum Adjusting Gear must be removed and the Sub Drum is replaced on its axis and be secured with an E Snap Ring 4.

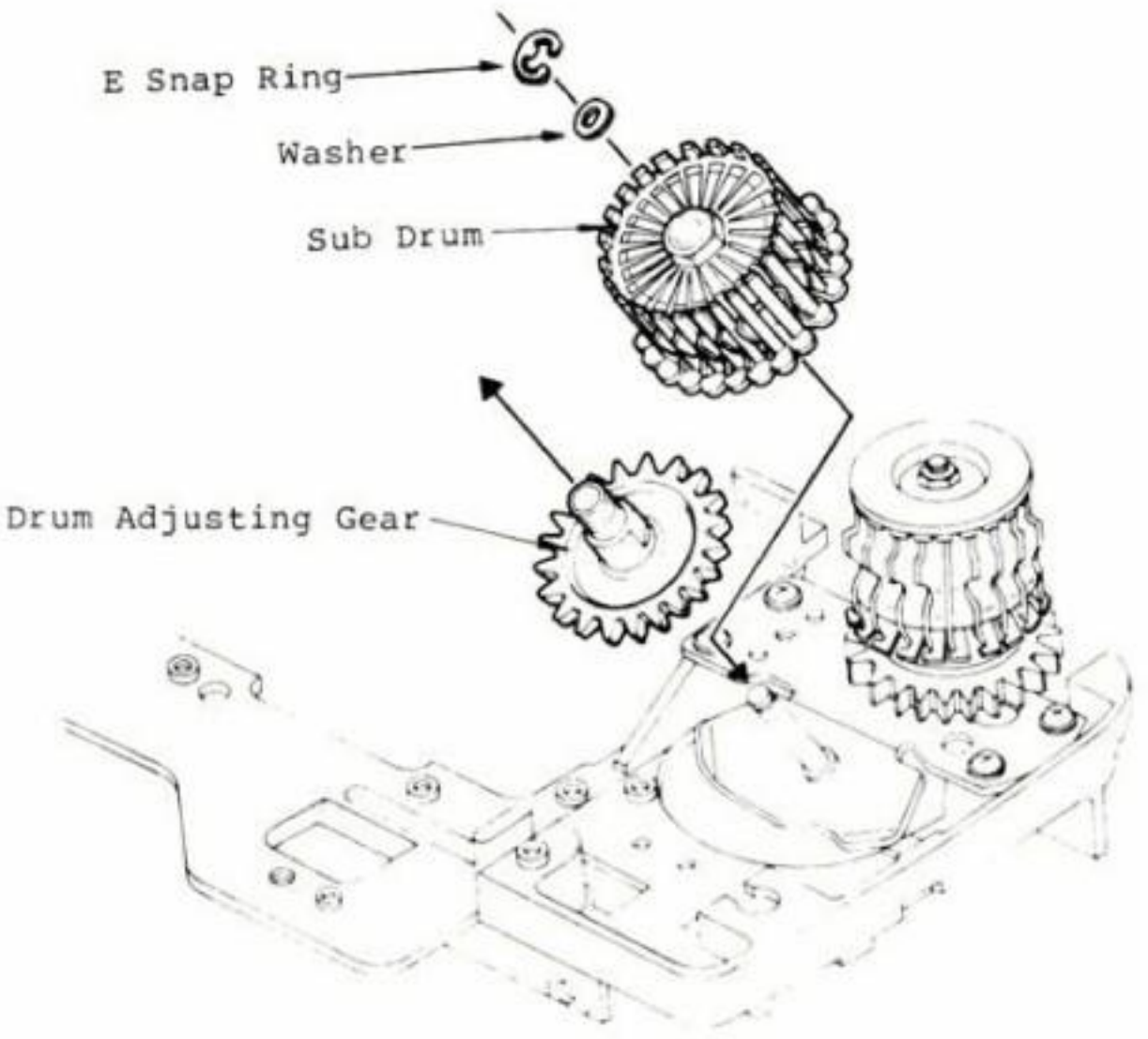


Fig. 33

11. For testing the needle selection, insert a Punch Card into the P.C. Panel, and move the Carriage slowly across the needles aligned in B position.

If the Carriage is moved too fast, the needles will collide with the Needle Guide and be damaged.

The Sub Drum Gear cam be used as Drum Adjusting Gear if it is separated from the Drum Unit.

Incorrect alignment of the Drum Unit causes the Needles, which are guided by the Sub Drum Gear, to collide with the Separation Cam. In this case, readjust the positioning of the Drum Unit.

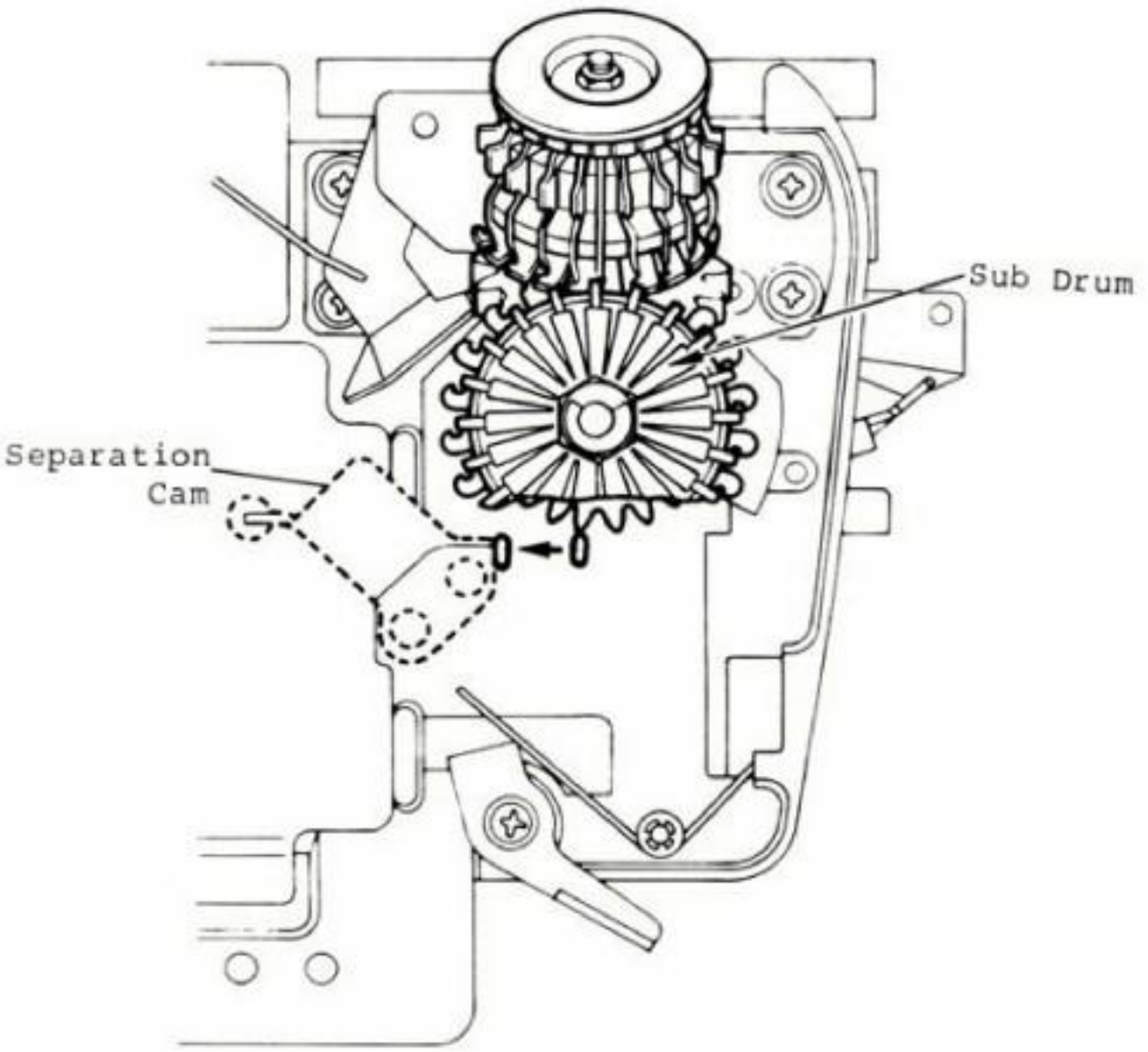


Fig. 34

12. After the adjustment of the Drum Unit has been finished, insert the coil of the Raising Spring into the protrusion of the S.P. Holder. Then fix the Holder so as the clearance between the Holder and the S.Drum Piece (upper position) is about 0.5mm.

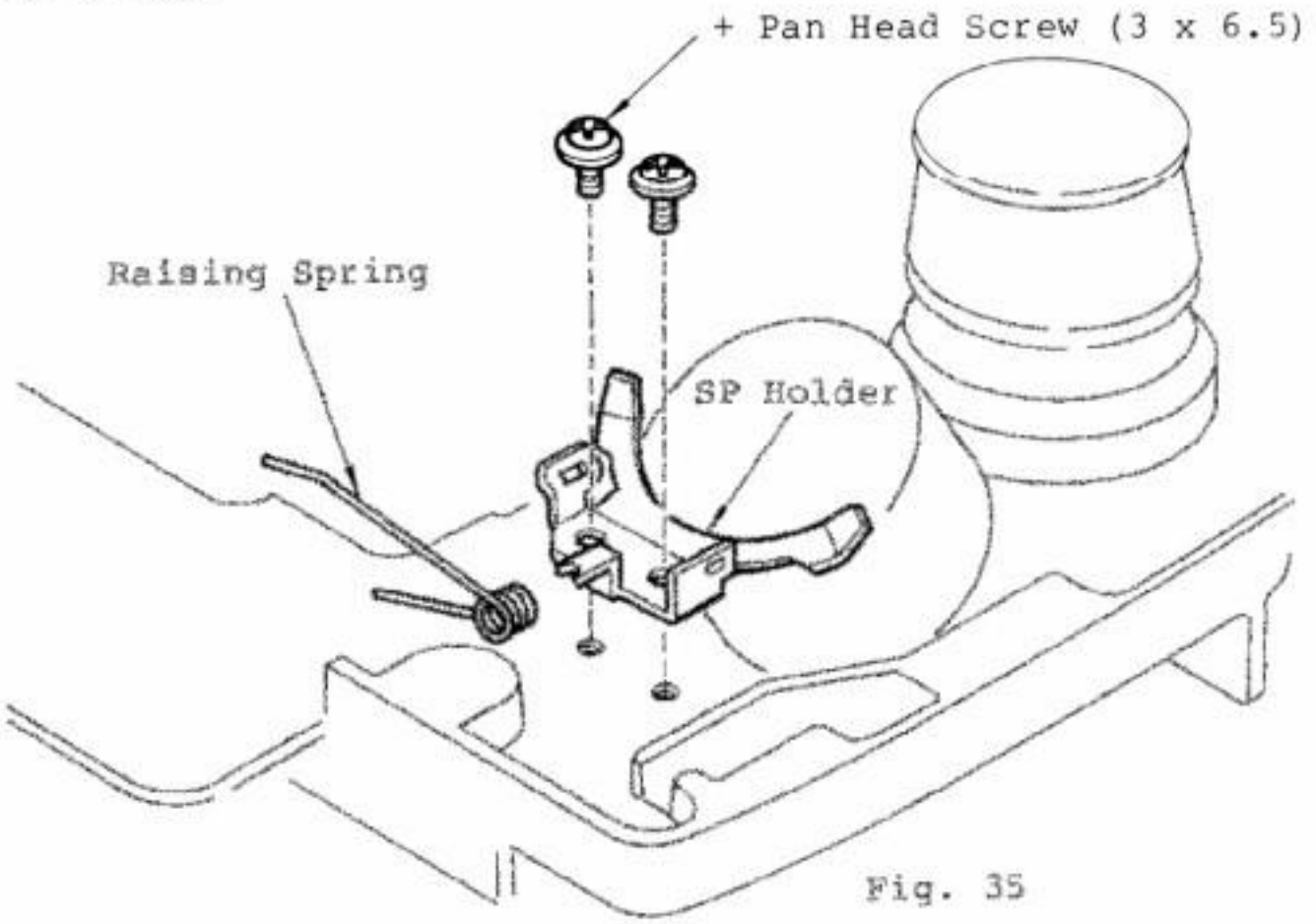


Fig. 35

13. Press down the long end of the Raising Spring, and guide it under the Handle Base.

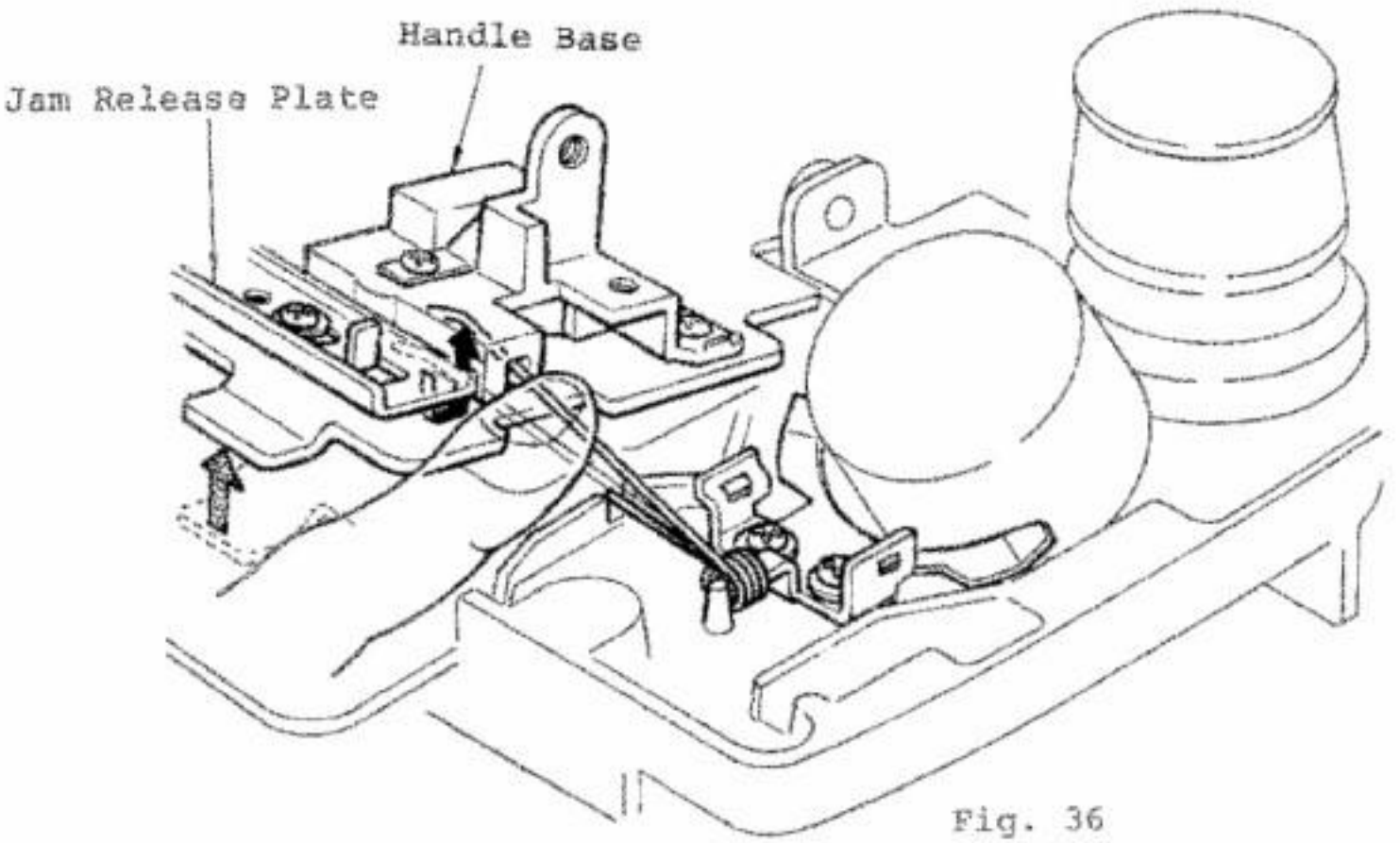


Fig. 36

14. Insert a straight end of the Side Lever Spring B into the openings of the S.P. Holder as shown, and with the other end, hold the upper part of the Side Lever between the bend.

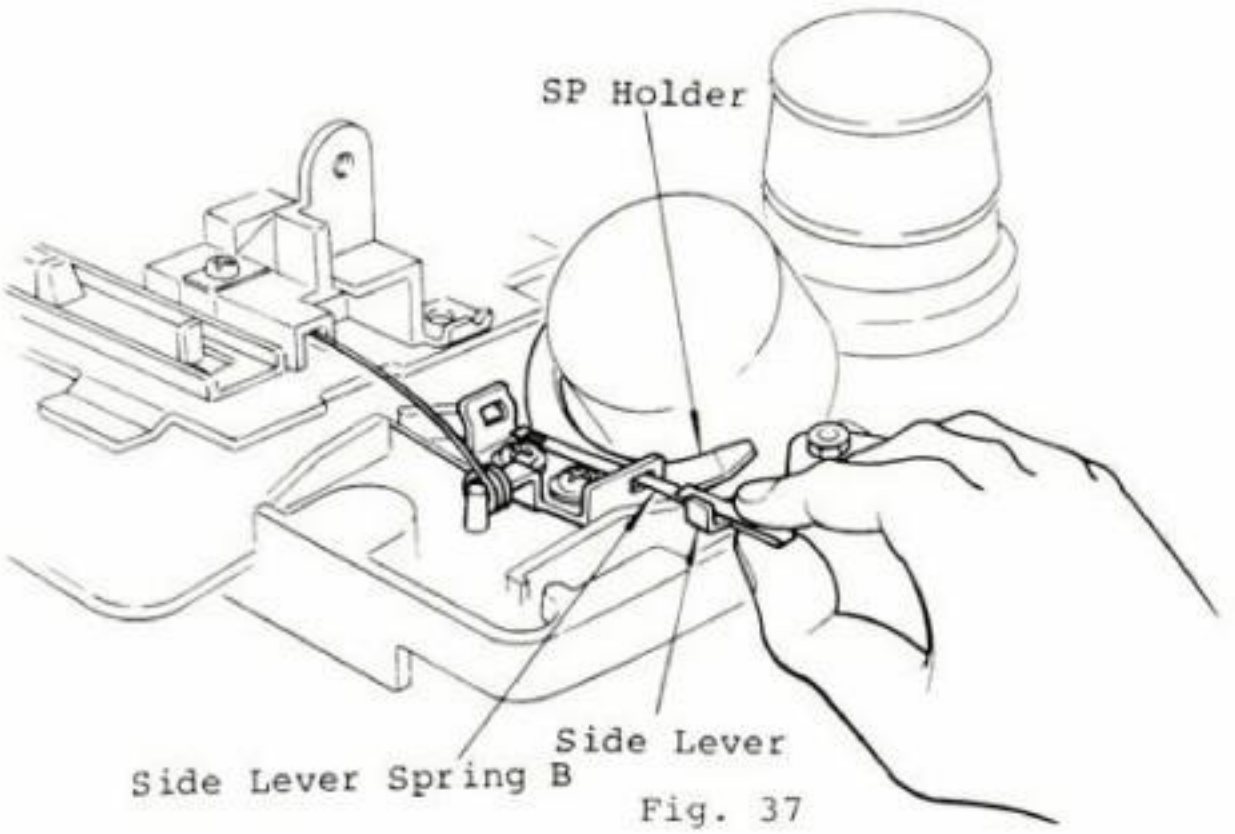


Fig. 37

15. Hitch the end of the Side Lever Spring B on the hook of the Side Lever Spring A, and fasten the Spring A with the Binding Head Tight Screw (3x8).

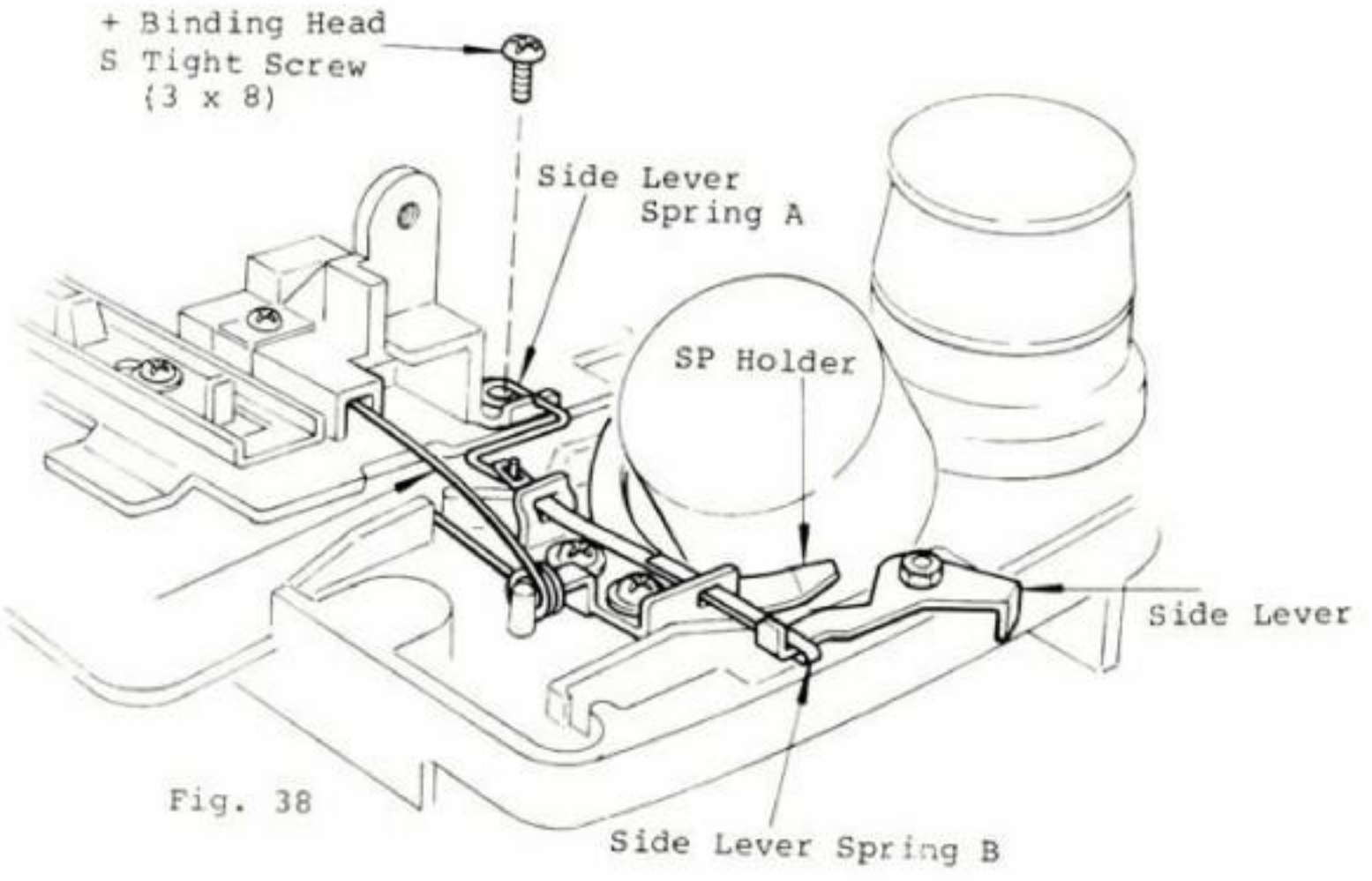


Fig. 38

2-2 Clear Wire Adjustment

The length of the Clear Wire, which works to clear the stored memory of the Sub Drum, must be adjusted after the Drum Unit adjustment has been made.
The Clear Wire becomes active, through the function of the Clear Cam, when the Carriage is moved past the centre of the Needle Bed. Adjust the length of the Clear Wire by stretching or folding the bent portion of the Wire, by using either Needle-Nose Pliers or a pair of Duck Bill Pliers, so as no clearance exists between the Sub Drum Clear Cam and Sub Drum Pieces.

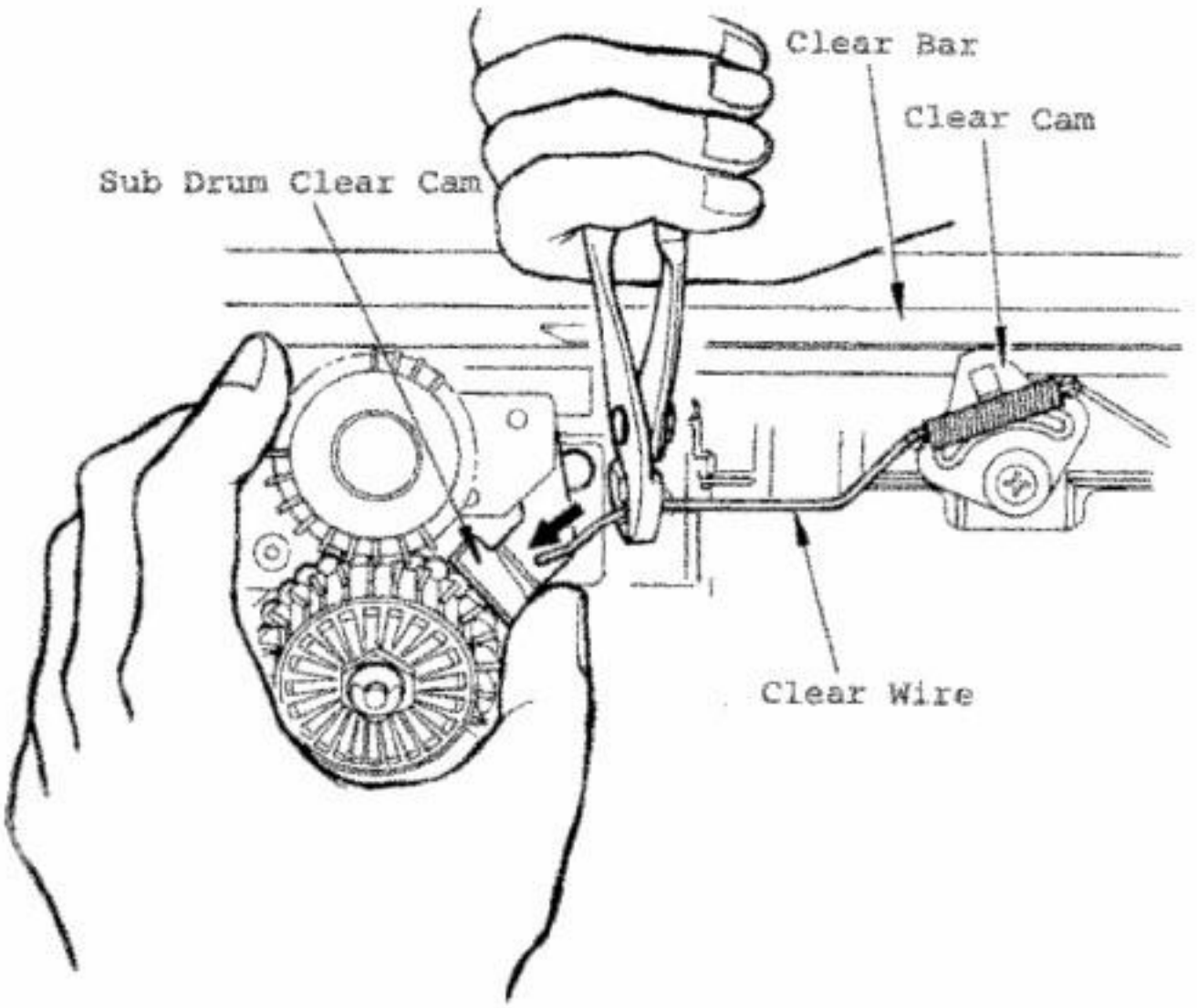


Fig. 39

* If the adjustment of the Clear Wires is not correct, the memory on the S. Drum will not be erased completely.

2-3 Course Stripes

Both Main Cams should be located at an equal distance from the inner surface of the Pipe (standard level).
In the case that the distance between the Carriage Pipe and one Main Cam differs from that between the Carriage Pipe and the other Main Cam, Course Stripes (irregular traverse stitches) becomes the result.

When the distance between the standard level (carriage Pipe) and a Main Cam is larger, the amount of yarn pulled in by a Needle is smaller and stitches become smaller. Conversely, when the distance is smaller, the stitches become larger owing to the larger amount of yarn pulled in by a Needle.
If you continue knitting with the two Main Cams unevenly positioned, the tightness of the stitches by a stroke of the Carriage from left to right differs from that made by a right to left stroke. The tight and loose row appear alternately. This is called "Course Stripes" (irregular traverse stripes).

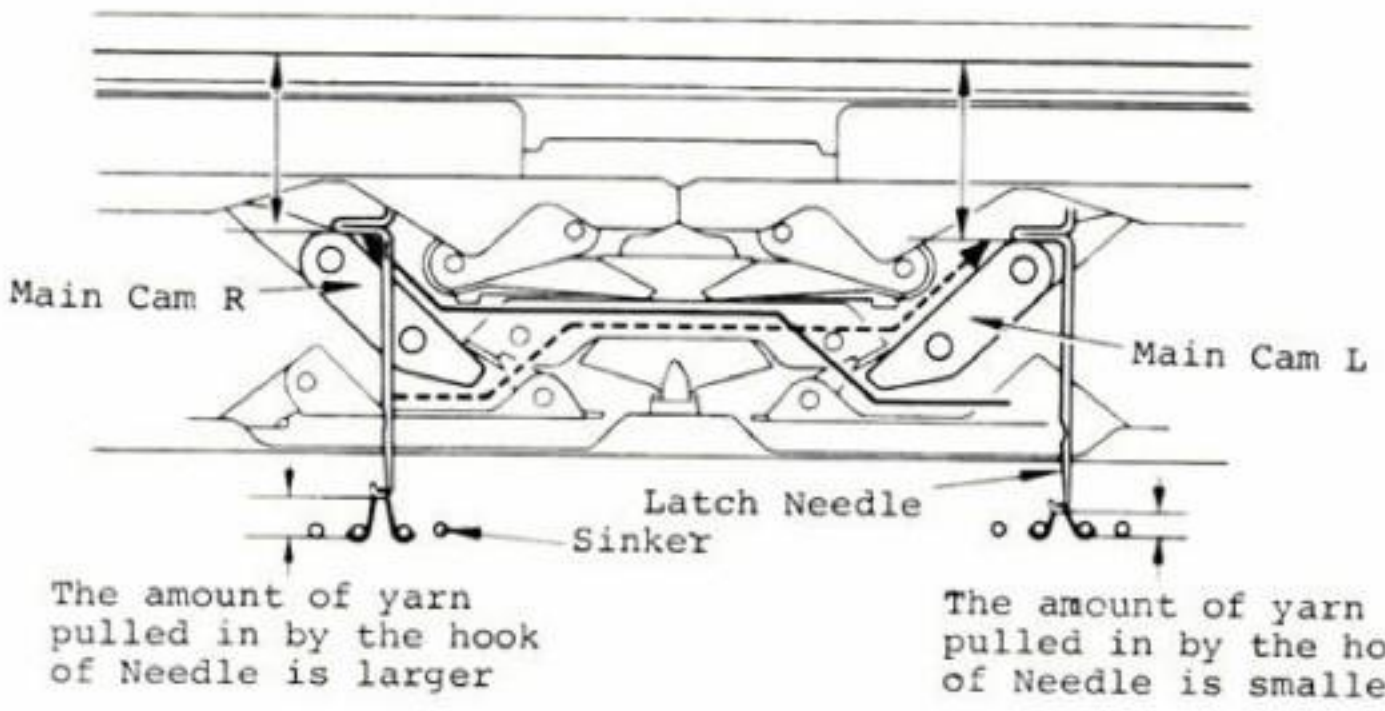


Fig. 40

1. The Course Standard Gauge is used to correct the distance. Turn the Cam Lever to the Slip Stitch position so as the Sub Cams are positioned as those shown in Fig. 41, below, and set the Stitch Dial to 1. Turn the Carriage over and insert the Course Standard Gauge into the Carriage sideways.

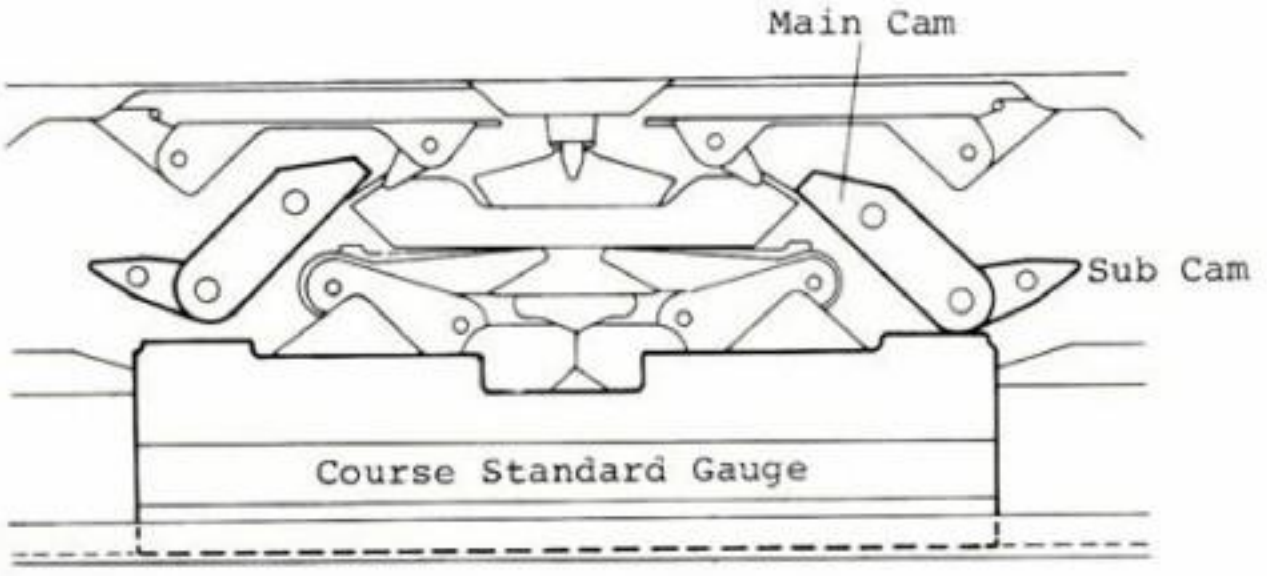


Fig. 41

2. Turning over the Carriage, loosen a + Binding Head S Tight Screw (3 x 5) which secures the Stitch Adjusting plate.

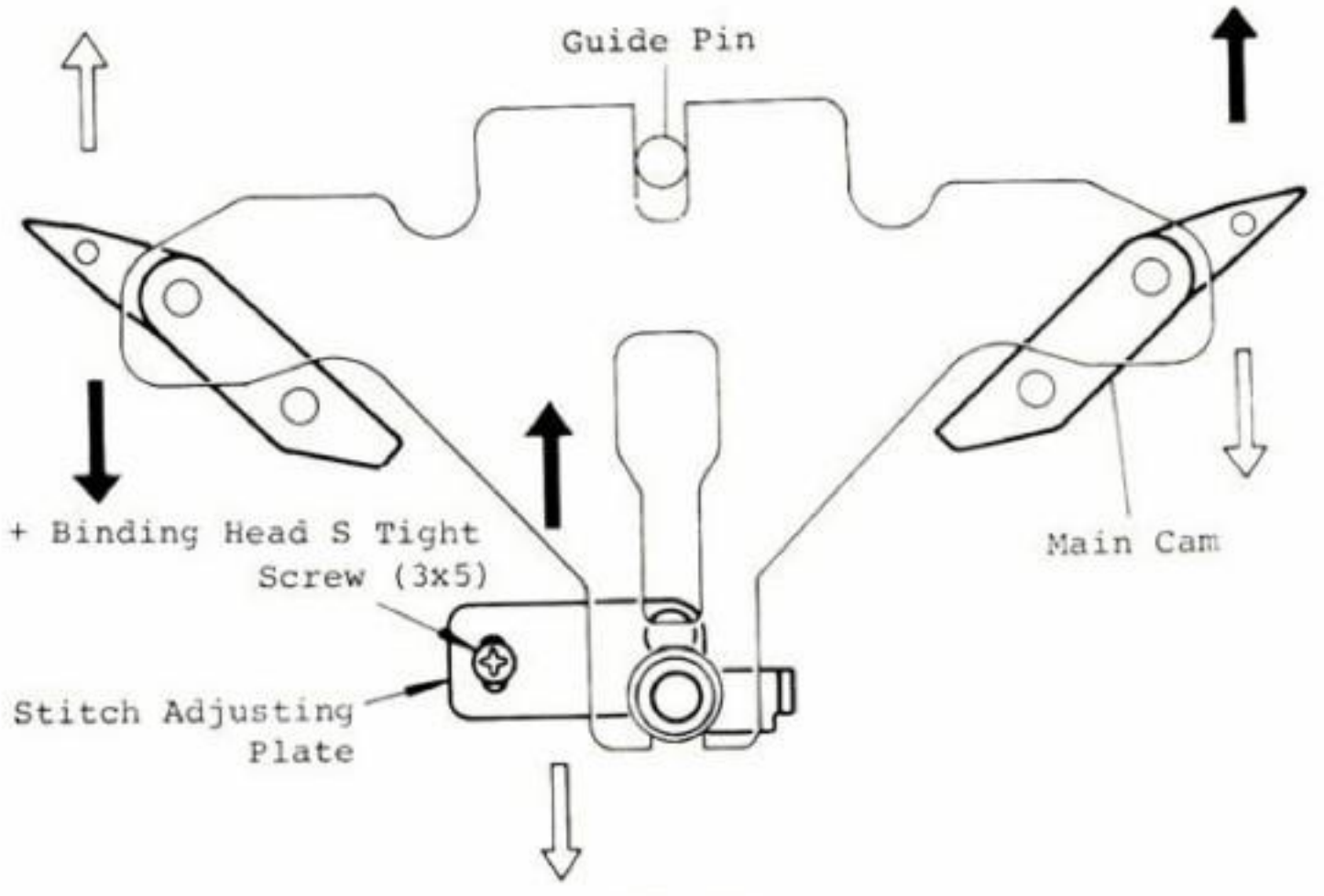


Fig. 42

3. By turning the Stitch Dial, the Main Cams will move towards the Course Standard Gauge and will come into contact with the gauge by moving the Stitch Adjusting Plate to and fro, so thot the Main Cams move in the same direction simultaneously.

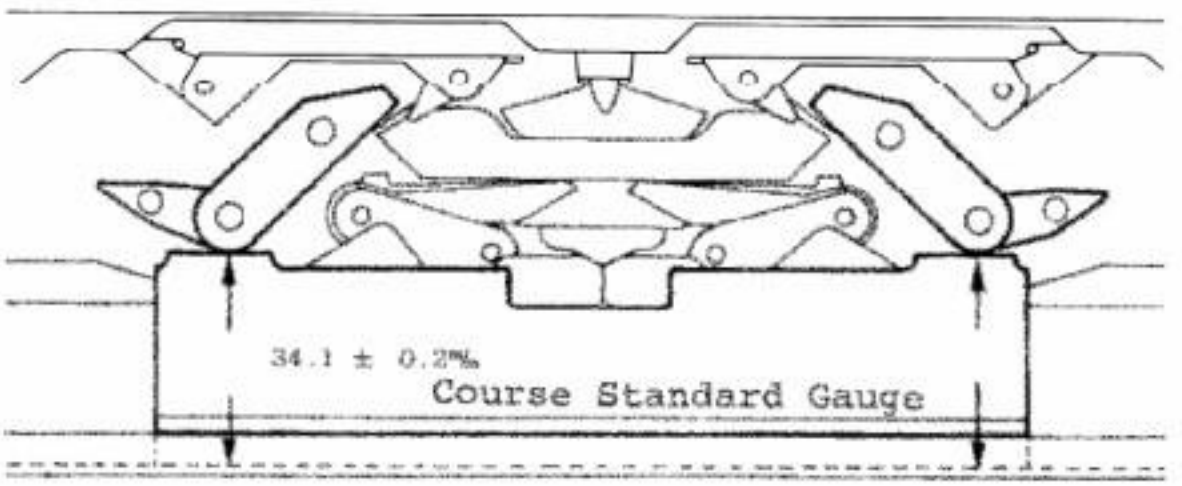


Fig. 43

4. The measurement between the inner surface of the Carriage Pipe and both Main Cams must be 34.1 ± 0.2mm., when the Stitch Dial is set at 5.

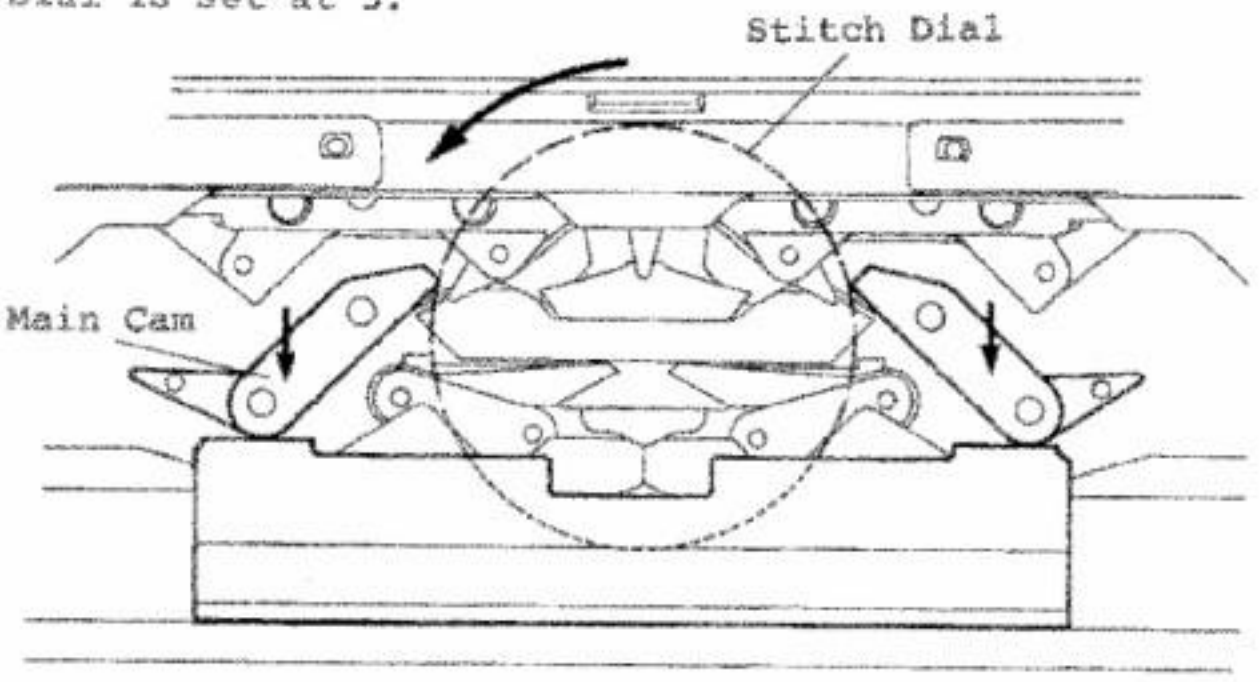


Fig. 44

2-4 Joining Carriage Plates A & B

* In joining Carriage Plates A and B, follow carefully the instructions set out below.

1. Attach Carriage Plate A to Carriage Plate B. Fasten four + SPW Binding Head Screws (3 x 7), so that the Carriage Plate A holder moves slightly.

2. Get the Cam Lever to Slip so that the Course Standard Gauge can be inserted along the Carriage Pipe.

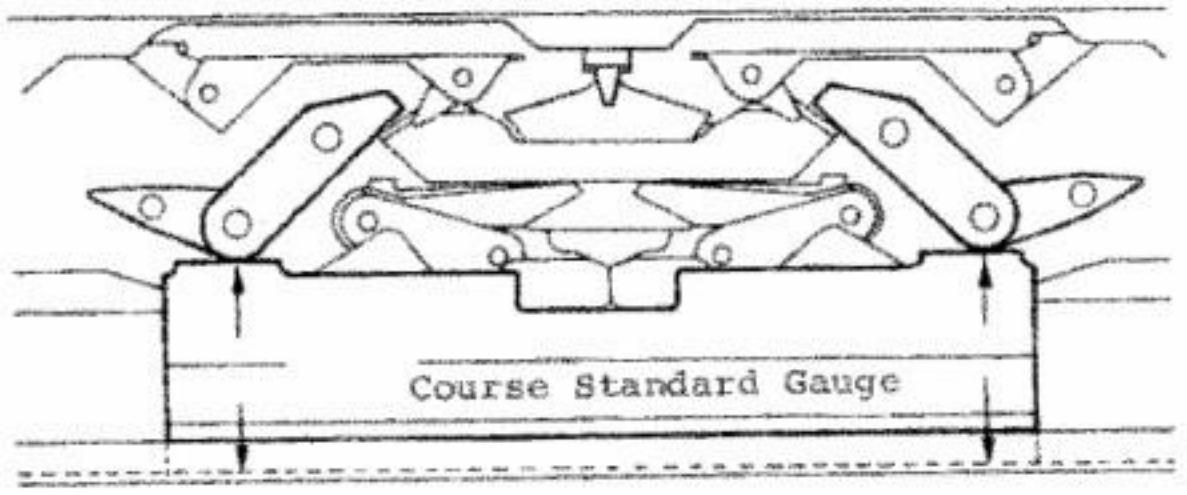
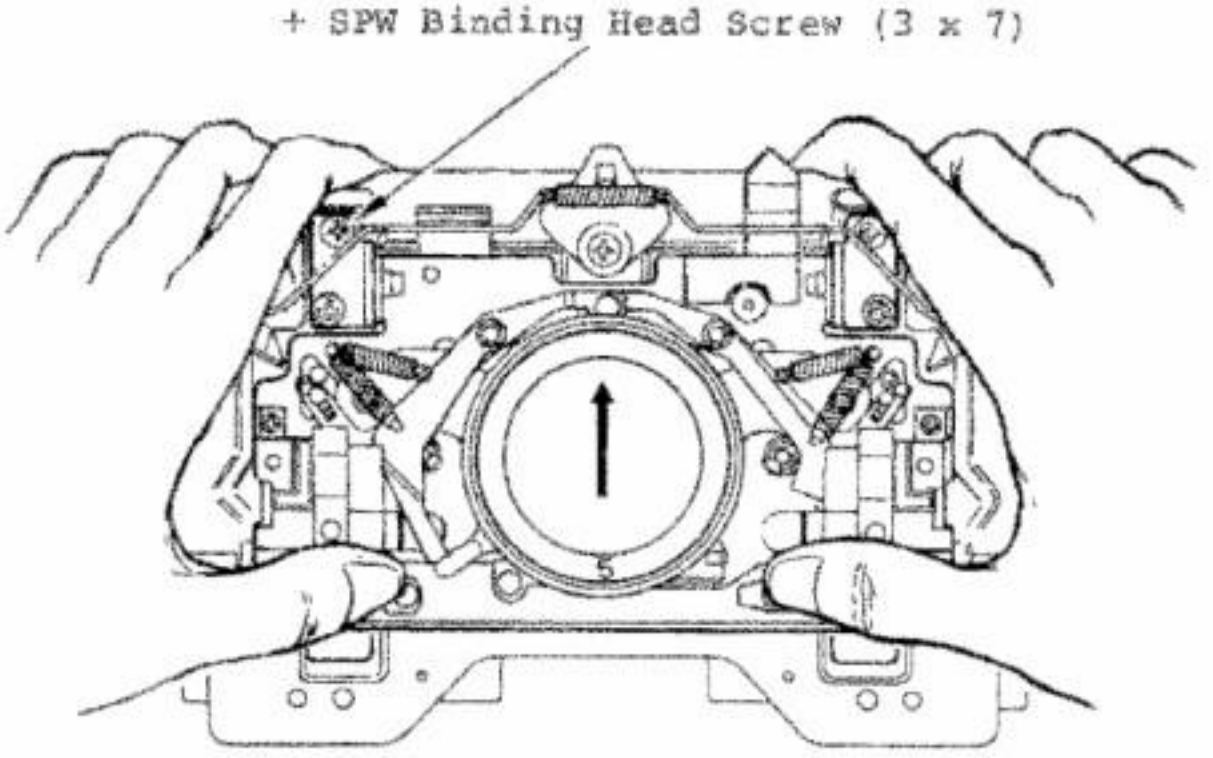


Fig. 45

3. Turn the Stitch Dial to 5 and fasten the four + SPW Binding Head Screws (3 x 7), while pushing the Carriage Plate A against the Carriage Pipe.



(Fig. 46)

Play between Carriage Plates A & B

The play between Carriage Plates A and B must be within 0.3mm.

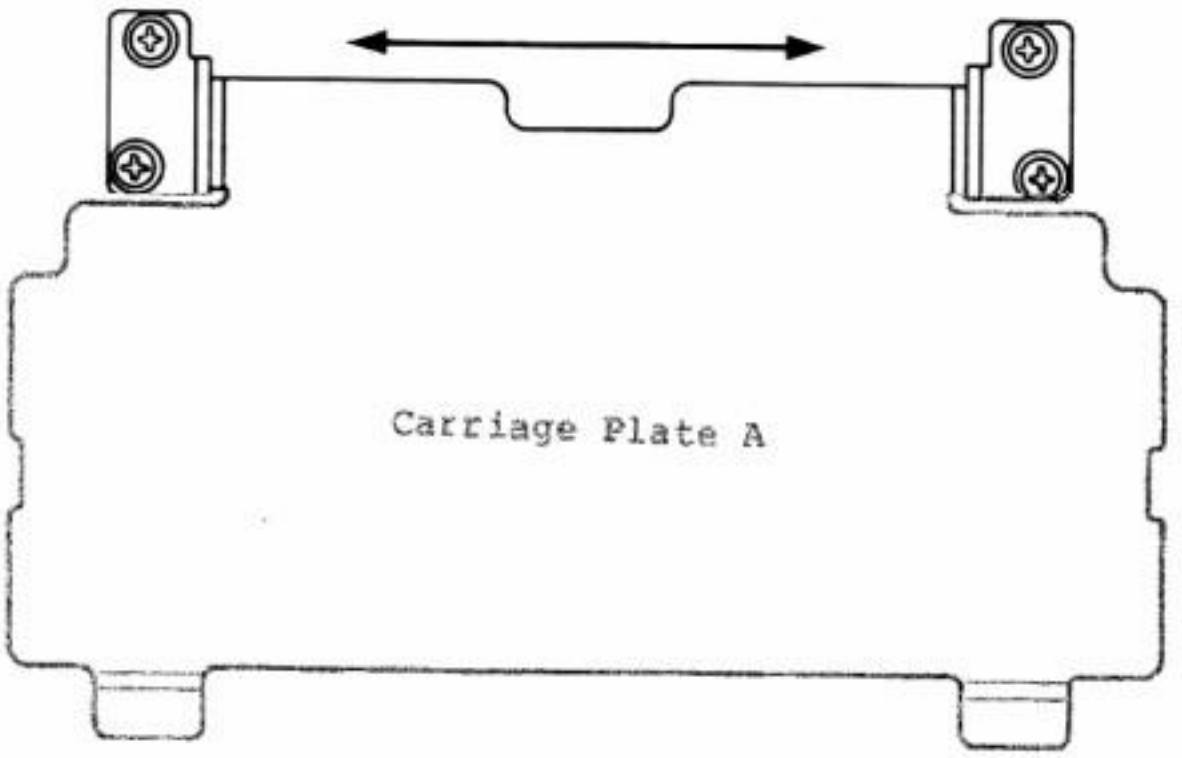


Fig. 47

If there is too much play between the two Carriage Plates, the position of the Cams against the Yarn Feeder move to the right or left during operation of the Carriage, thus causing failure in knitting.

2-5 The Measurement Between Needle Guide & Middle Course Cams

The clearance between the Middle Course Cam and Needle Guide must be more than 5mm. and must also be parallel.

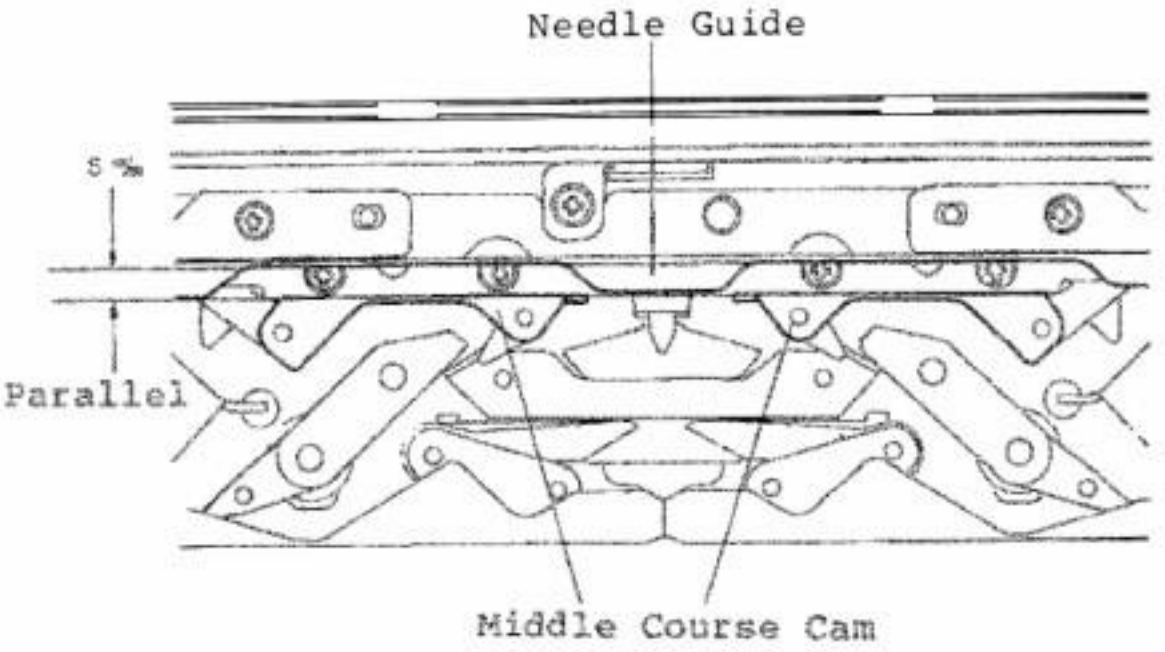


Fig. 48

When Knitting in Punch Lace or Knit-in stitches, the selected Needles move between the Needle Guide and Middle Course Cam. If the clearance is too narrow, the Needle butts are unable to go through their selected course.

2-6 Drum Assembly

1. If it is necessary to disassemble the Drum Unit, refer to the diagram below.

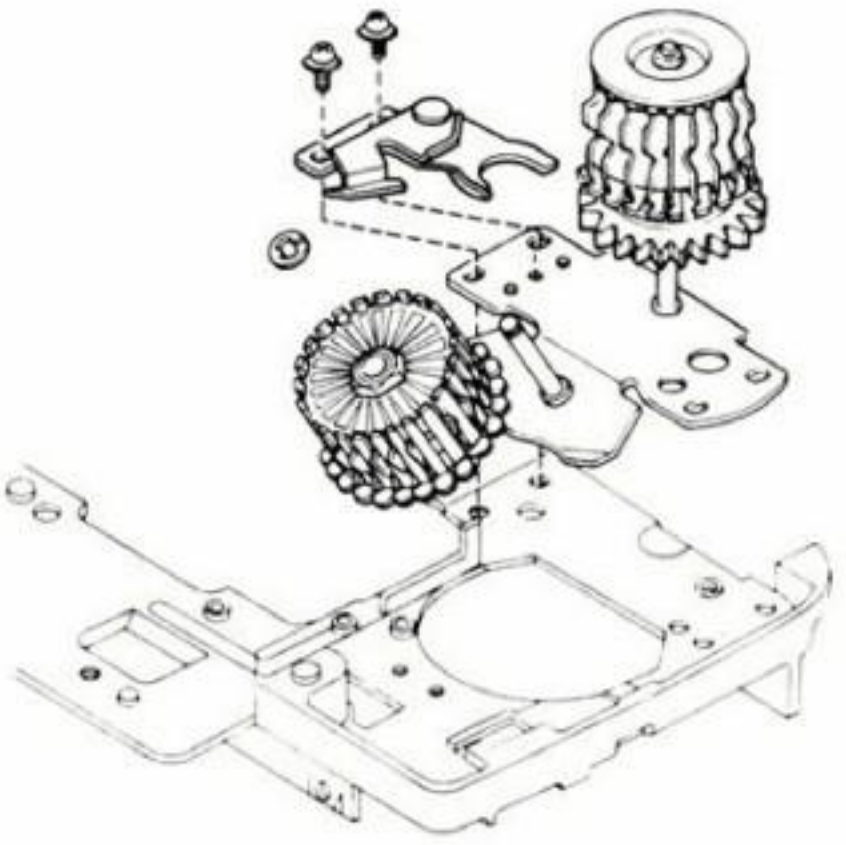


Fig. 49

2. Insert into the Main Drum a + screw driver and unscrew the Hexagonal Nut on top of the Drum with a box screw driver. The Main Drum can now be disassembled.

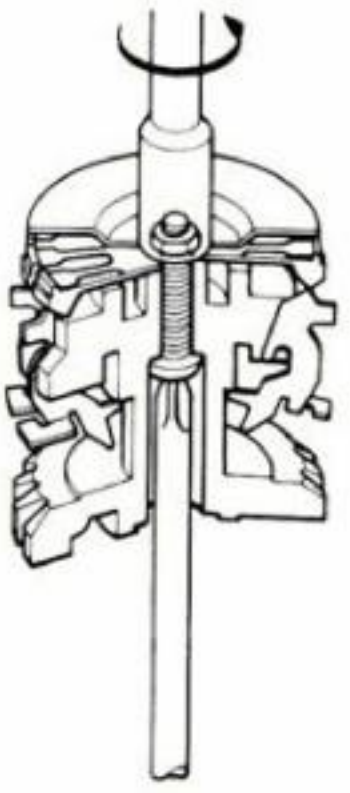


Fig. 50

3. To assemble the Main Drum, care must be taken so that the Main Drum Pieces, the Main Drum Rebound Spring and the Plastic Gear Wheel are aligned correctly.

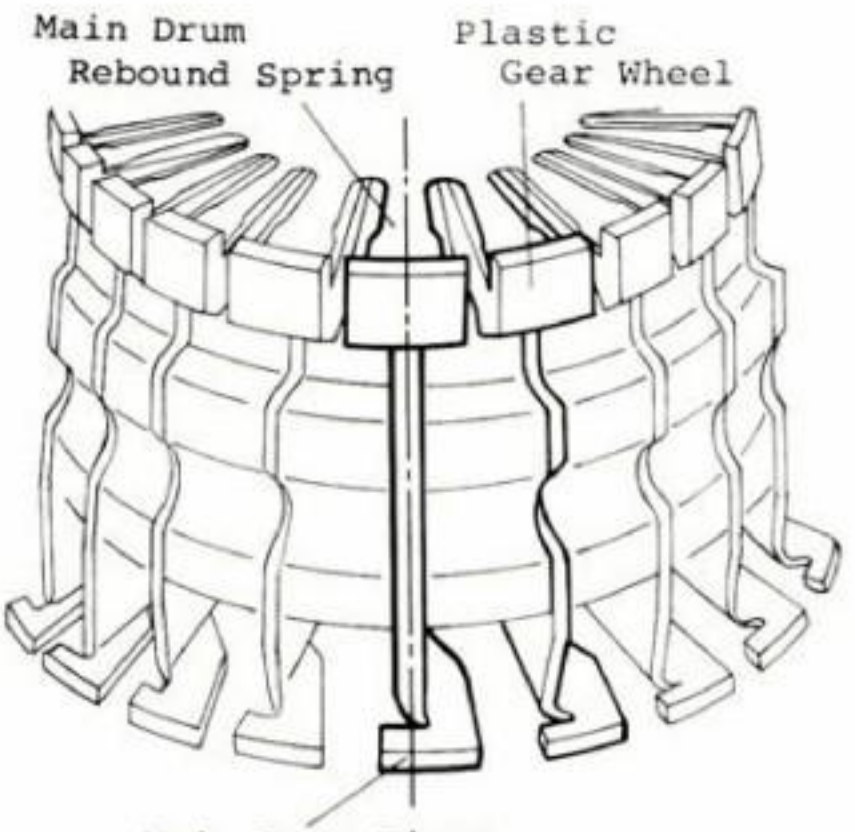


Fig. 51

3. CARRIAGE ASSEMBLY

1. Place the Cam Lever theough the opening in the Carriage Cover, and place its knob at the KNIT-IN position.

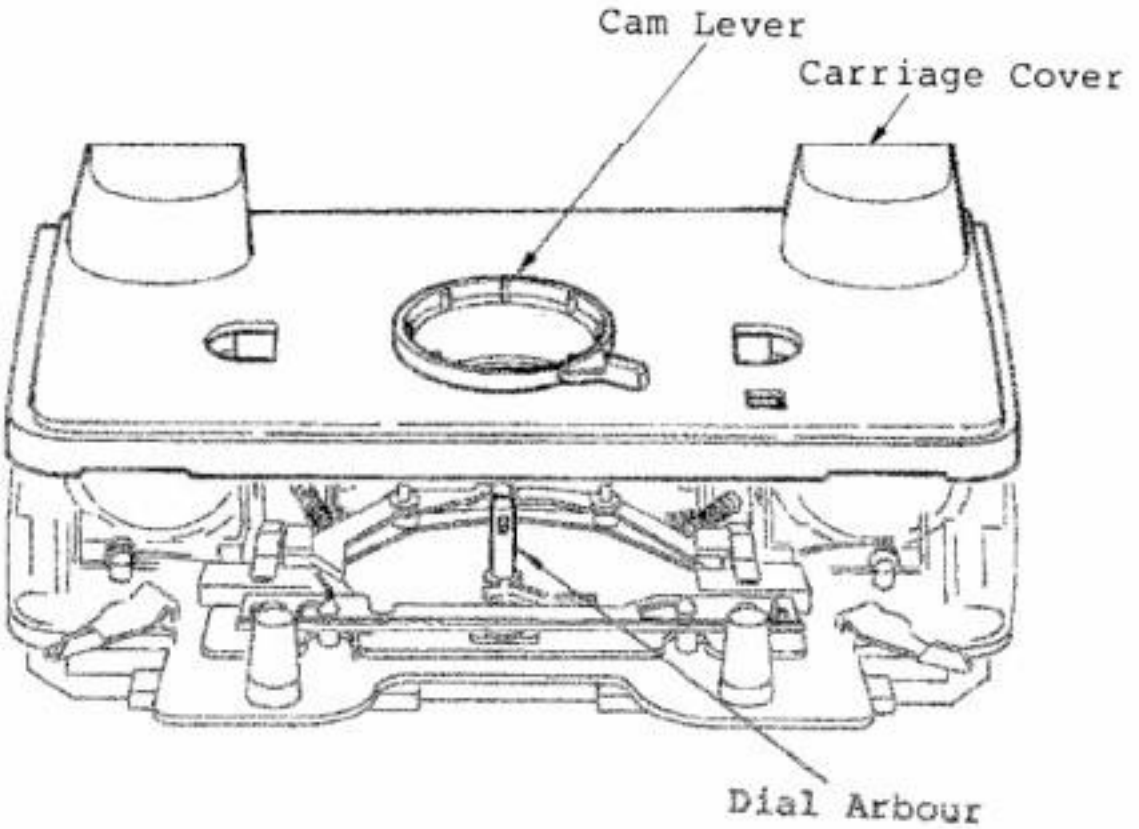


Fig. 52

2. Fit the Cam Lever on the Dial Arbour, and push it down.

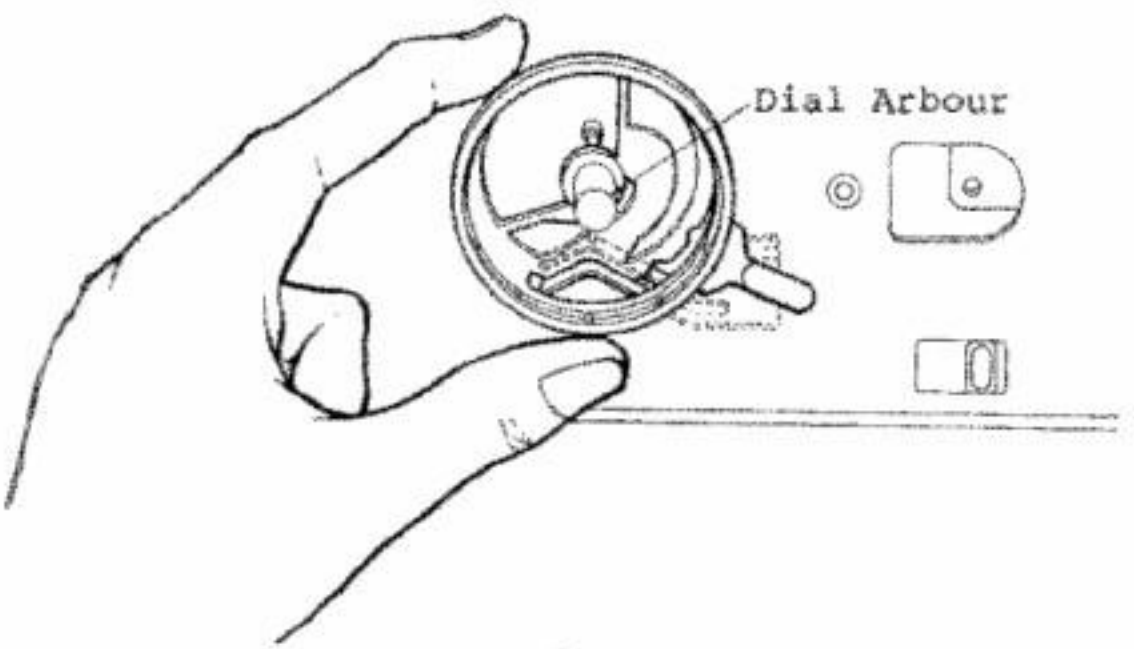


Fig. 53

3. Turn the Cam Lever to Stockinet while pushing down so as the wavy part of the Cam Lever becomes engaged with the leaves of the Dial Spring.

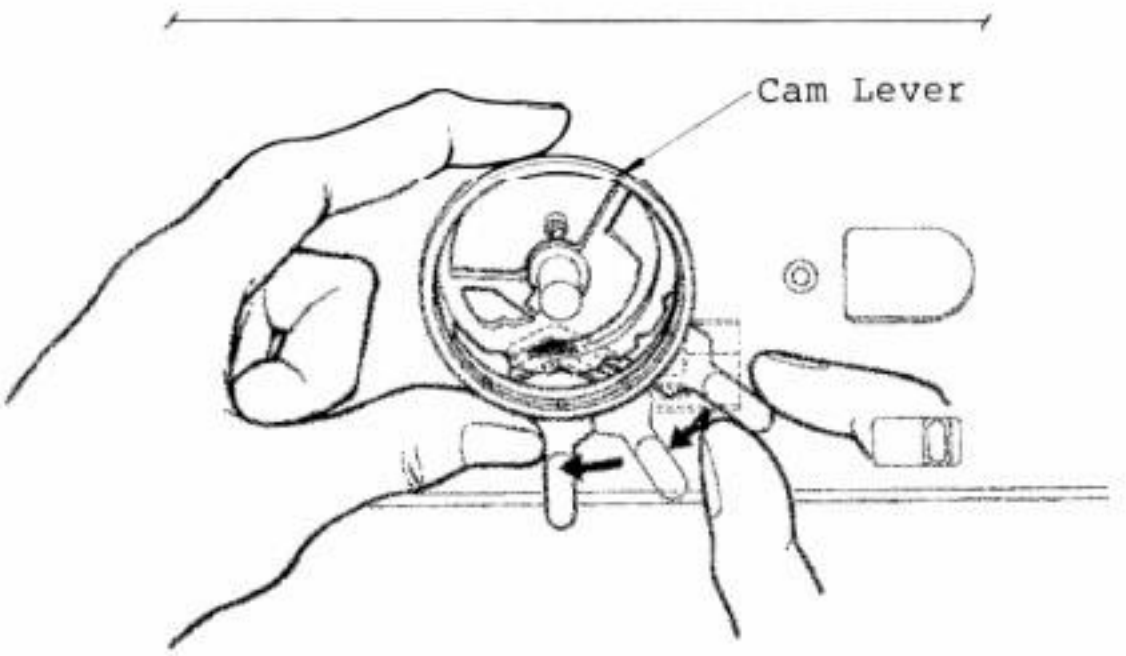


Fig. 54

4. Secure Carriage Cover with two + Binding Head Screw (3 x 6).

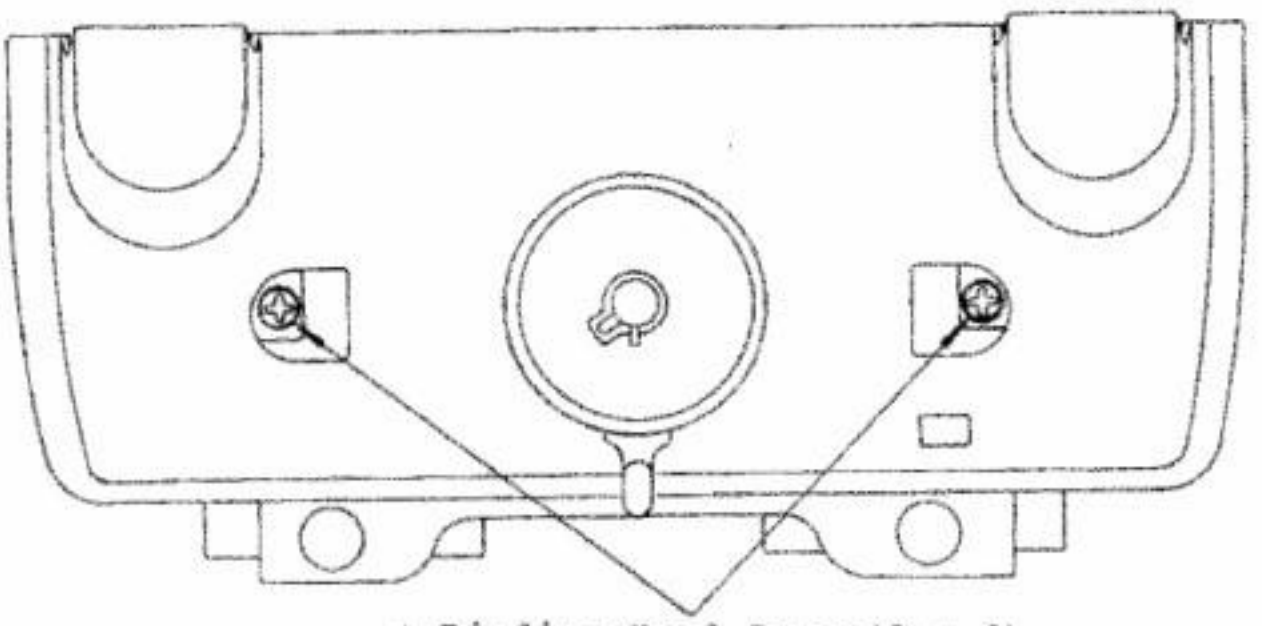


Fig. 55

5. Push the Travelling Plate Pin towards the Dial Arbour.

(If the Travelling Plate Pin is away from the Dial Arbour, the Stitch Dial will not fit in, and will not rotate.)

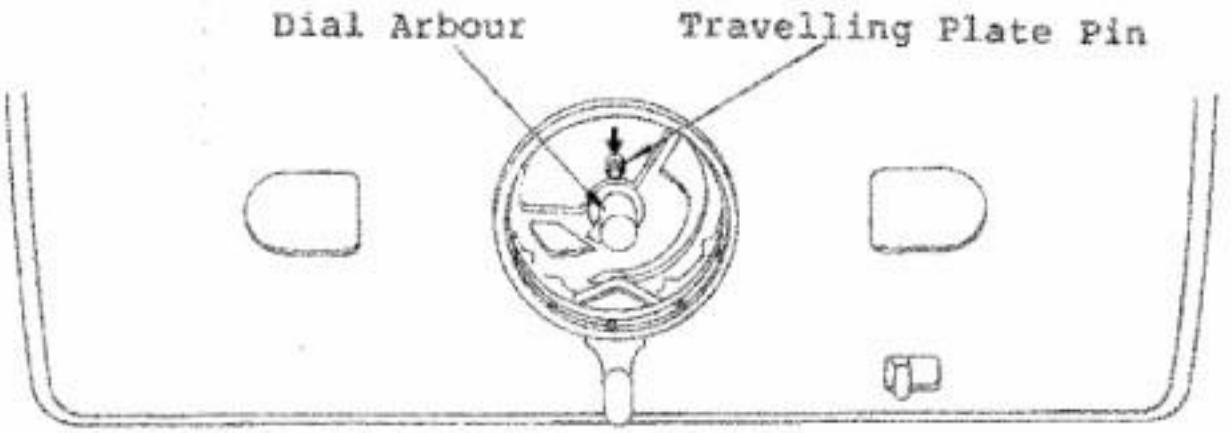


Fig. 56

6. Place the Stitch Dial over the Cam Lever making sure that the pin on the dial Arbour clears the groove in the Stitch Dial.

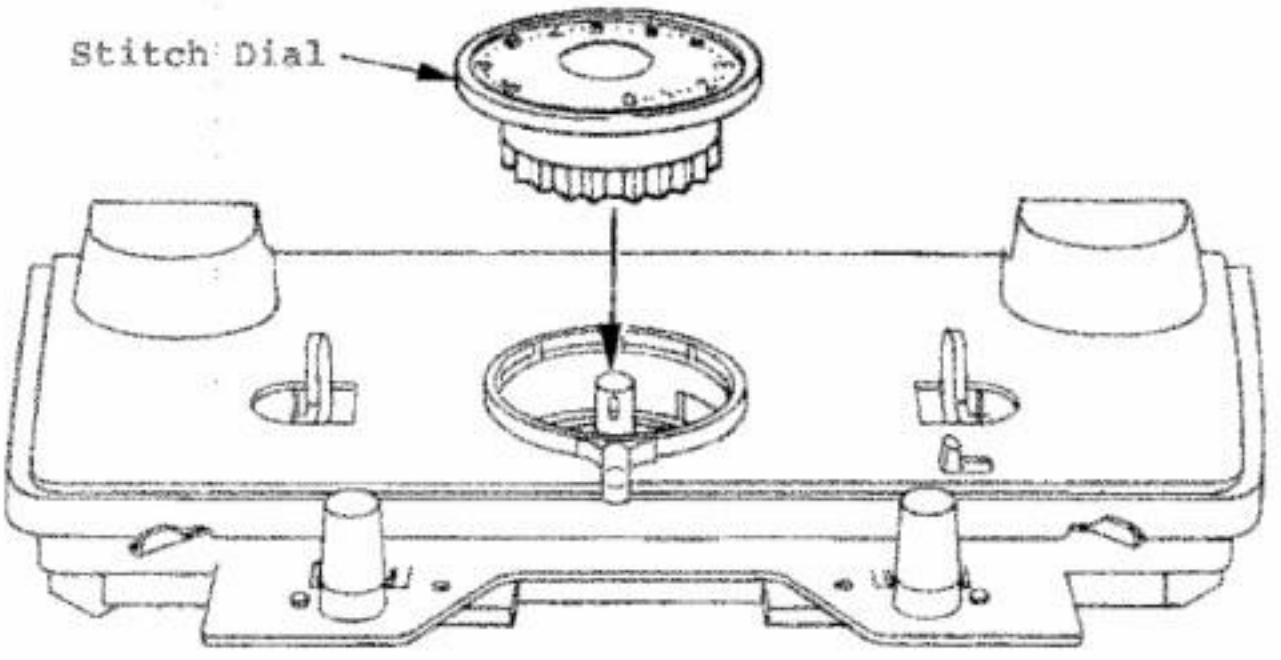


Fig. 57

7. With the Carriage Handle down, as illustrated in Fig. 58, secure it by inserting and fastening the two Carriage Handle Screws.

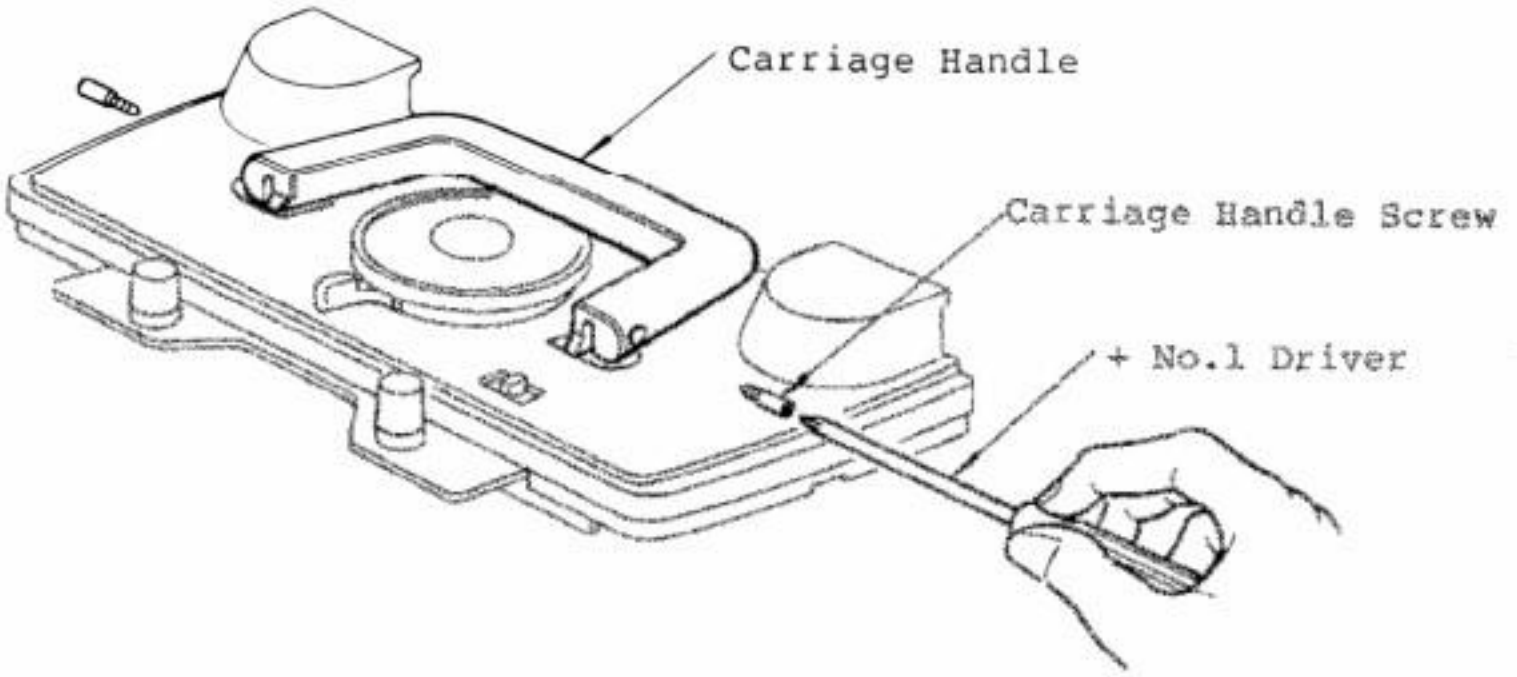


Fig. 58

4. KNIT RADAR AND PATTERN UNIT ASSEMBLY & DISASSEMBLY

4-1 How to disassemble the Knit Radar Unit

1. Before removing the Knit Radar Unit, take off the Row Counter at the right side of the Radar Unit by removing the Pan Head S Tight Screw.

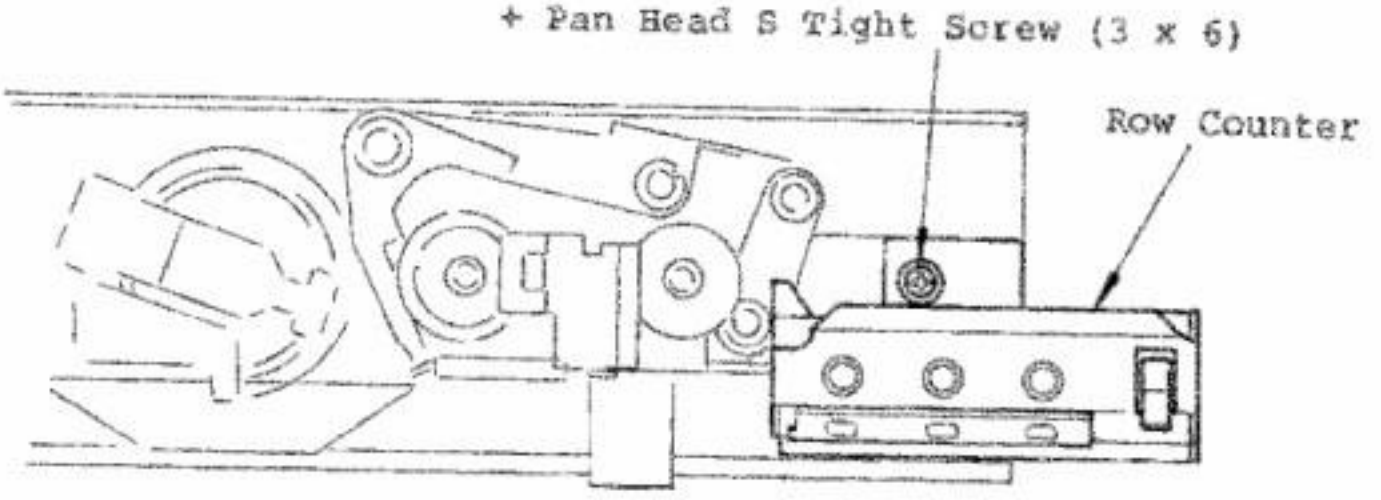


Fig. 59

2. Push approx. 95 needles, in front of the Knit Radar Unit, to D position, and remove four + Binding Head Tight Screws (3x8) securing the Knit Radar Unit.

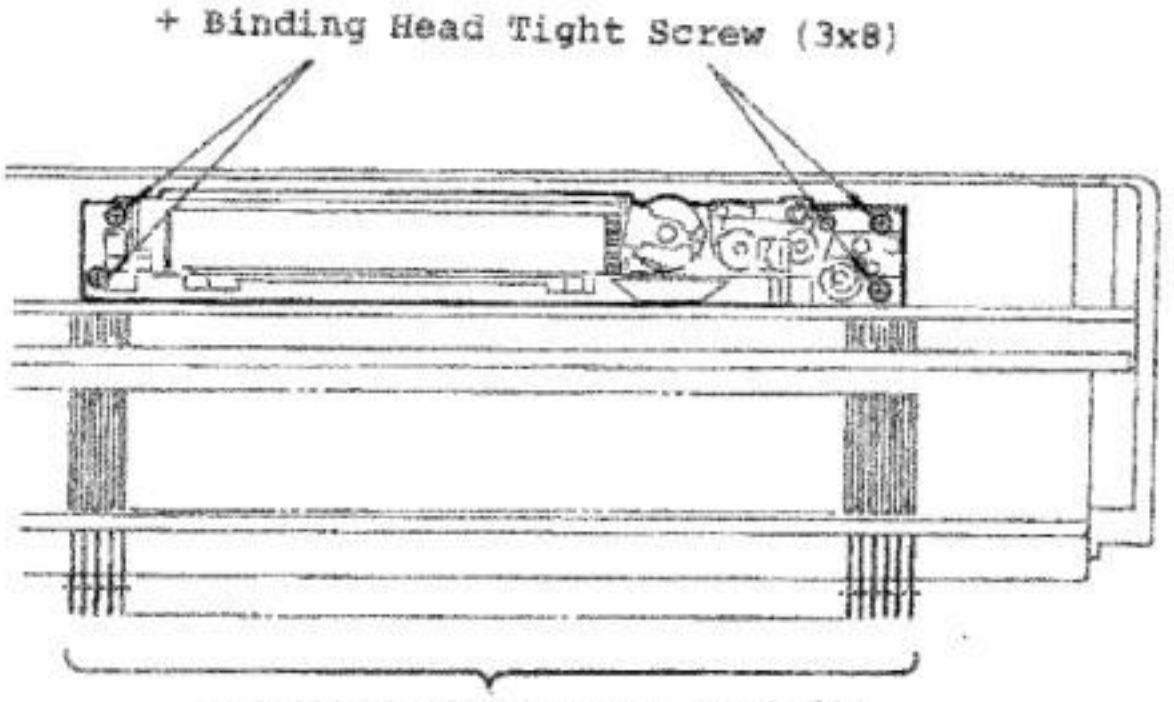


Fig. 60

3. Hold the left end of the Knit Contour with your left hand, and while pushing in the Feeding Lever with the thumb finger, lift up the right end and guide it toward right.

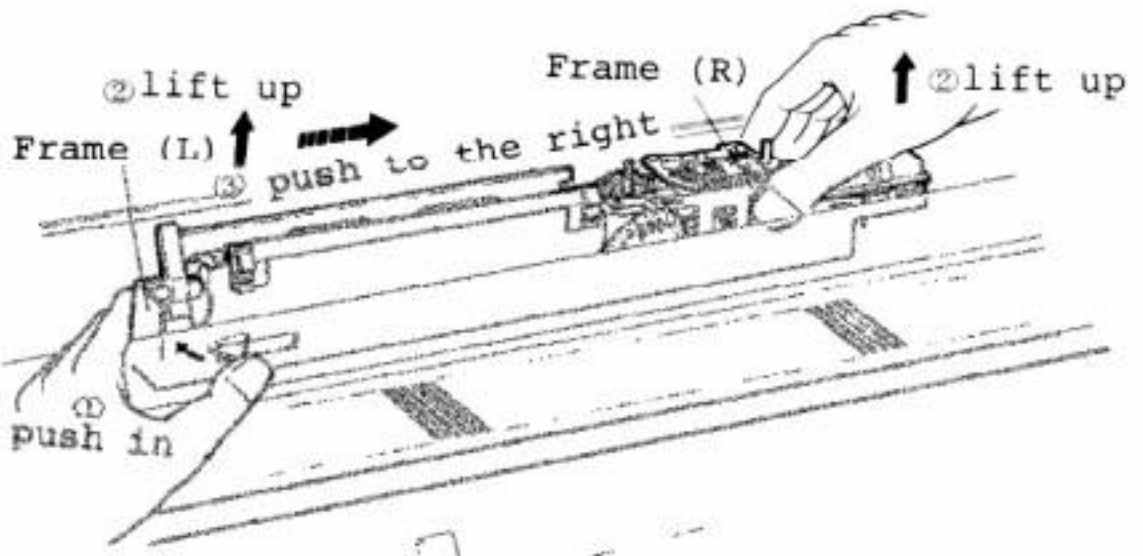


Fig. 61

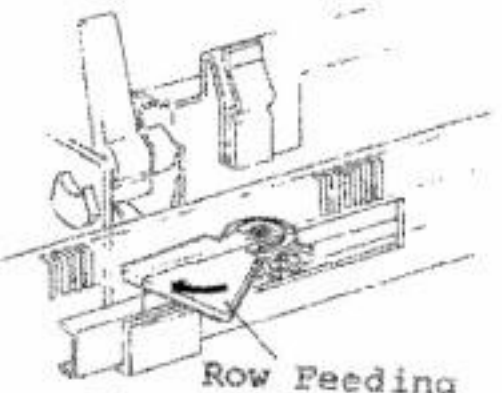


Fig. 61-1

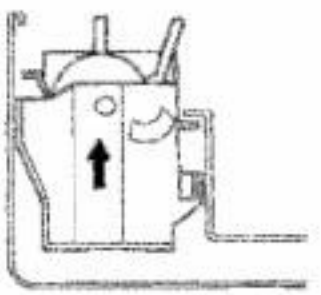


Fig. 61-2

4. Further lift up the Fram (R) and while tilting the Rader forward, take it out.

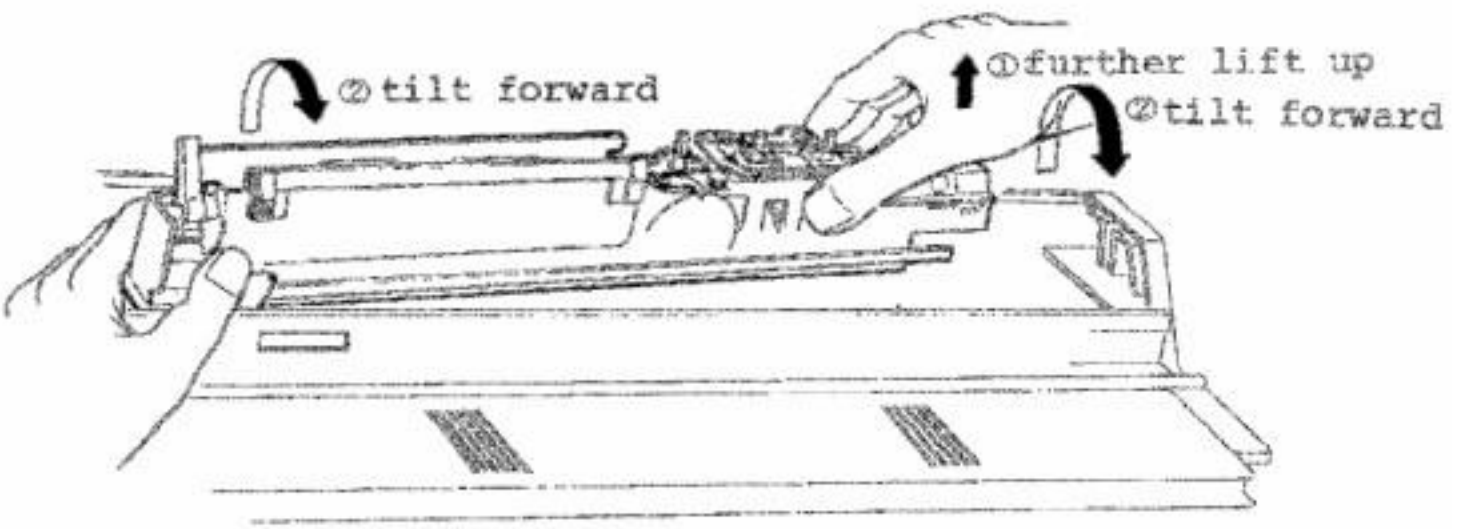


Fig. 62

4-2 How to Disassemble the Pattern Unit

1. Push the needles in front of the Pattern Unit to D position, remove the Feeding Dial, and remove four Collar Head S tight Screws securing the Pattern Unit to the Needle Bed Bracer.

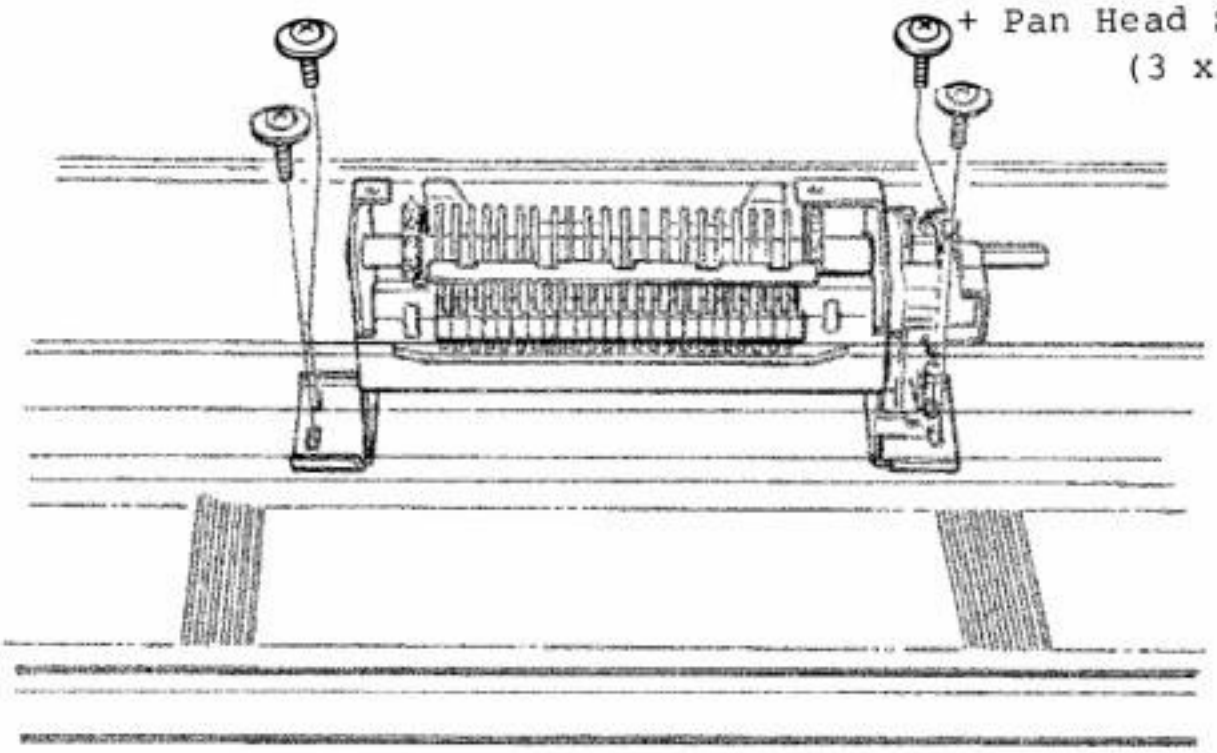


Fig. 63

2. Hold the pattern unit with both hands, nad lift it up, then guide it towards you.

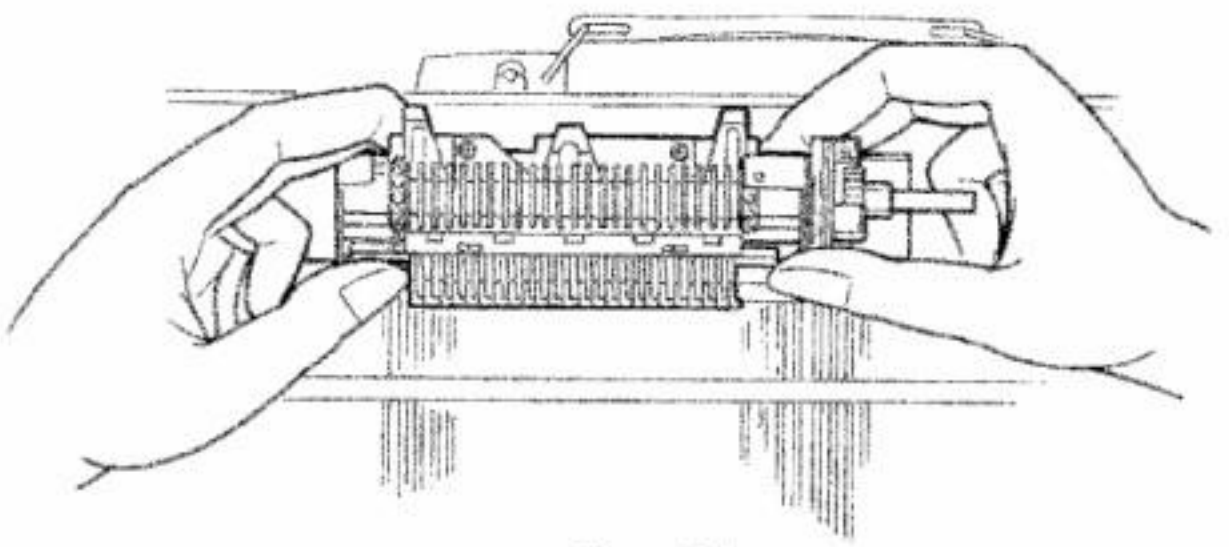


Fig. 64

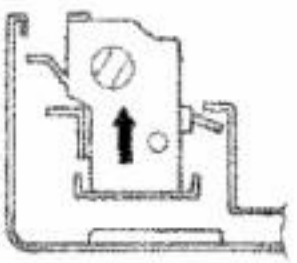
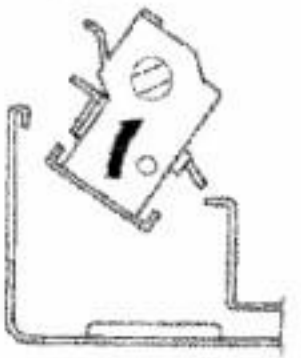


Fig. 64-1



(Fig. 64-2

5. ADJUSTMENT & REMOUNTING OF PATTERN UNIT

5-1 How to Adjust or Repair the Pattern Unit

* The Touch Lever Scanning Fingers protrude through the Punch Card holes to read the pattern and to transmit it to the Main Drums. If the Punch Card Holes are positioned so that the Scanning Fingers are unable to protrude through them, then the Touch Levers cannot function correctly and the Pattern will be incorrectly knitted on the fabric.

  In order to confirm whether or not the Scanning Fingers enter the Punch Card holes smoothly, read carefully the following instructions.

  1. Insert Punch Card No.1 into the Pattern Unit.

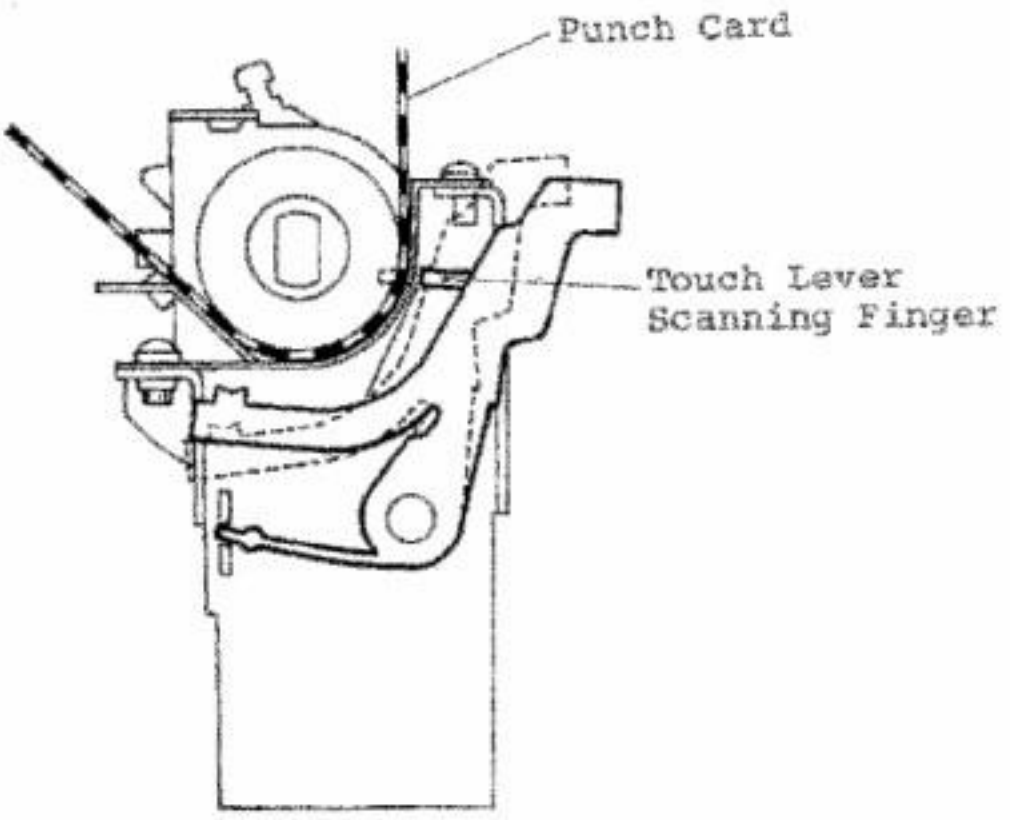


Fig. 65

2. Looking through the Adjustment Confirmation Aperture at the left end of the Pattern Unit, raise the end touch lever and check to see if its scanning finger enters into the center of the Punch Card Hole.

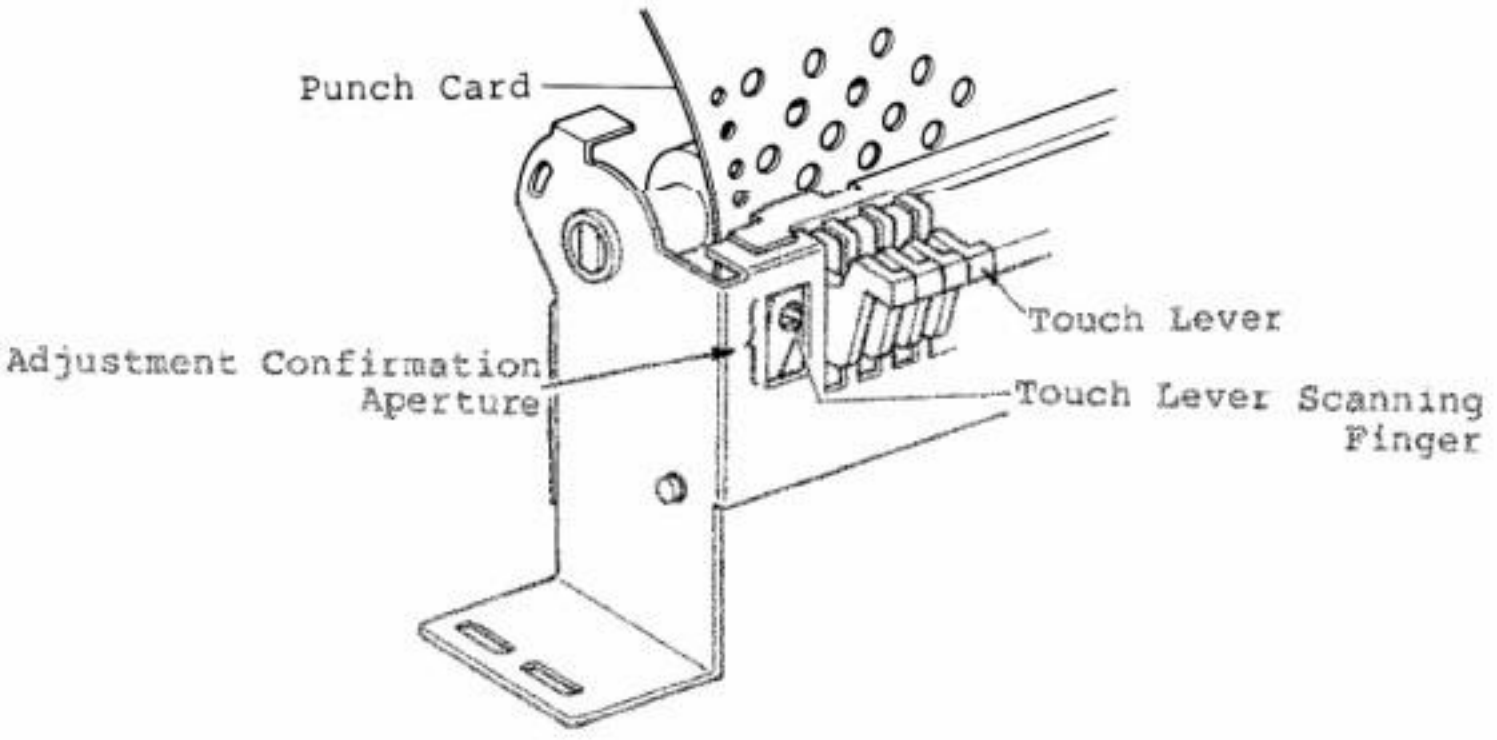


Fig. 66

3. If the Scanning Finger does not enter into the centre of the Punch card hole, remove the Feeding Lever Spring, on the right side of the Pattern Unit, and remove one + Binding Head S tight screw (3x14) and remove the Feeding Ratchet Stopper Plate.

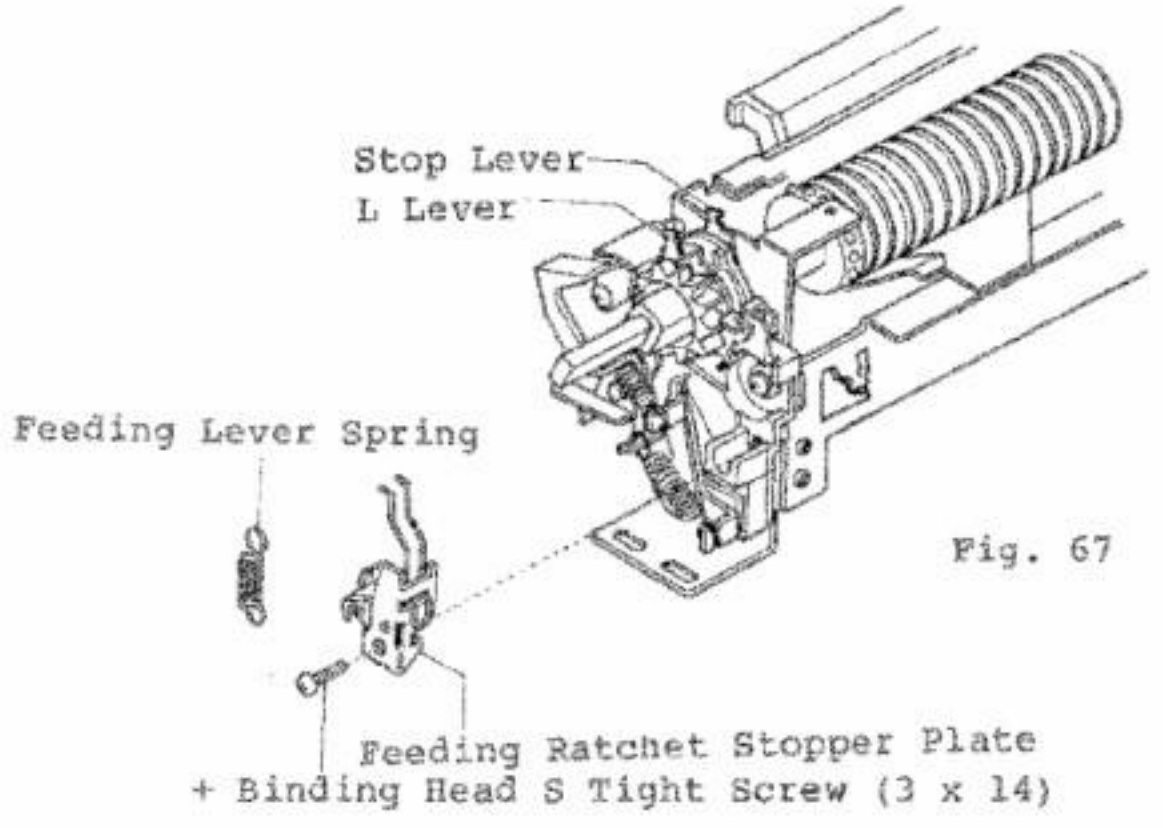


Fig. 67

4. Loosen three screws which secure the Stop Lever Holder. while closely watching the position of the Punch Card holes and the projection of the Touch Lever, move the Stop Lever Holder in the arrowed direction. To gain smooth evtry of the Scanning Fingers, into the Punch Card holes, the graduation is usually set within 2-4.

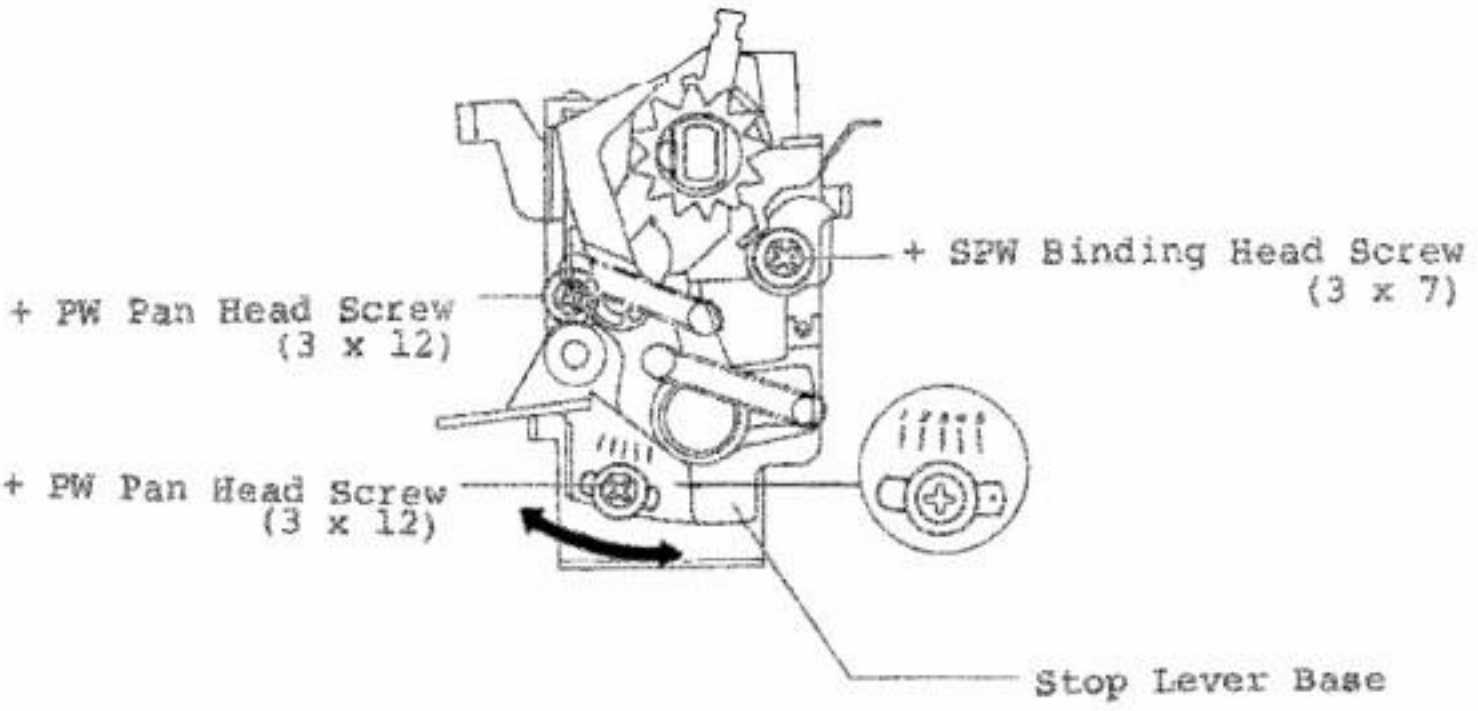


Fig. 68

5. After the adjustment has been completed, move towards you the Stop Lever and L Lever and removing the Feeding Lever Collar, install the Feeding Ratchet Stopper Plate.
The purpose of moving the Stop Lever towards you, is to make the setting of the Stop Lever Spring more easy. The removal of the Feeding Lever Collar is to prevent the Pawl on the Feeding Ratchet Stopper Plate from being damaged.

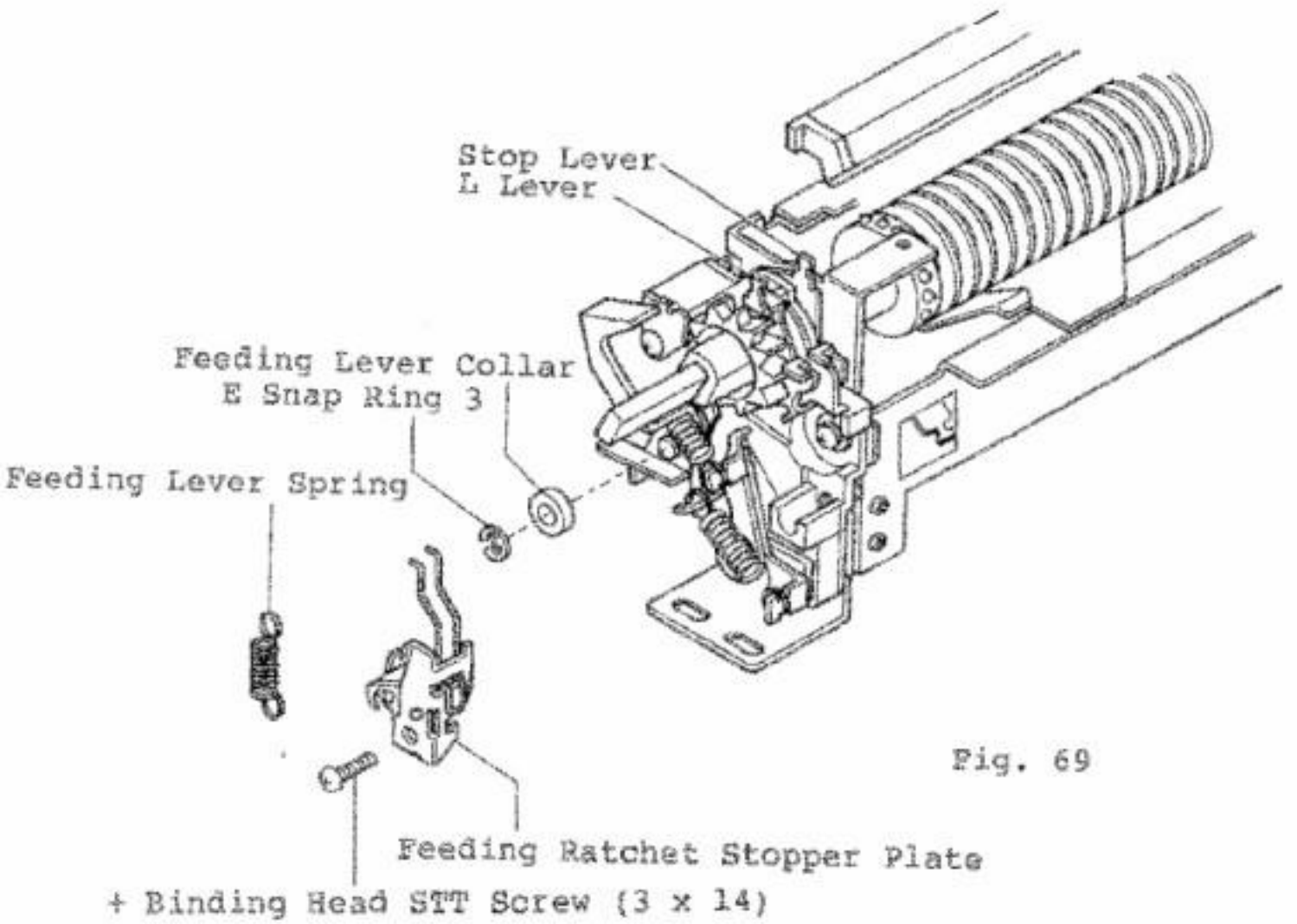


Fig. 69

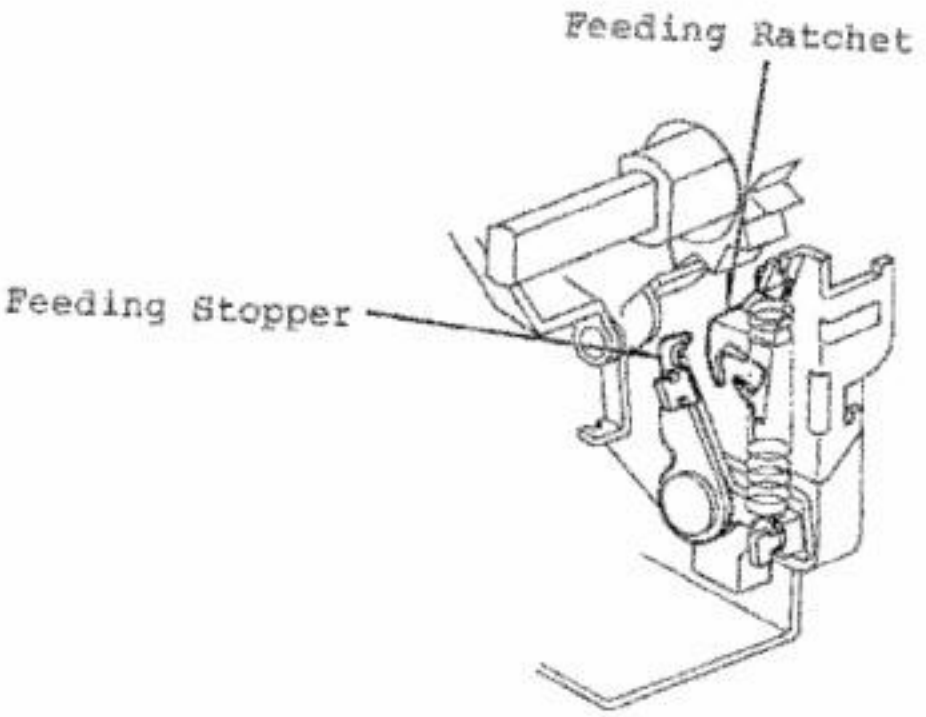


Fig. 70

5-2 Remounting of Pattern Unit

1. Reverse the procedure of removing the Pattern Unit when replacing it.

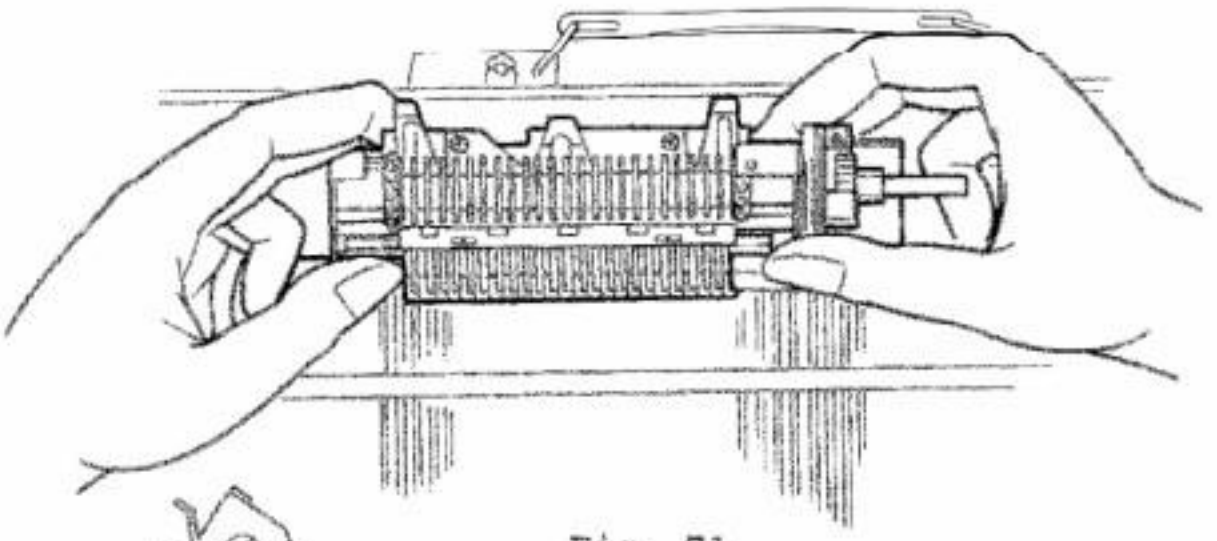


Fig. 71

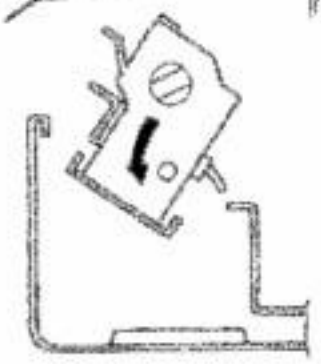


Fig. 71-1

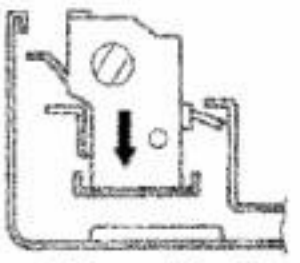


Fig. 71-2

2. Insert four + Pan Head S Tight Screws (3 x 5) and fasten them.

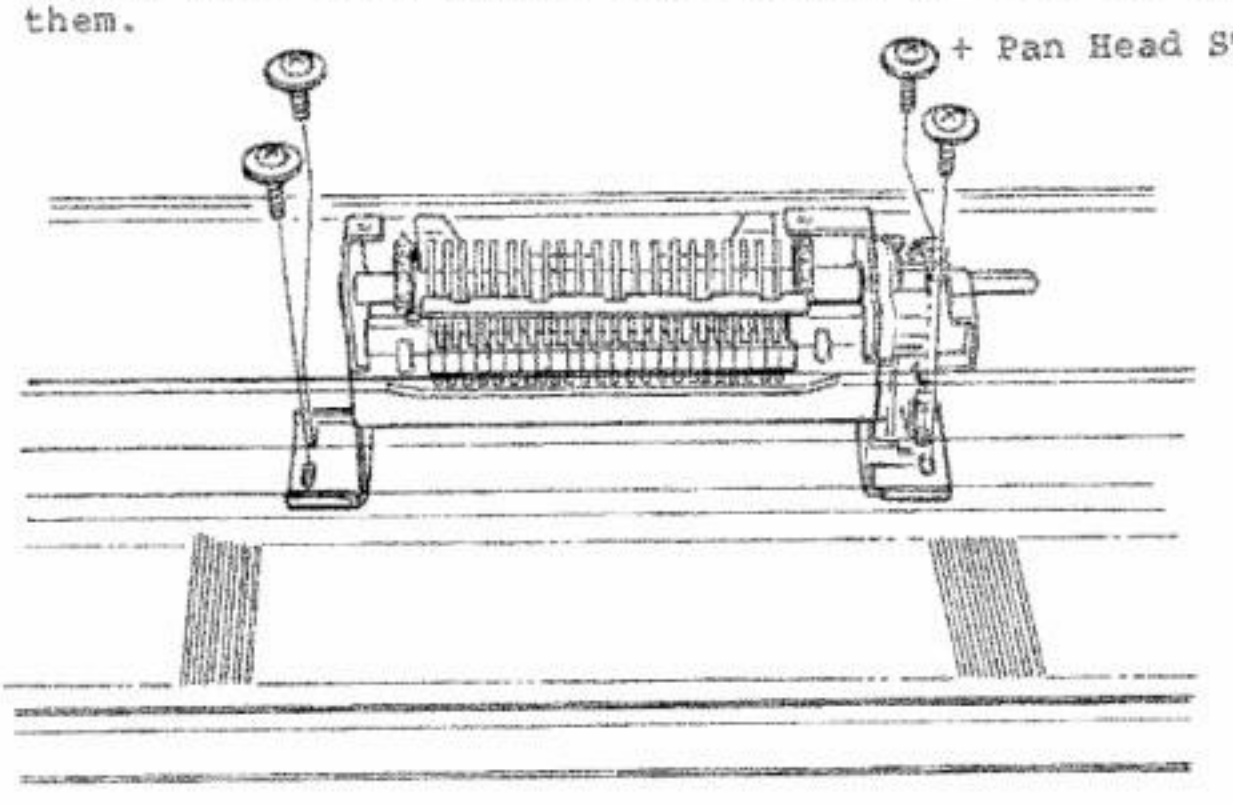


Fig. 72

5-3 Adjusting the Clearance Between the Touch Lever and Main Drum piece

In case of imperfect adjustment of the clearance:

* When a Punch Card is inserted into the PC Panel, the Touch Levers read the pattern by pushing their Scanning Fingers into the Card holes. Those Touch Levers remaining in a lower position, push the Main Drum Pieces. However, in the case that there is too much clearance between the Touch Levers and the Main Drum Pieces, the Touch Levers are unable to transmit the pattern to the Main Drum.

Correcting methods:

1. Insert an NP Card into the PC Panel, loosen four + Pan Head S Tight Screws (3 x 5), which secure the Pattern Base to the Needle Bed Bracer A.

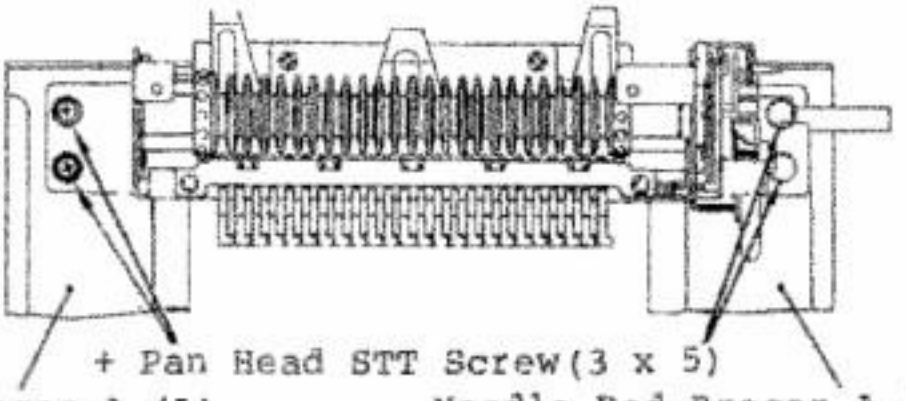


Fig. 73

2. As shown in Fig. 74, move the Carriage so that the Main Drum in aligned with a Touch Lever. Move the Pattern Unit towards the Main Drum so that the clearance between the Main Drum Piece and the Touch Levers will fall within a range of 0.2mm.

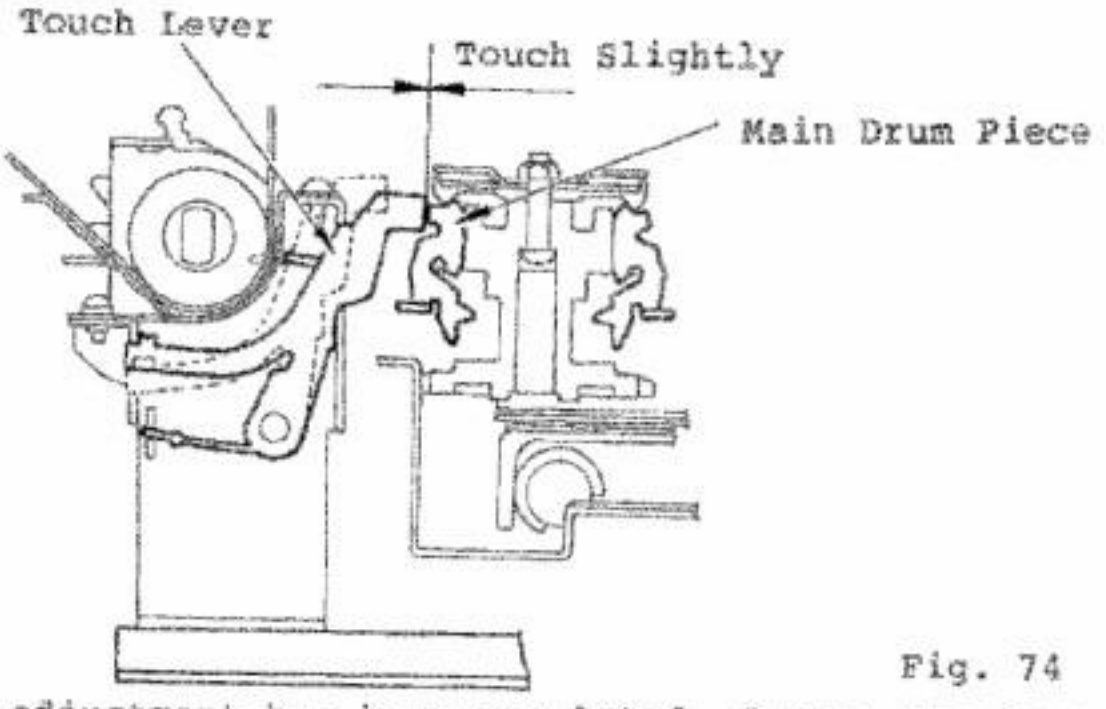


Fig. 74

3. After the adjustment has been completed, fasten the four screws and examine whether or not the Touch Levers work correctly.

NOTE: Whenever the Pattern Unit is removed from the machine, be sure to adjust the clearance between the Touch Levers and Main Drum Pieces, when remounted.

5-4 Adjustment of Feeding Lever

* As the Feeding Lever is moved up and down, the Punch Card will be fed every row. If the movement of the Feeding Lever is irregular, the holes on the Punch Card will be out of position for the Scanning Fingers to enter and the pattern will not be formed correctly on the fabric.

1. The Feeding Lever is operated by a Driving Cam on the rear side of Carriage Plate B, on the Carriage.

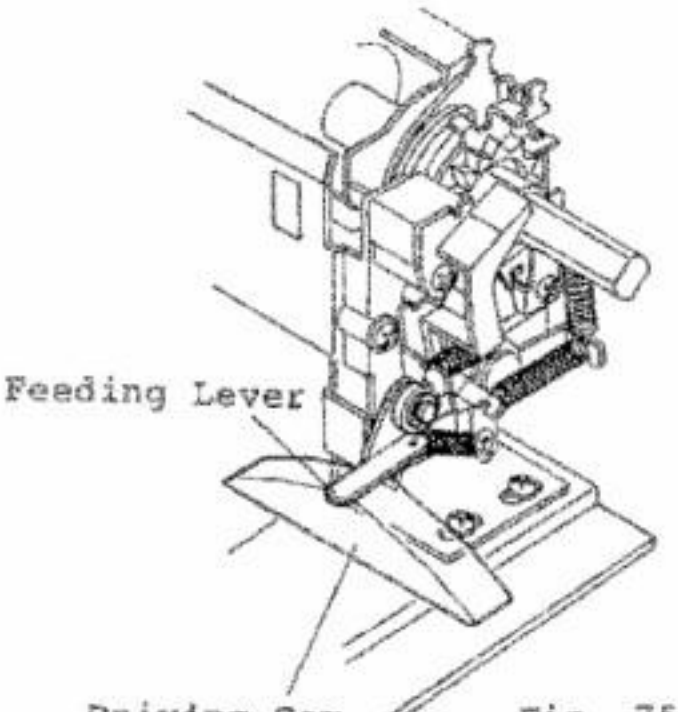


Fig. 75

2. When the Feeding Lever is raised to the top of the Driving Cam, the Feeding Lever Collar is also raised. At this point, measure the clearance between the Collar and the Feeding Lever of which the clearance should measure less than 0.25mm.
In the case that the clearance is more than 0.25mm., exchange the collar for a larger one to reduce the clearance to the required measurement.

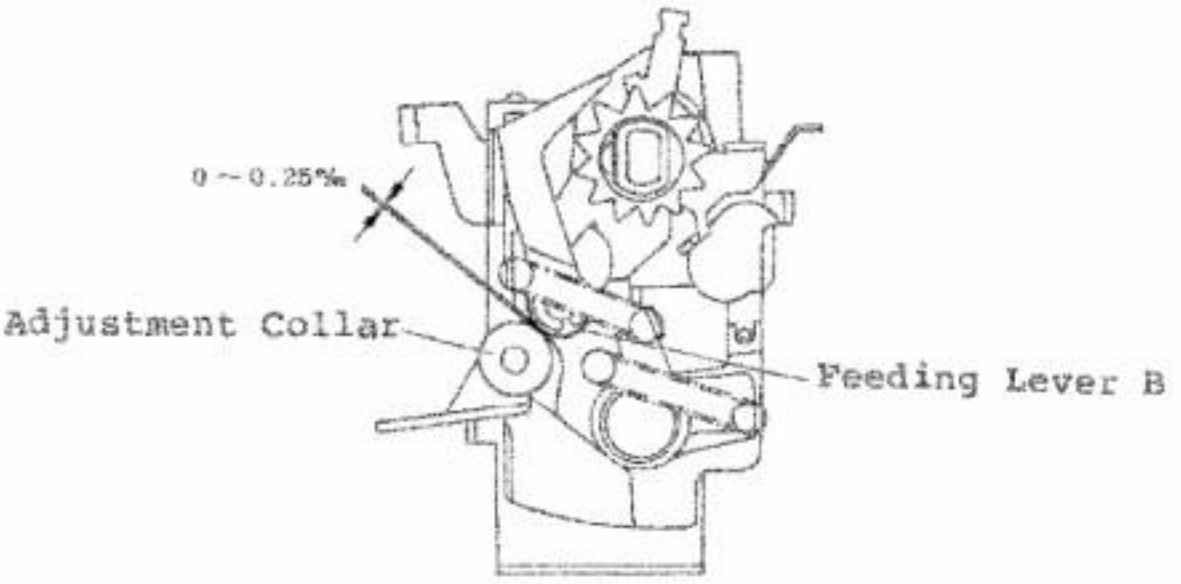


Fig. 76

3. In case there is too much clearance between the Feeding Pawl and a cog on the Ratchet Wheel, remove an E Snap Ring 3 attached to the Stop Lever Base, in order to exchange the adjustment collar with a more suitable one.

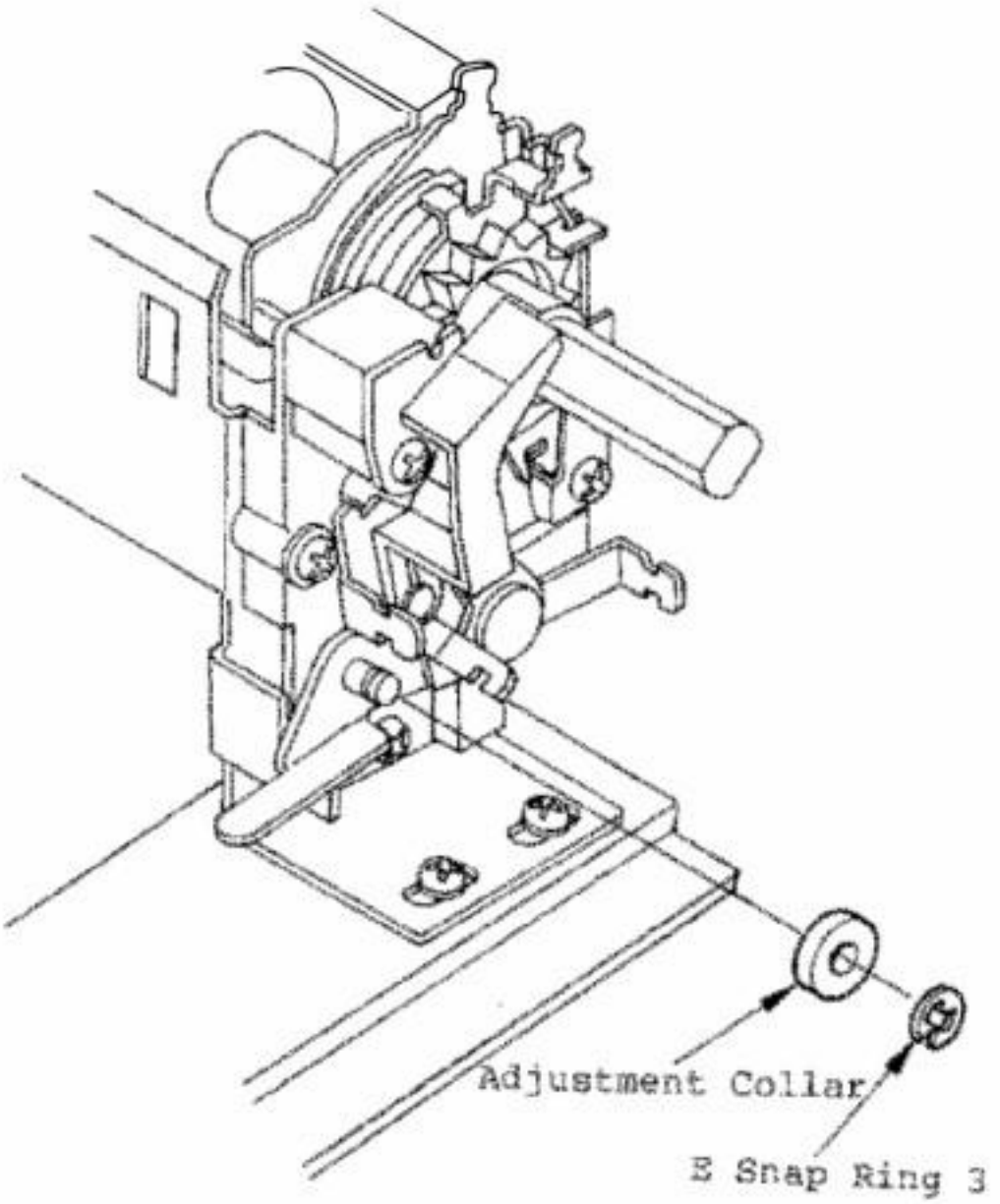


Fig. 77

6. ADJUSTMENT & MEASUREMENT OF EACH PARTS OF NEEDLE BED

6-1 The dimension between the back surface of the Rail and the Needle Bed Rack is 19.0 ± 0.2mm.
(The difference between the maximum and minimum measurement should be within 0.2mm.)

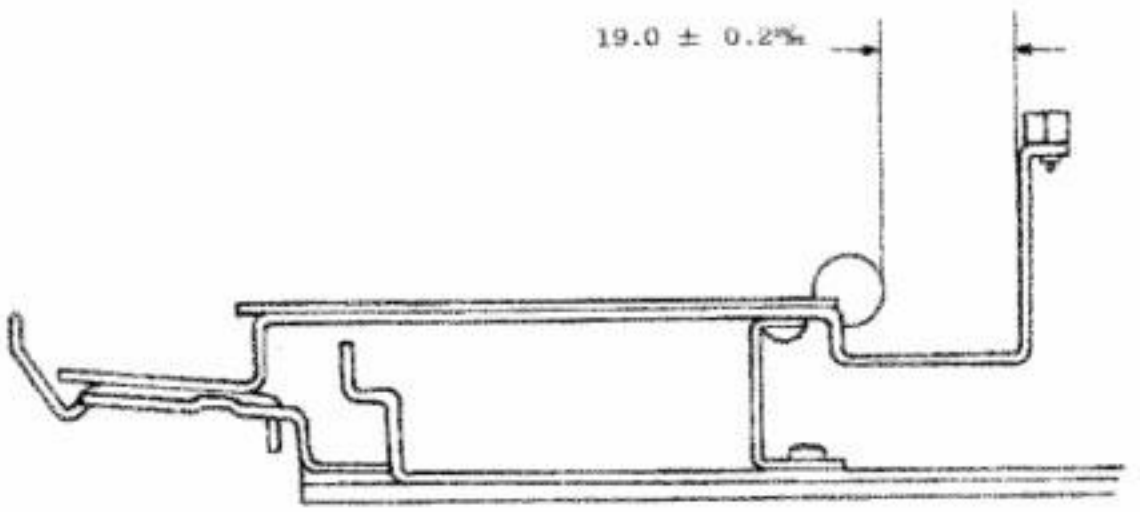


Fig. 78

1. In case the dimension between the Rail and Rack is too large:

a) If the dimension is too large it gives too much play to the Main Drum engaged with the Rack and causes the Needles to collide with the Separation Cam during pattern knitting.

b) As the position of the Drum Unit recedes further backwards than the standard position, the Needles selected by the Sub Drum come out insufficiently and collide with the Separation Cam.

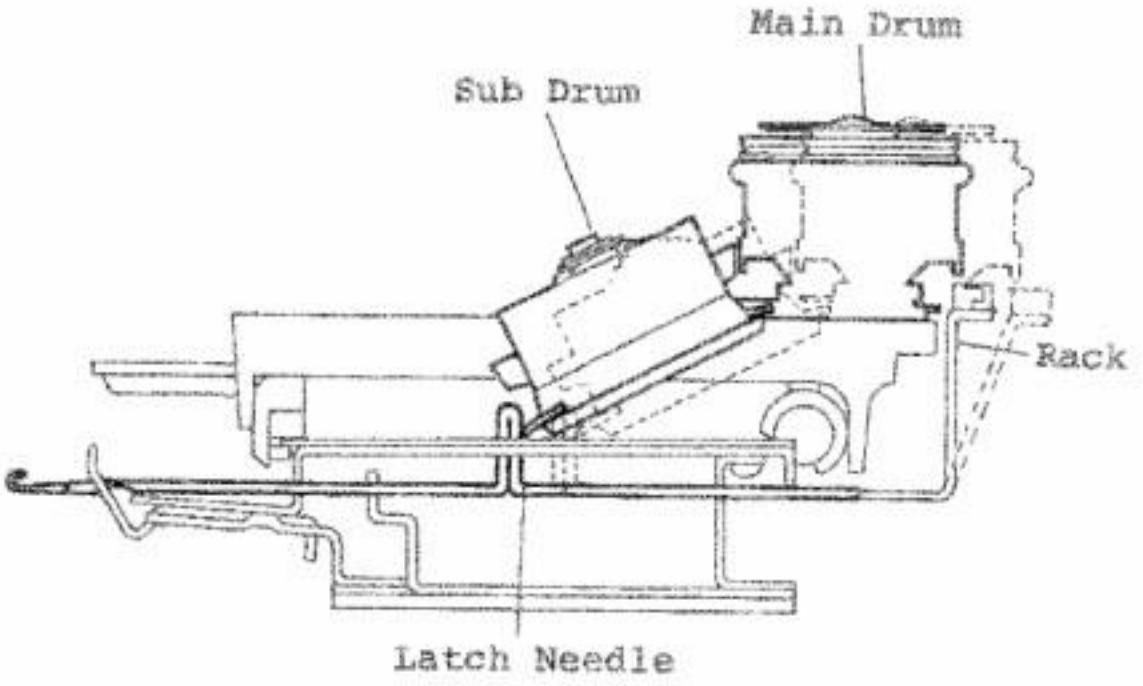


Fig. 79

2. In Case the dimension is too small:

a) The Main Drum Gear becomes engaged with the Rack too much which results in the Carriage becoming too heavy during operation.

b) The position of the Drum Unit becomes more forward than the standard position. And the selected needles will collide with the Separation Cam.

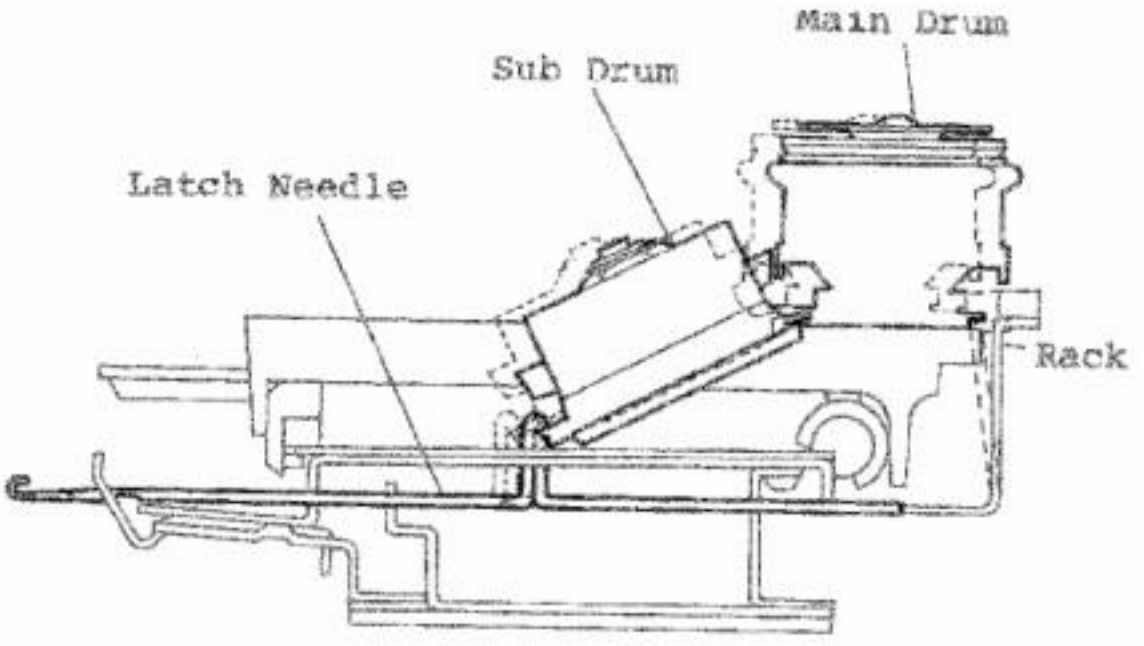


Fig. 80

Correction Methods:

When the dimension is smaller or larger than the standard measurement:
Bend the Needle Bed Rack backwards or forwards, as the case may be, with the Rack Adjusting Tool, as shown in Fig. 80, below. Check the eveness of the Rack after adjustment.

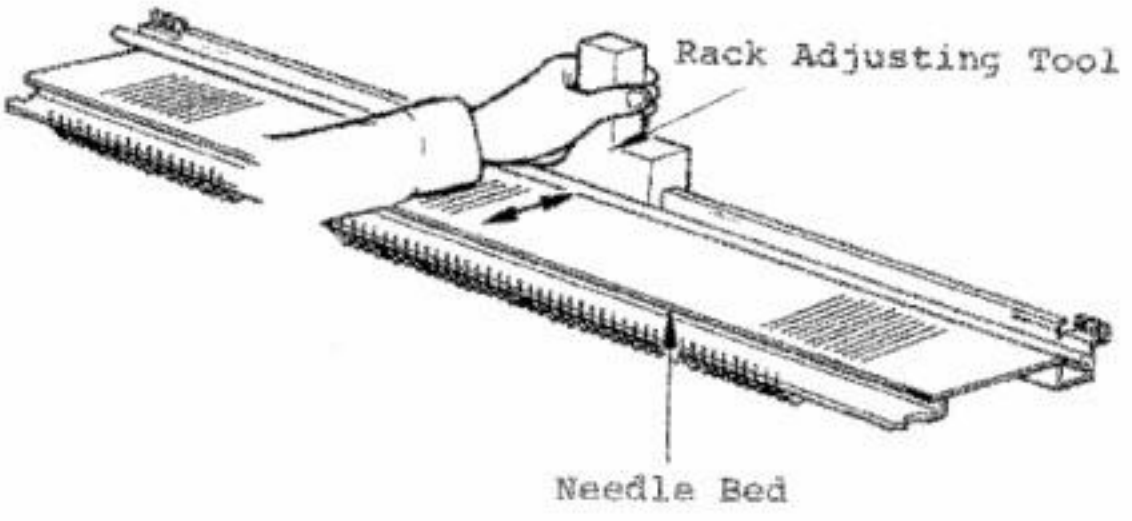


Fig. 81

6-2 If the measurement at the right and the left are different.

The L dimension is 121 ± 0.25mm.
(The range between the maximum and minimum measurement should be within 0.2mm.)

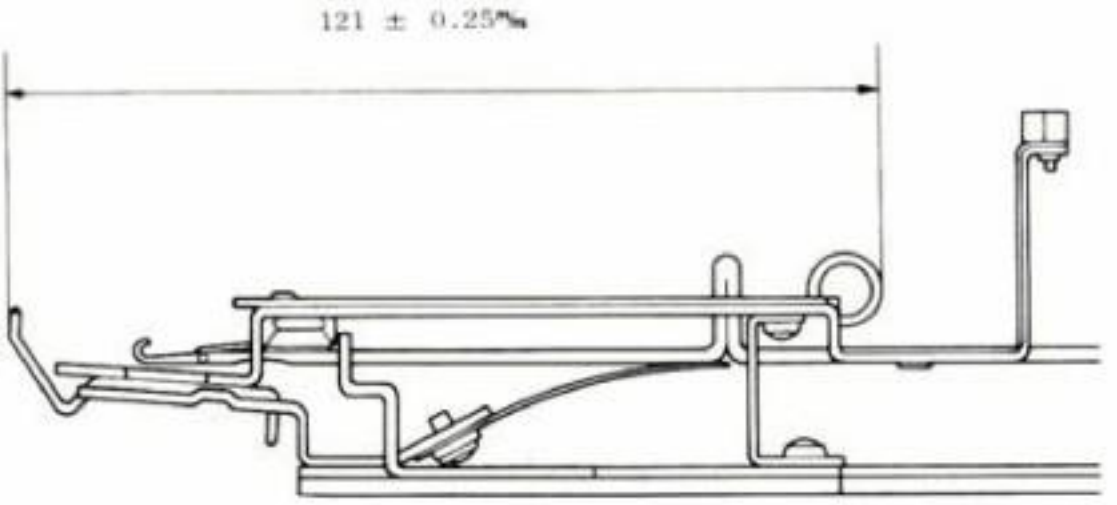


Fig. 82

As shown in the below diagram, the length of the fabric coming from the part with a larger dimension becomes longer, while the length of the fabric on the opposite side with a smaller dimension becomes shorter. Therefore, if both ends of the dimension L are equal, then the fabric on both sides will also be equal.

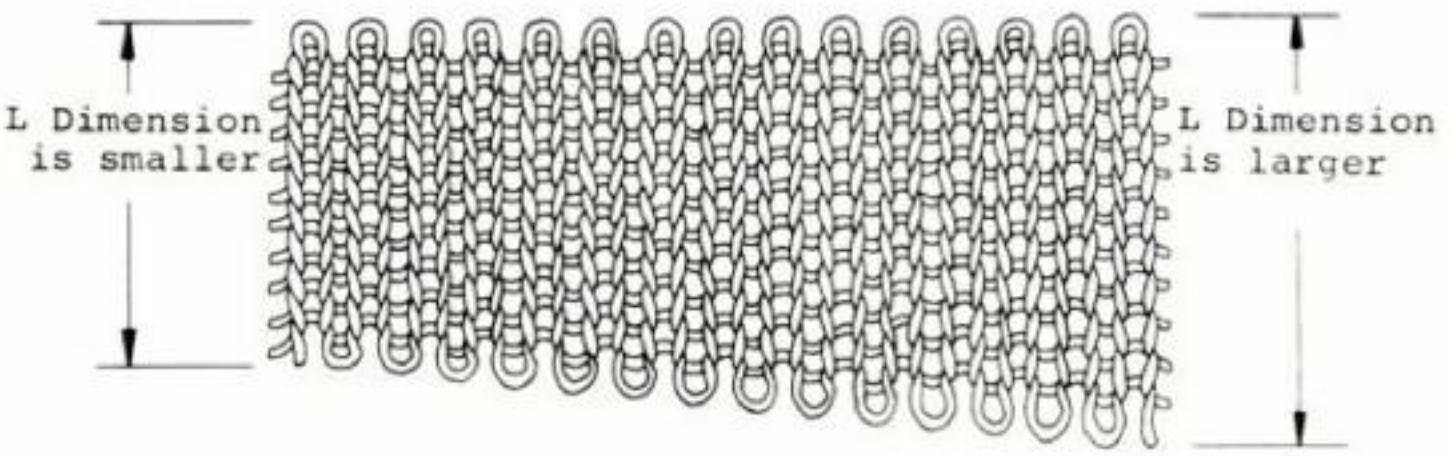


Fig. 83

If the maximum distance between the Rail and Sinker Posts differs by more than 0.2mm. from the minimum distance, the size of stitches will be uneven.

For instance: Max. 121.5mm
Min. 120.5mm
121.5 - 120 = 1

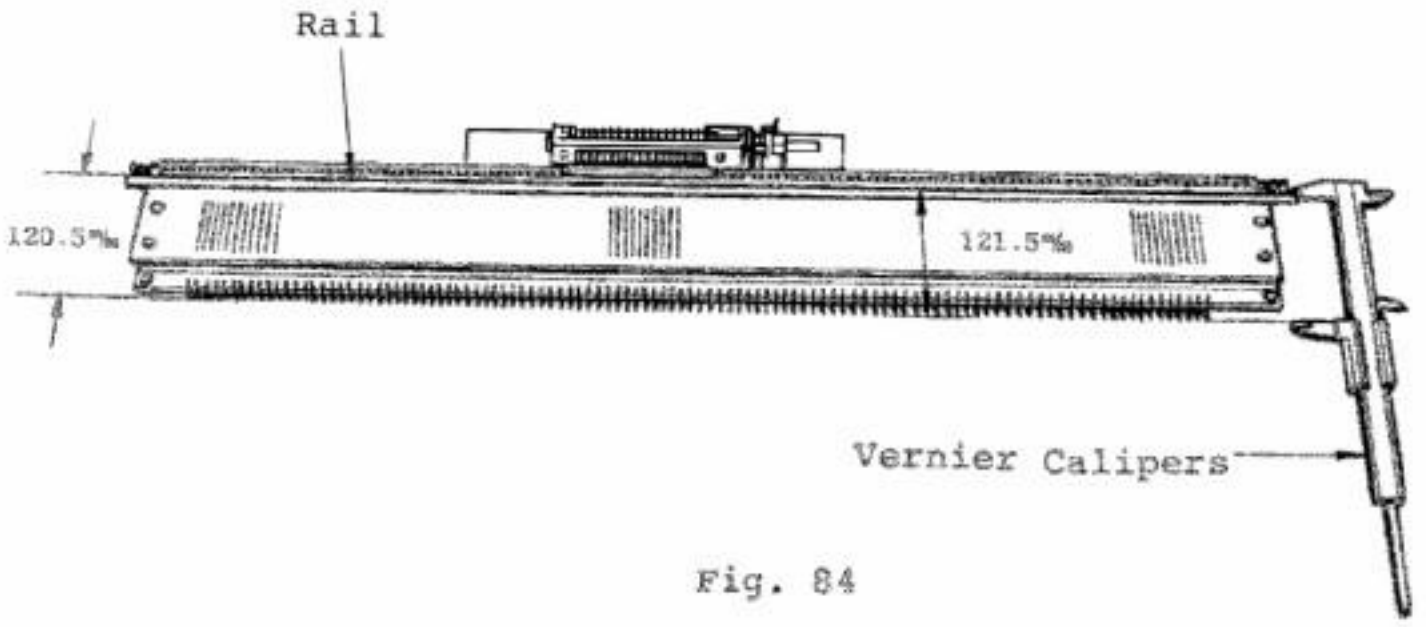


Fig. 84

Correcting Method:

1. The difference between both lengths of the fabric can be corrected by moving forward or backwards the Sinders, so as to reduce the difference of measurement within 0.2mm. In order to do this, loosen, by a 1/4 turn, the Hexagonal Nut below the portion of Sinkers to be adjusted.

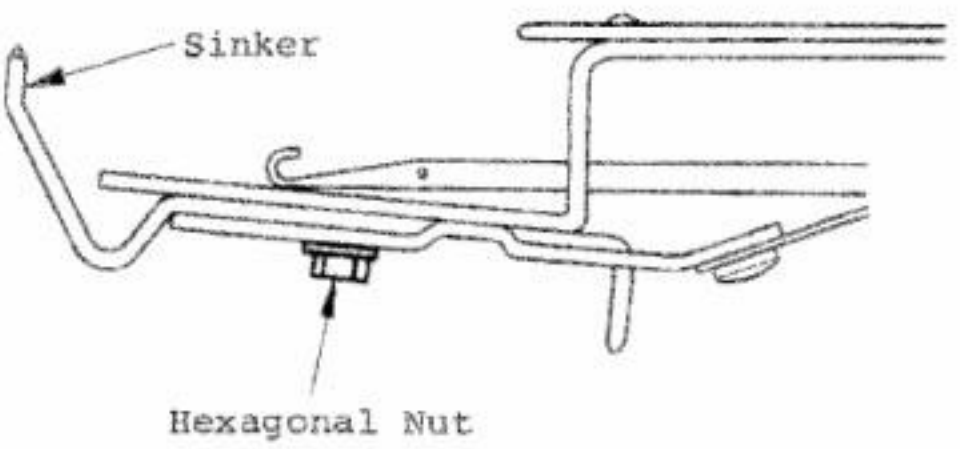


Fig. 85

2. Loosen + Binding Head C Tight Guide Screws (3 x 8) and + Special Binding Head C tight Screw (3 x 20), which are used to secure the Needle Bed Bracers A (R/L) and B (R/L) to the Needle Bed.

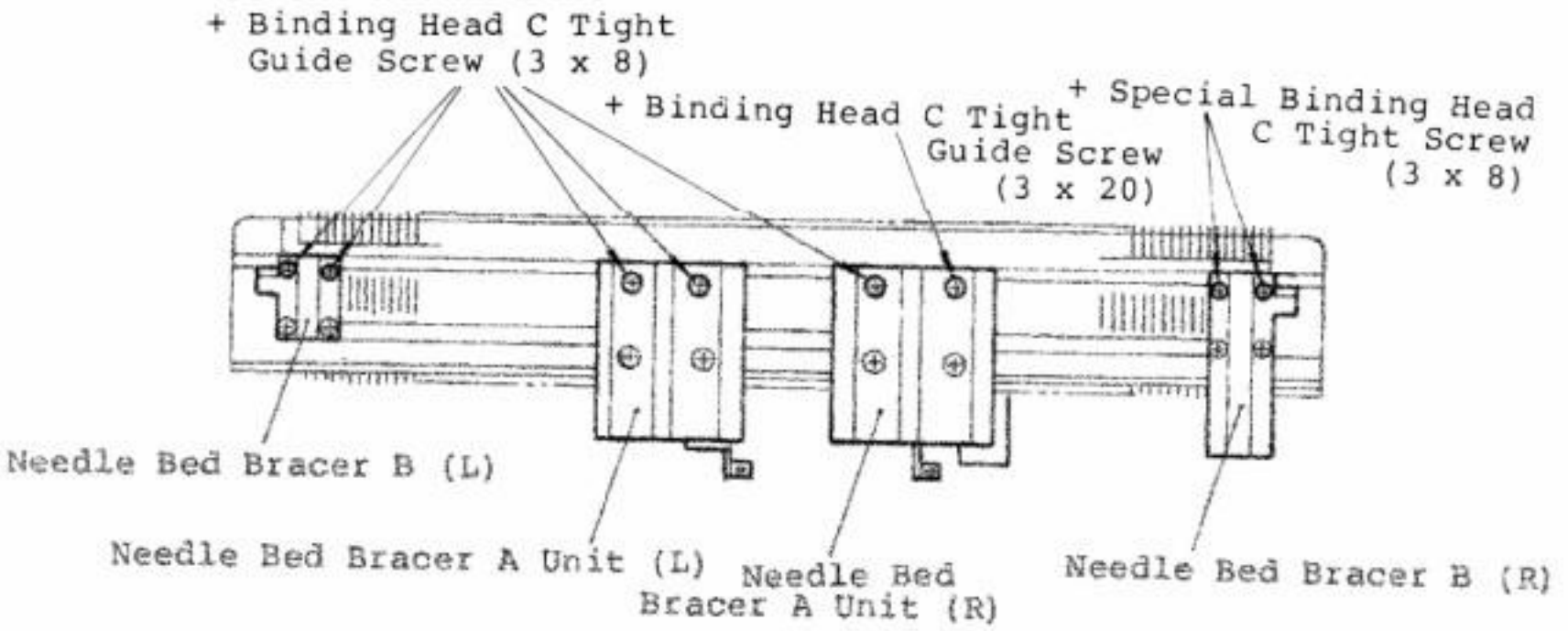


Fig. 86

3. Insert a 1mm. thick steel plate between the Front Edge of the Needle Bed and the Sinkers, as shown in Fig. 86. While pressing downwards, push it in the arrow-marked direction and the Sinkers will be moved forwards. Repeat the above procedure for correct alignment of the Sinkers.

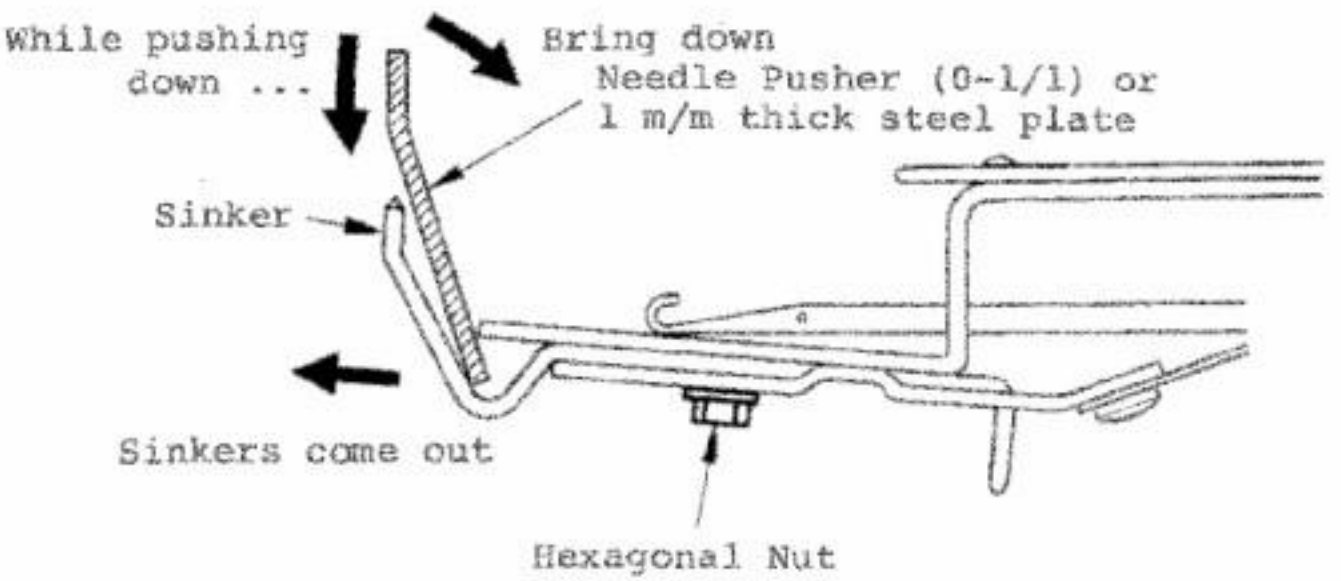


Fig. 87

4. After tightening the Hexagonal Nut, measure the L dimension
5. Once the adjustment has been completed, tighten the + Binding Head C Tight Guide Screws (3 x 8) and + Special Binding Head S Tight Screw (3 x 20) previously loosened.

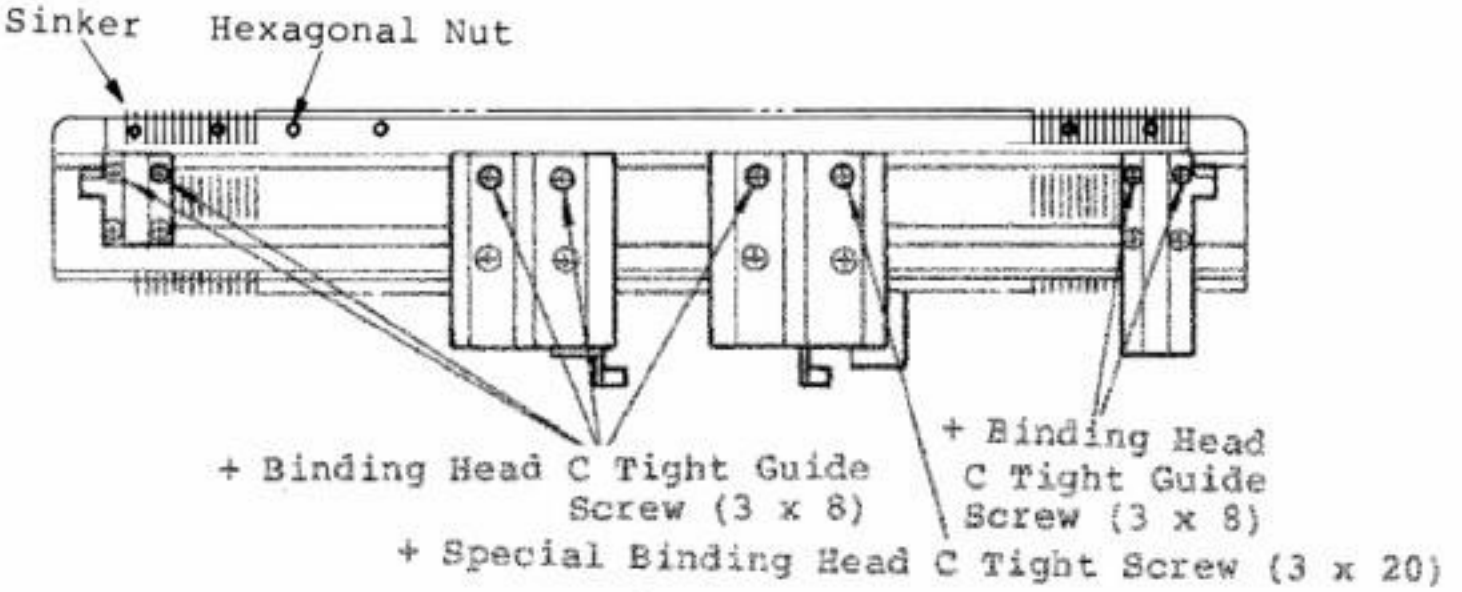


Fig. 88

In case it is necessary to move the Sinkers backwards:

(1) Loosen the Hexagonal Nut near the Sinker Post to be pushed inward by a quater turn.
(2) Loosen 7 CTT screw (3x8) and STT Screw (3x20) securing the bracer. (fig. 88)
(3) Push the foot of the Sinker Post with the round part of a wooden hammer.

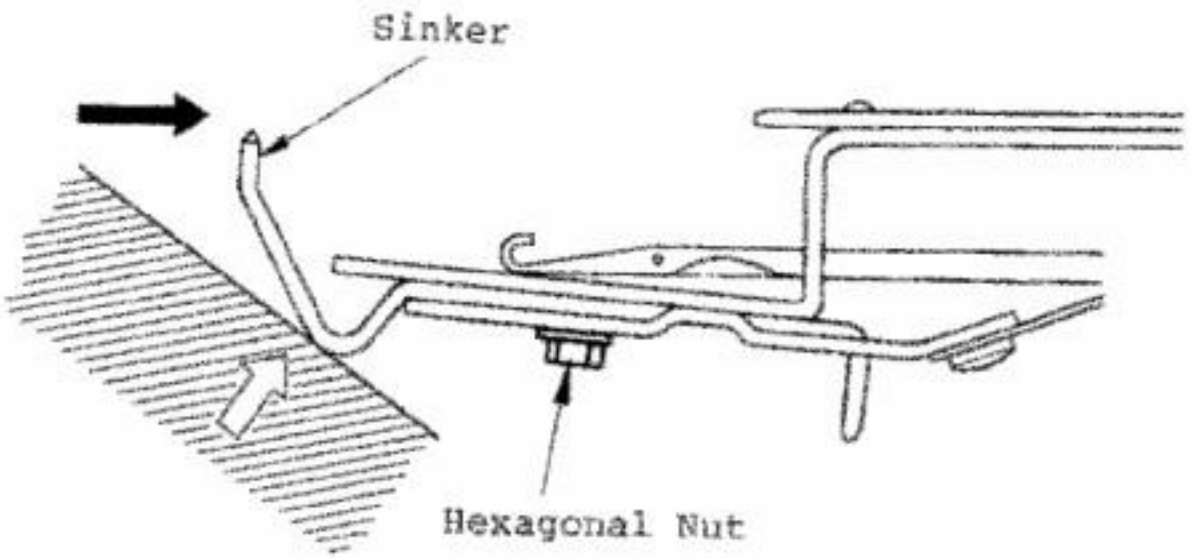


Fig. 89

7. REASSEMBLY OF MACHINE BODY

7-1 How to Reassemble the Knit Radar Unit

1. Push 95 needles from the right end, to D position.
   Hold the Paper Lever with your left hand and the Frame(R) with your right hand, pull connecting bar to the right.

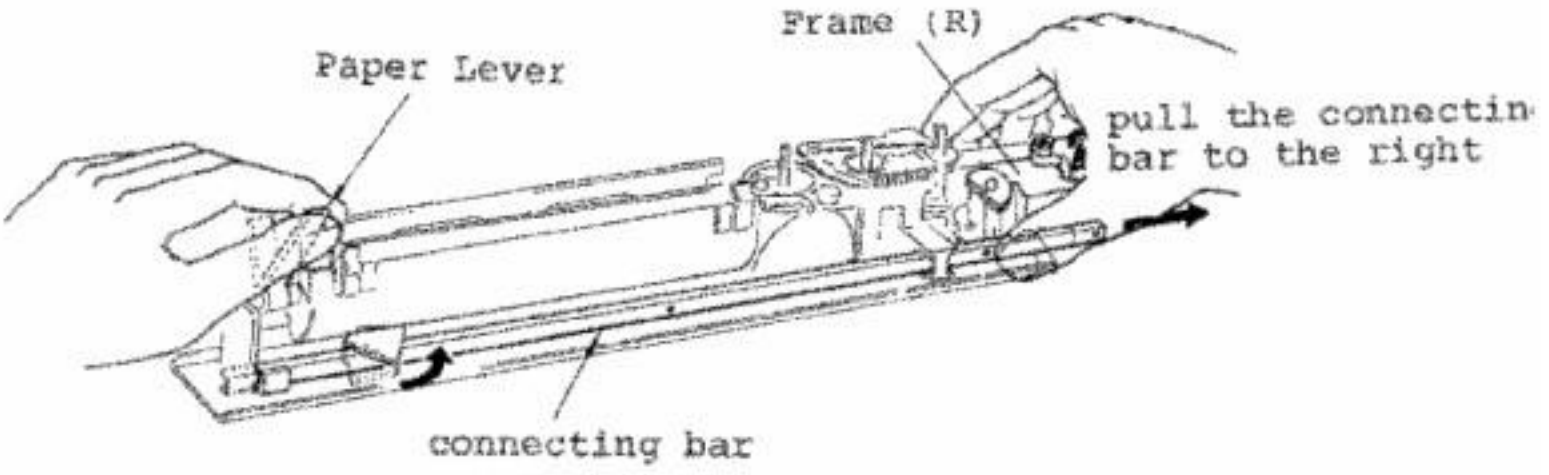


Fig. 90

2. Tilt the Knit Radar Unit forward, and guide the side of the Paper Lever into the position, and fit the Row Feeding Lever in position. Correct the tilt and place the unit on the Needle Bed Bracer.

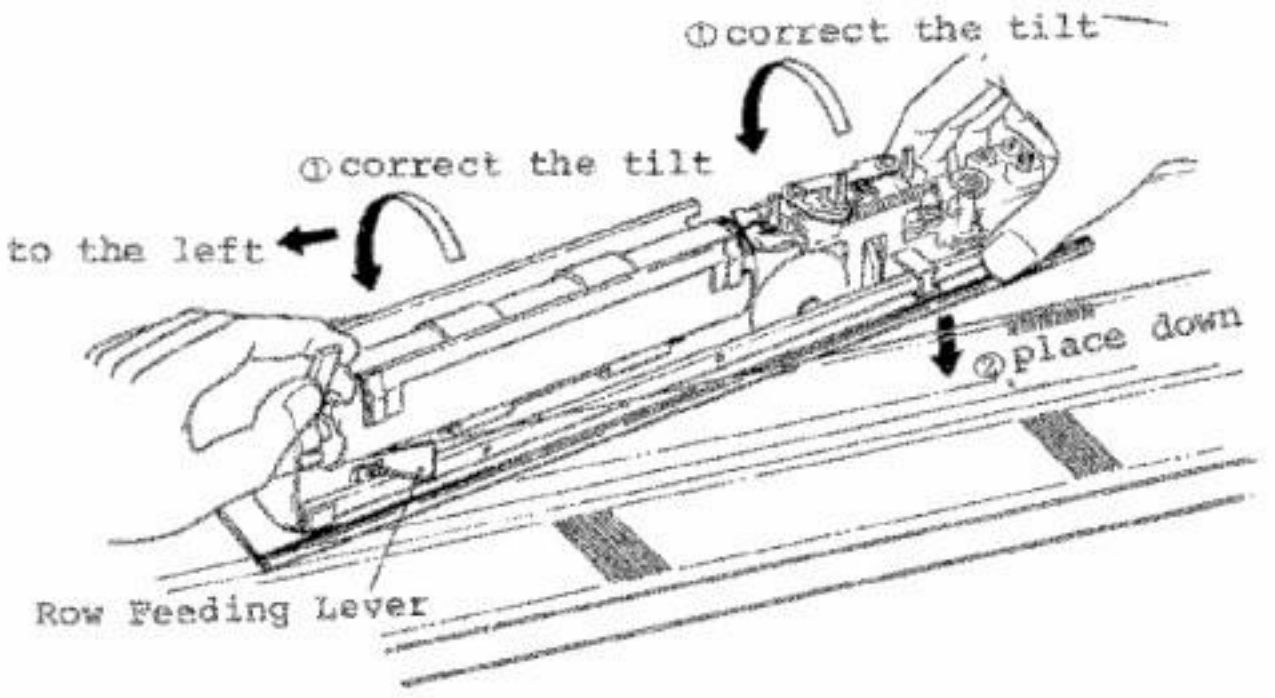


Fig. 91

3. Fasten the Unit with 4 STT screws(3x8), push back the needles in D position to A position.

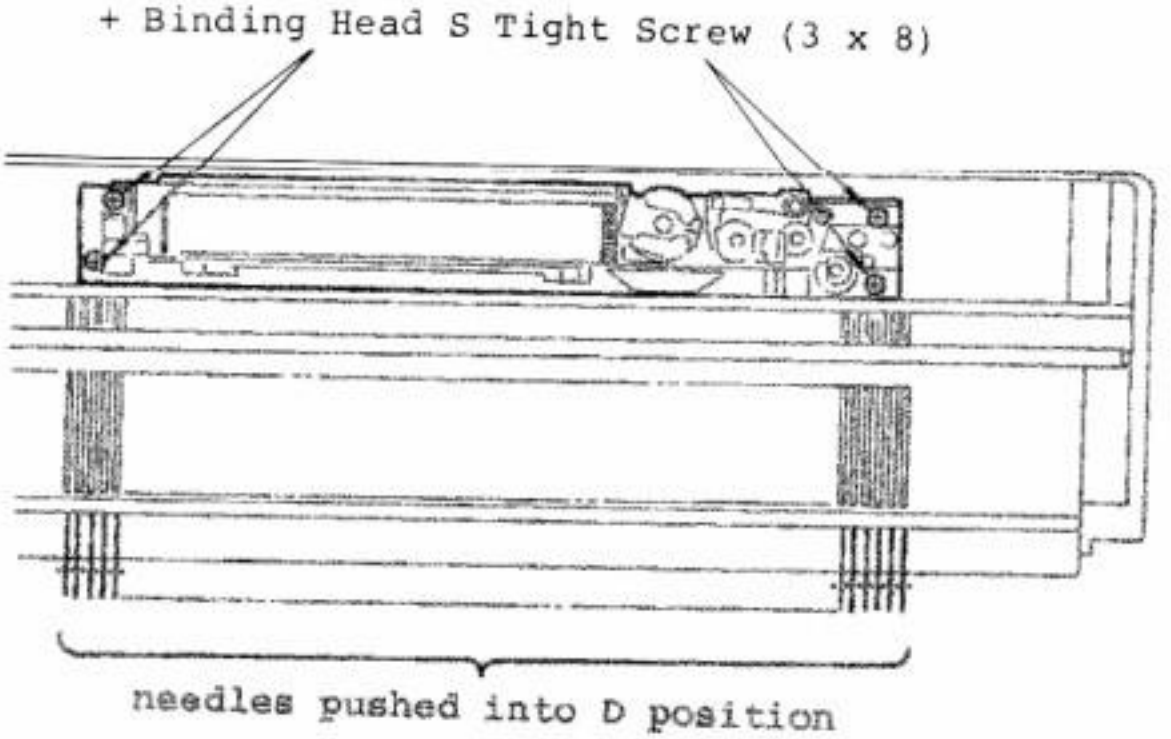


Fig. 92

4. Fasten the Row Counter with the STT screw(3x6).

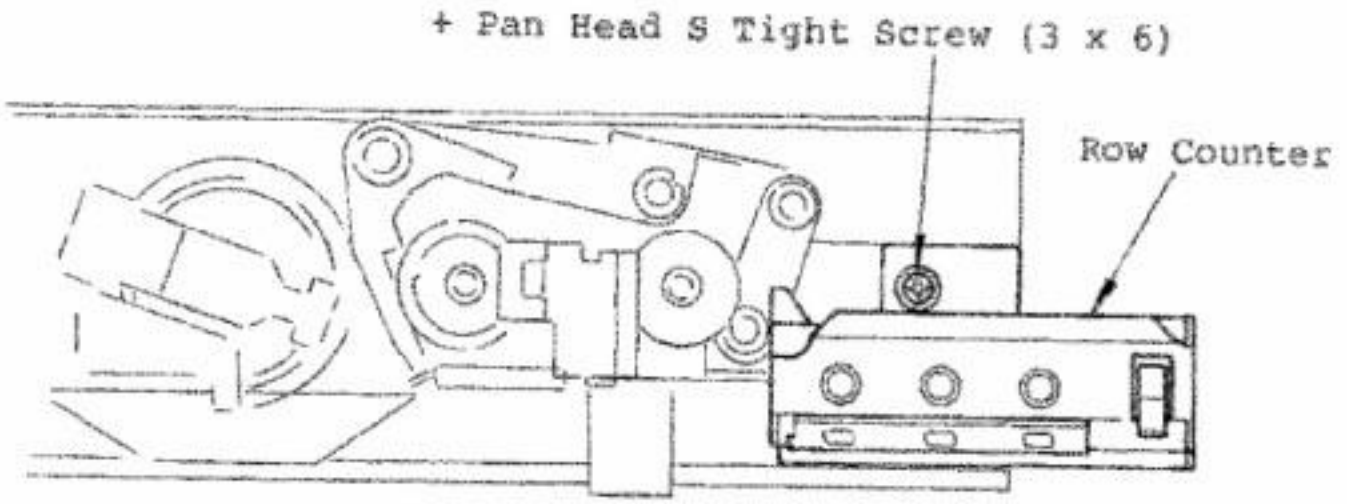


Fig. 93

7-2 Reassembly of the Needle Bed to the Casement

1. Fit the needle bed in the case so as the Needle Bed Bracer A(R/L) correspond with the Handle Support Plate on the case.

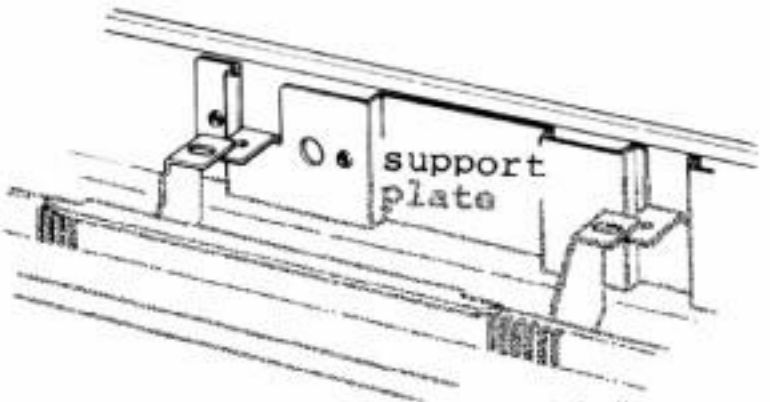


Fig. 94-1

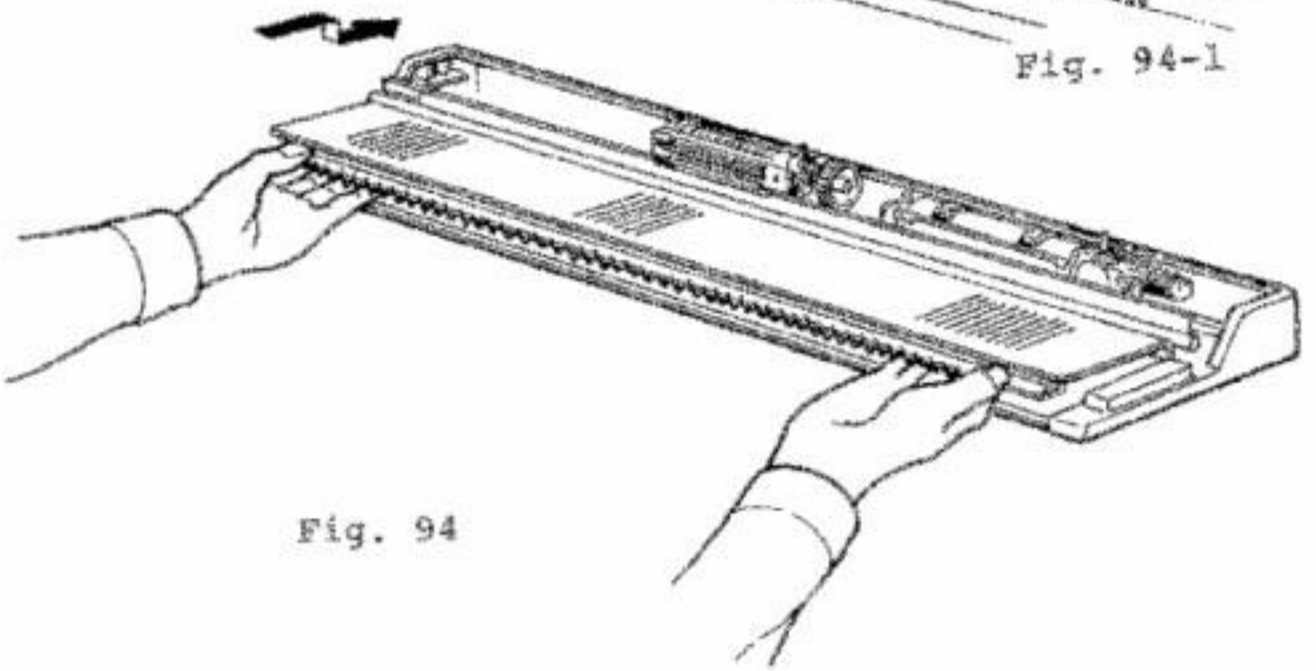


Fig. 94

2. Fasten the Needle Bed Bracer (R/L) with the STT screws (3x8):

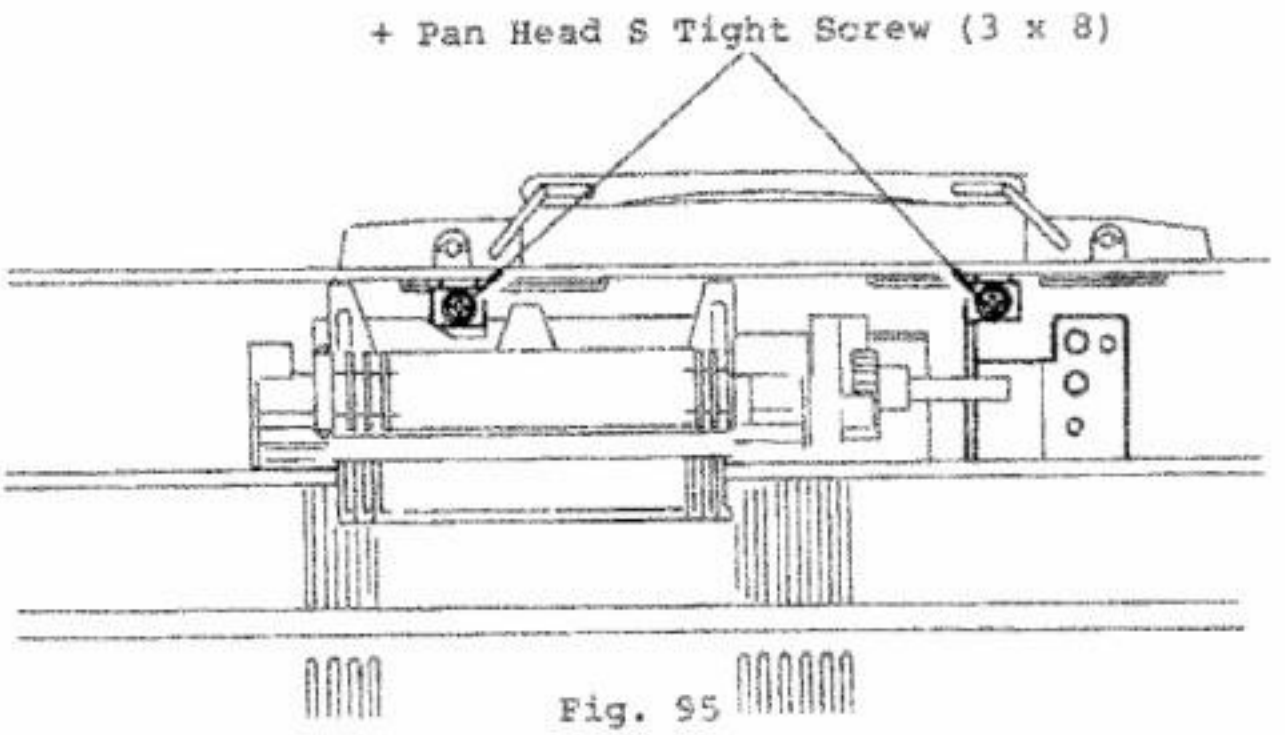


Fig. 95

3. Secure both ends of the Needle Bed with four + Special Flat Head S Tight Screws (4 x 10) and two + Binding Head Tapping Screws 2 (3 x 8).

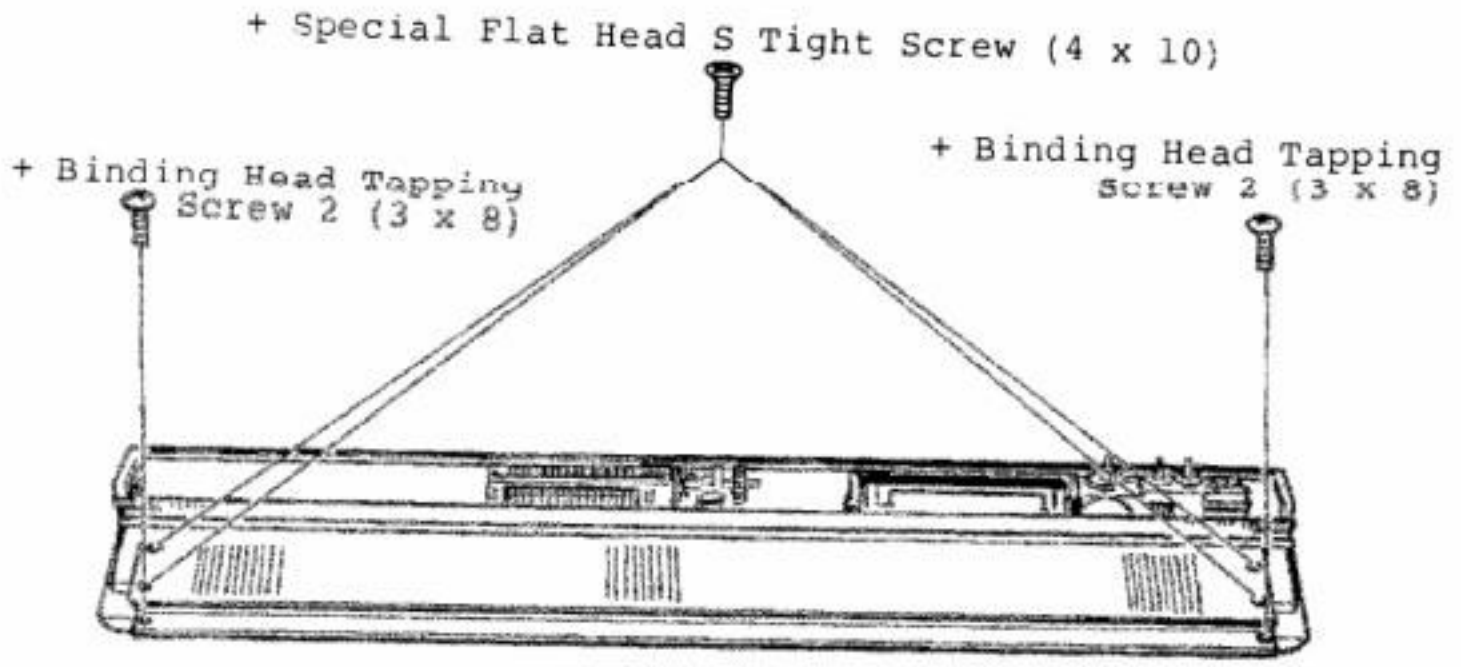


Fig. 96

4. Insert the AB Panel Unit to the Side Cover of the Casement (L).

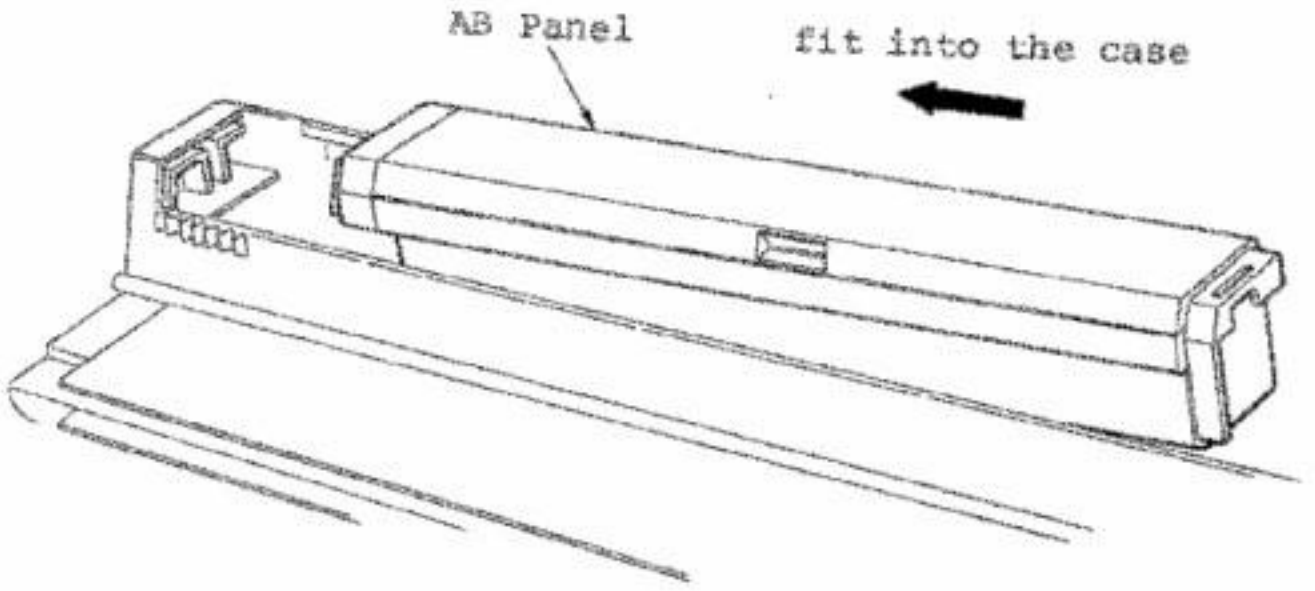


Fig. 97

5. Fit the KR Panel into the Side Cover(R), join the PC Panel to the KR Panel, and place them over the Pattern Unit.

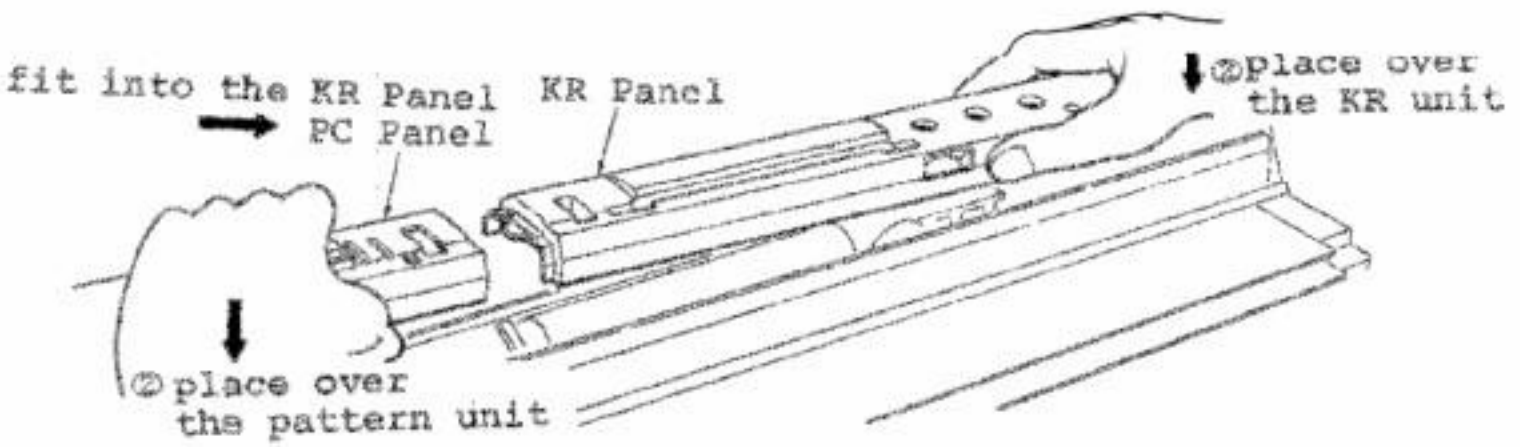


Fig.98

6. Fasten the Panel screws, and fit the Knobs, and Dials in their correct position.

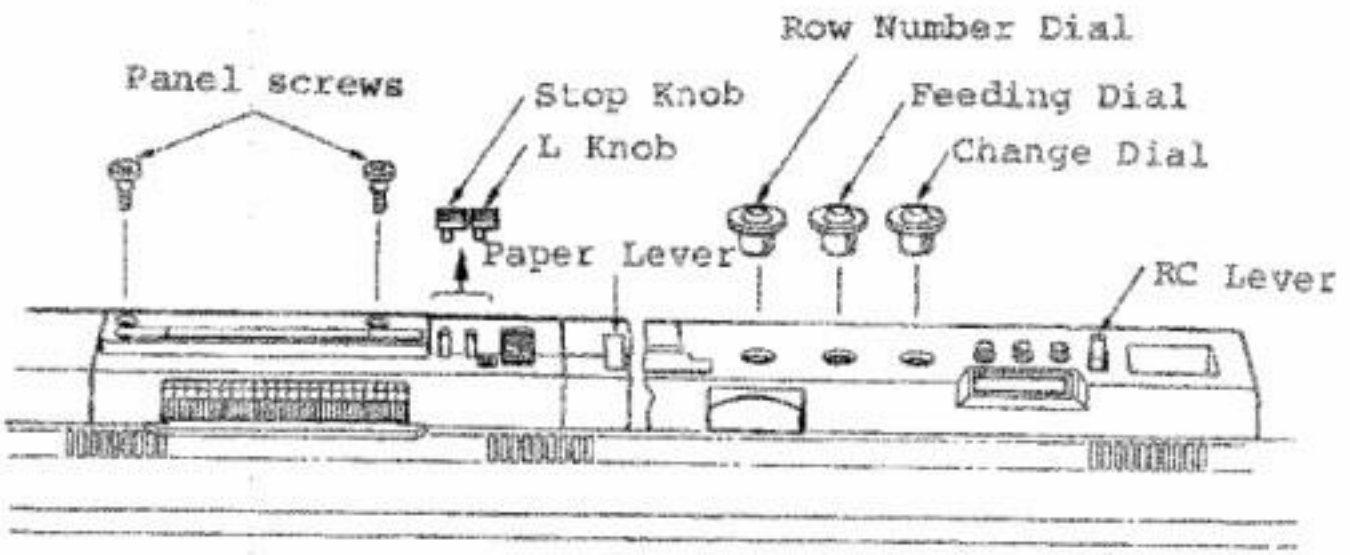


Fig. 99

7. Turning over the body, secure two + Pan Head S Tight Screws (3 x 8) between the two Rabber Pads.

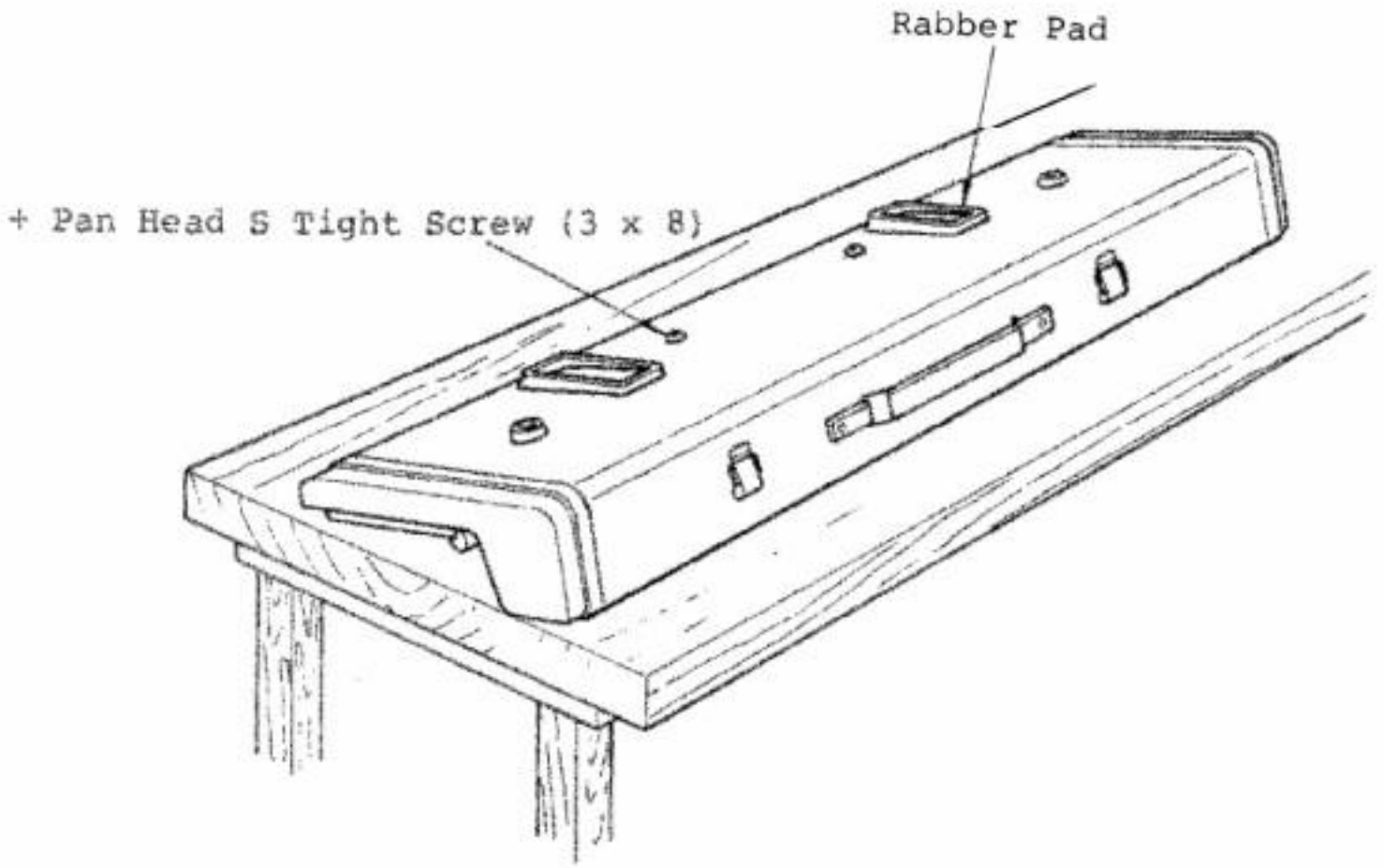


Fig. 100

8. CORRECT POSITION OF ARM FOR NEEDLE & NEEDLE BED

P.N..... 0 - 0.3mm.
(Fabric Presser touches bottom surface of Needle.)

P.S..... 1.5 - 2.0mm.
(The clearance between Sinkers and edge of Fabric presser.)

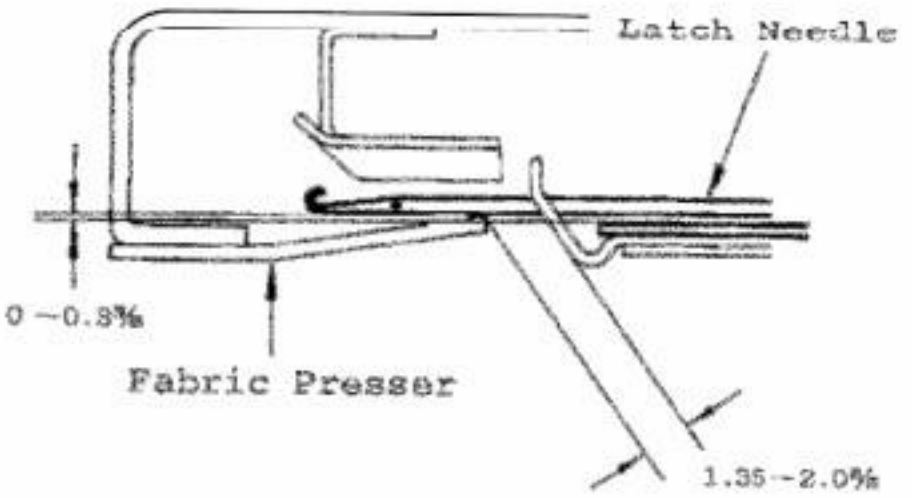


Fig. 101

Y.S..... 0.3 - 1.0mm.
(The clearance between rear edge of Yarn Feeder and Sinkers.)

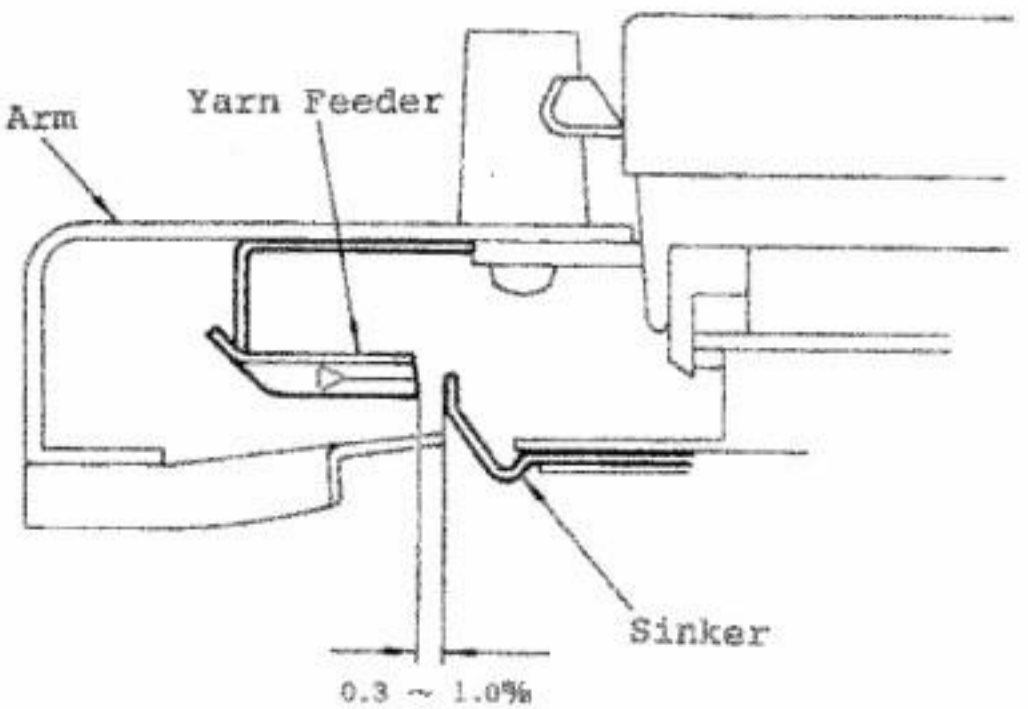


Fig. 102

8-1 Before the adjustment of the Arm

* It will be easy to adjust the measurement if the weaving brushes are removed from the Arm.

Remove the weaving brushes as instructed below:

(1) Turn over the Arm, remove the screws fastening the Fabric Gears. Then remove the screws fastening the Tuck Lever Bases.

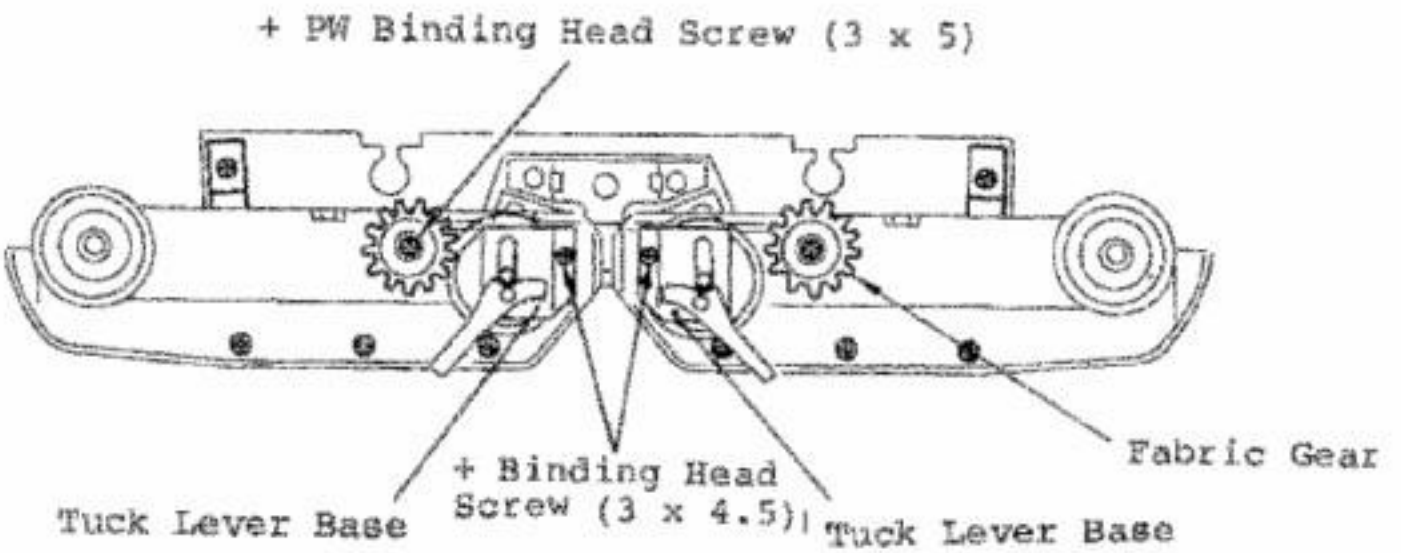


Fig. 103

(2) Turn over the Arm to the top side, set the Weaving Lever to "○" mark, and remove the screw fastening the Brush. Set the Weaving Lever to the "ᔕ" mark, and remove the Brush from its axis.

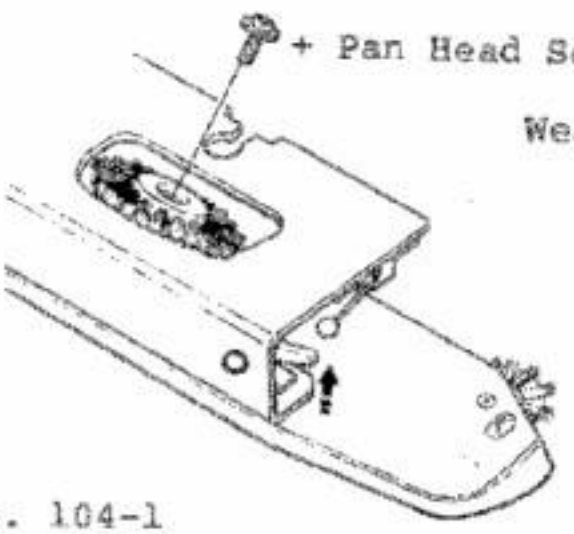


Fig. 104-1

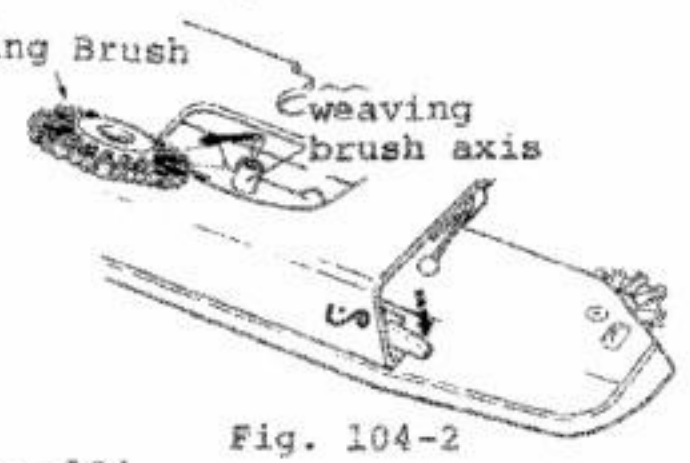


Fig. 104-2

Fig. 104

8-2 P.N. Clearance

1. In case a clearance exists between the Fabric Presser and Needles, the stitches will float and this sometimes makes knitting impossible.

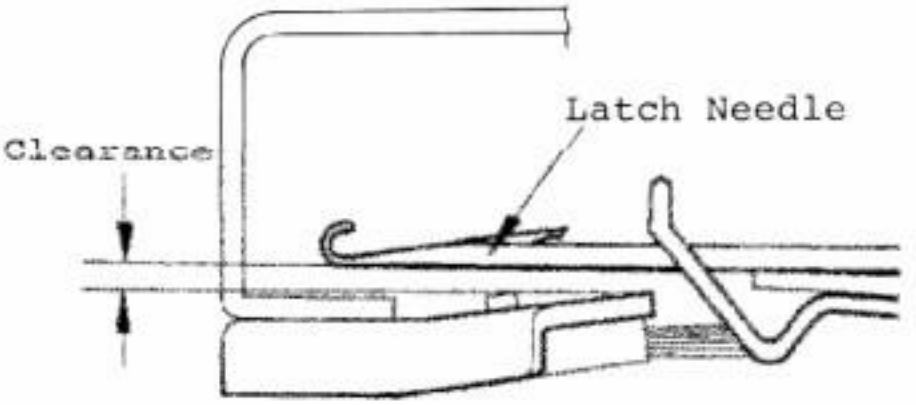


Fig. 105

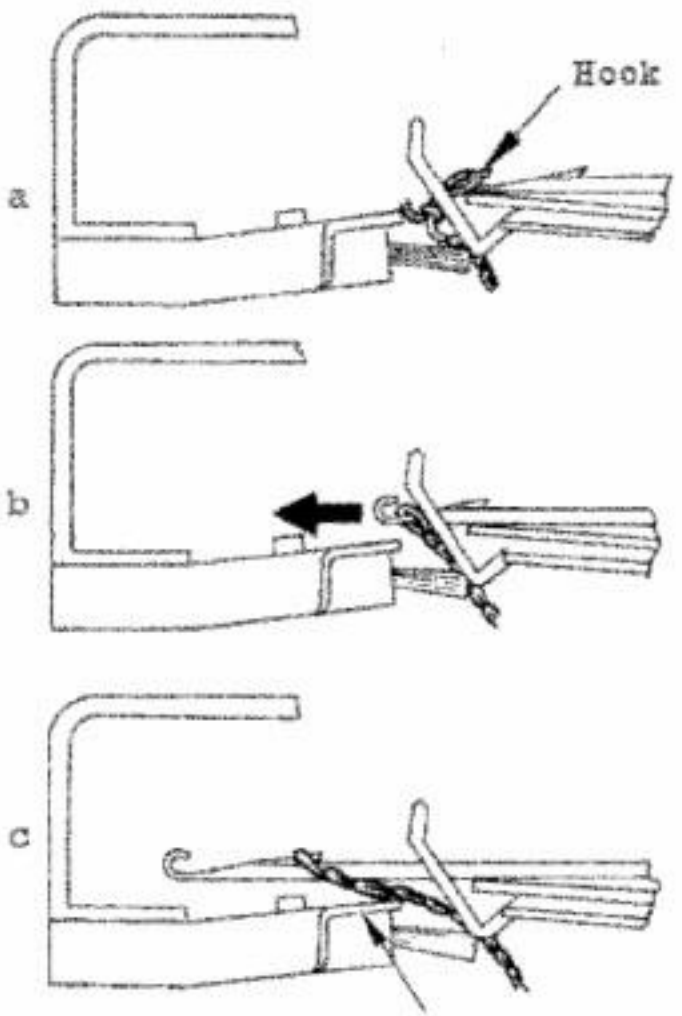


Fig. 106

The process in thes case is illustrated in the diagrams below.

a) A stitch is caught by the hook of a Needle.

b) The stitch advances with the Needle as it moves in the arrowed direction.

c) The Fabric Presser serves to stop the stitches advancing with the Needles, and also to push the fabric behind the latches of the Needles. But if a clearance exists between the Fabric Pressers and Needles, the force to hold down the fabric becomes too weak to stop the fabric completely, followed by the Needles which move back before the stitches have been pushed behind their latches. This makes it impossible to knit effectively.

2. If the Fabric Presser is positioned lower than the standard requirement, it cannot push up the Needles. Therefore, the relative position of the Needles becomes lower for the Yarn Feeder and that causes the stitches to drop or fail to knit.

In case the Needles are lifted too much by the Fabric Presser:

1. The Carriage becomes heavy during operation.
2. The Yarn Feeder will hit the Needle hooks and consequently bend them.

P.N. Adjustment

Adjust the Fabric Presser in such a way so that its edge will touch the Needles and so that it will push against them to the extent not exceeding 0.3mm.

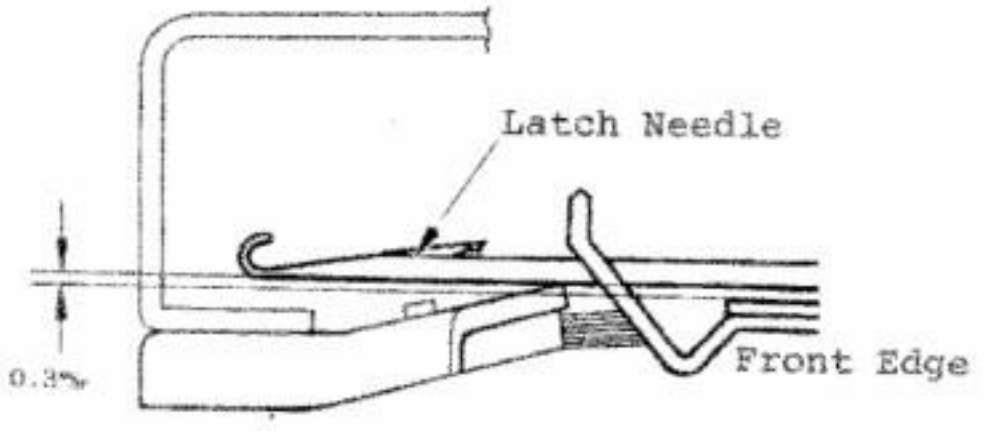


Fig. 107

1. Push about 60 needles to D position and set both Russel Levers to the I position.

2. Check how the edge of the Fabric Presser touches the Needles while moving the Carriage from left to right.

3. When the edge of the Fabric Presser does not touch the Needles, remove the Arm from the Carriage, place the Arm, with its face downwards and, with your hands, push downwards.

NOTE: If too much force is applied, the Arm will become so bent that the Needles will be pushed up more than necessary. Therefore, the adjustment should be made so that the edge of the Fabric Presser will be gently brought into contact with the Needle by degrees.

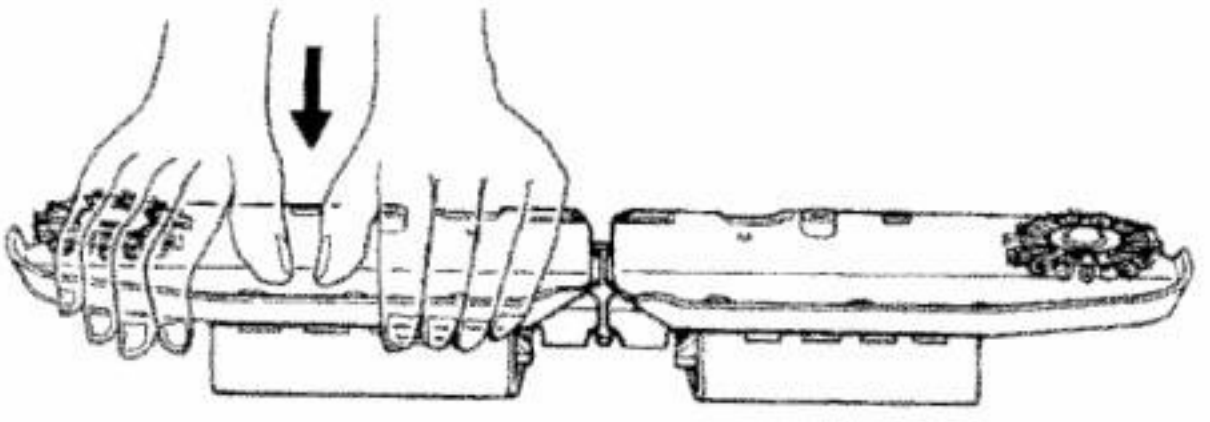


Fig. 108

4. Adjust the P.N. clearance to the extent that the edge of the Fabric Presser touches the lower part of the Needles gently, and at the same time there must be a clearance of about 2mm. between the Yarn Feeder and projection of the Fabric Presser.

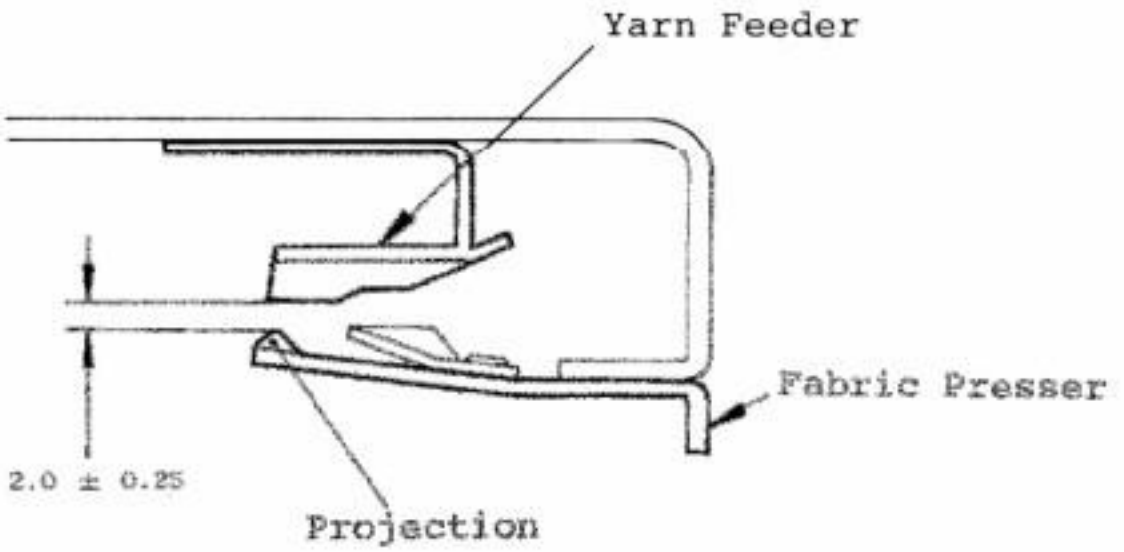


Fig. 109

When the needle is lifted up by the plate, the yarn is fed into the hook of the needle, so if the clearance between the needle and the yarn feeder is wider than required, the needle can not catch the yarn, on the contrary, if the clearance is narrower than required, the latch of the needle will hit the yarn feeder and will be damaged.

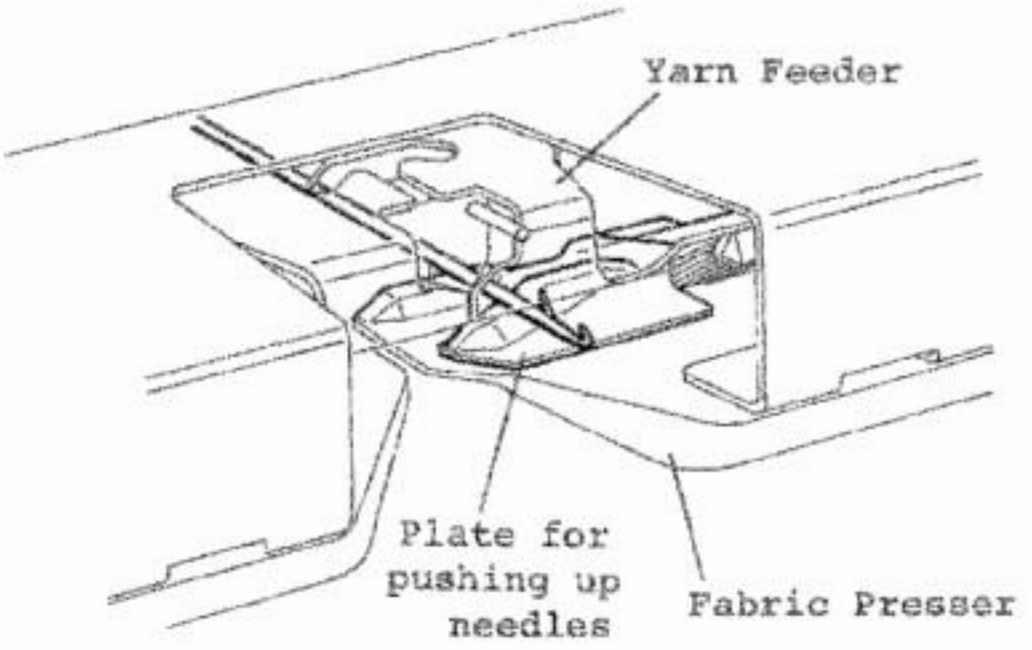


Fig. 110

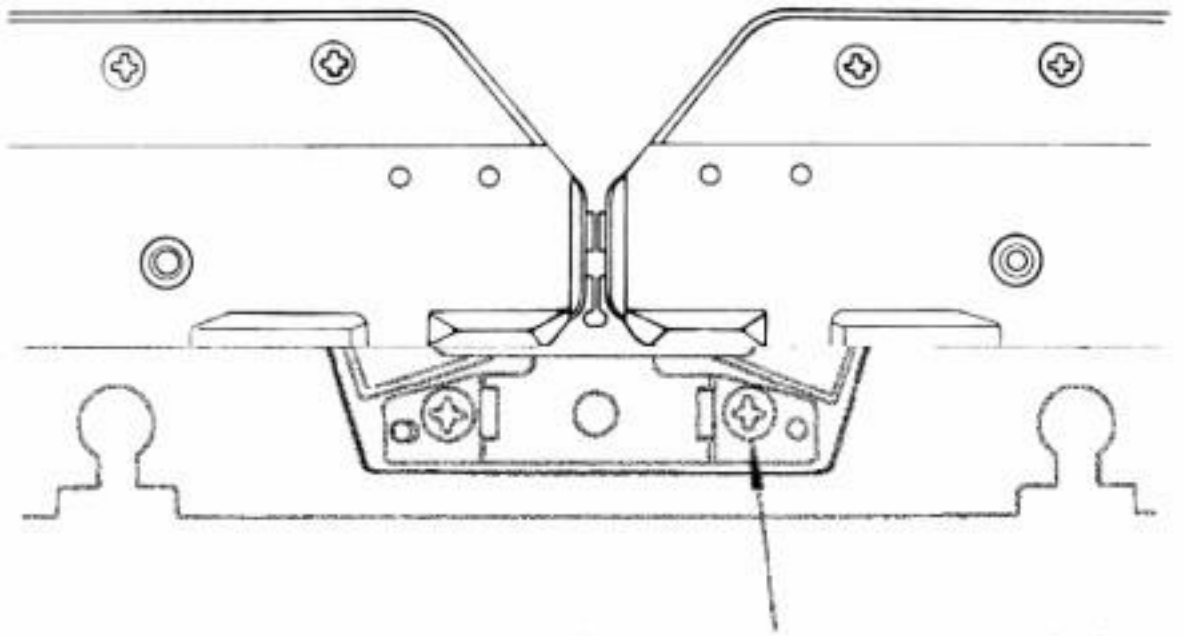


Fig. 111

Note: The clearance between the Yarn Feeder and the Fabric Presser must be adjusted by the adjustment for the clearance between the needle and the Fabric Pressers.

The P.N. clearance should be adjusted to within the range of the standard requirement (0-0.3mm). If the clearance between the Yarn Feeder and the needle is wider, adjust it by inserting a thin plane washer between the Yarn Feeder and the Arm.

5. In case the Fabric Presser touches the Needles too much, move the Carriage to the end of the Needle Bed (in the direction of the part of the Fabric Presser that requires adjustment) and pull the edge of the Presser downwards with your hand, as indicated in Fig. 112

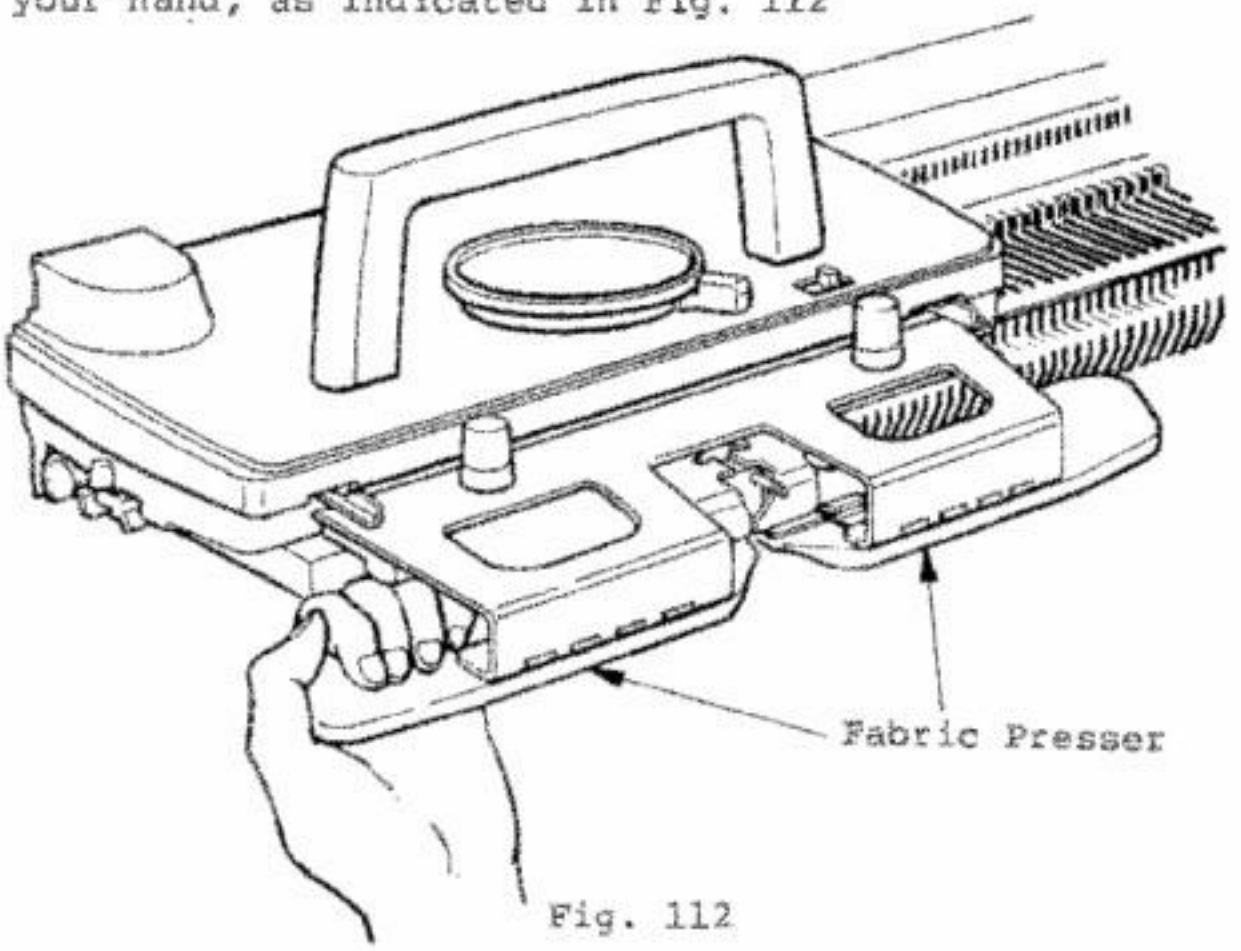


Fig. 112

6. Adjust both Fabric Pressers so that they are horizontal (as illustrated below).

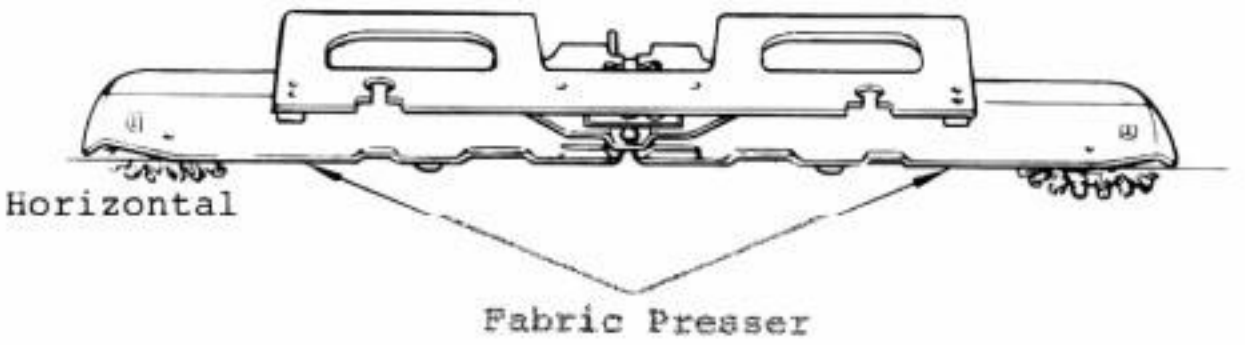


Fig. 113

8-3 P.S. Clearance

1. If a clearance exists of more than 2.0mm. between the front edge of the Fabric Presser and Sinkers, the stitches will float and cannot be knitted.

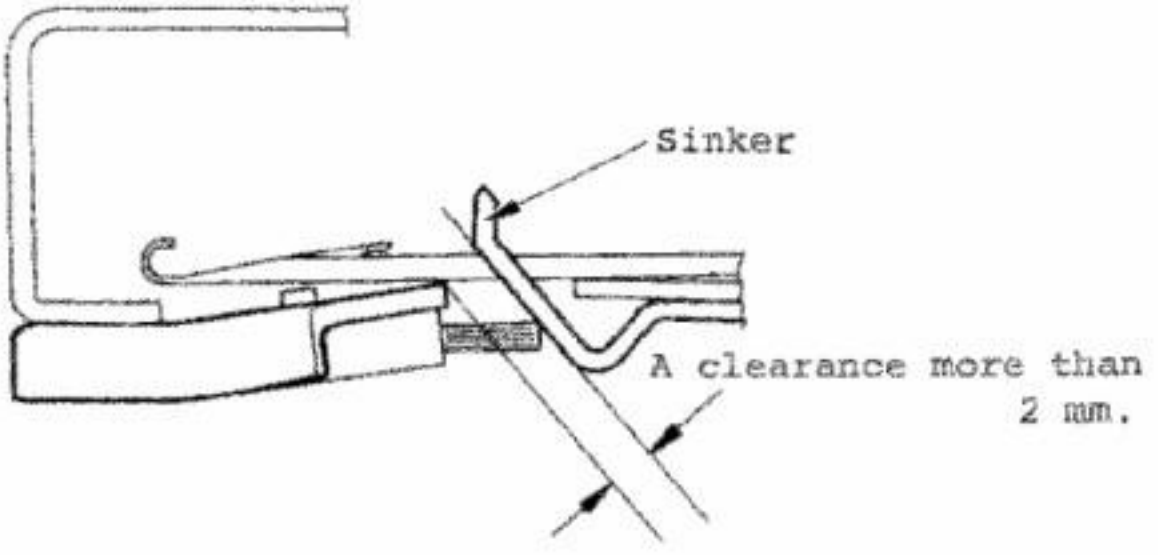
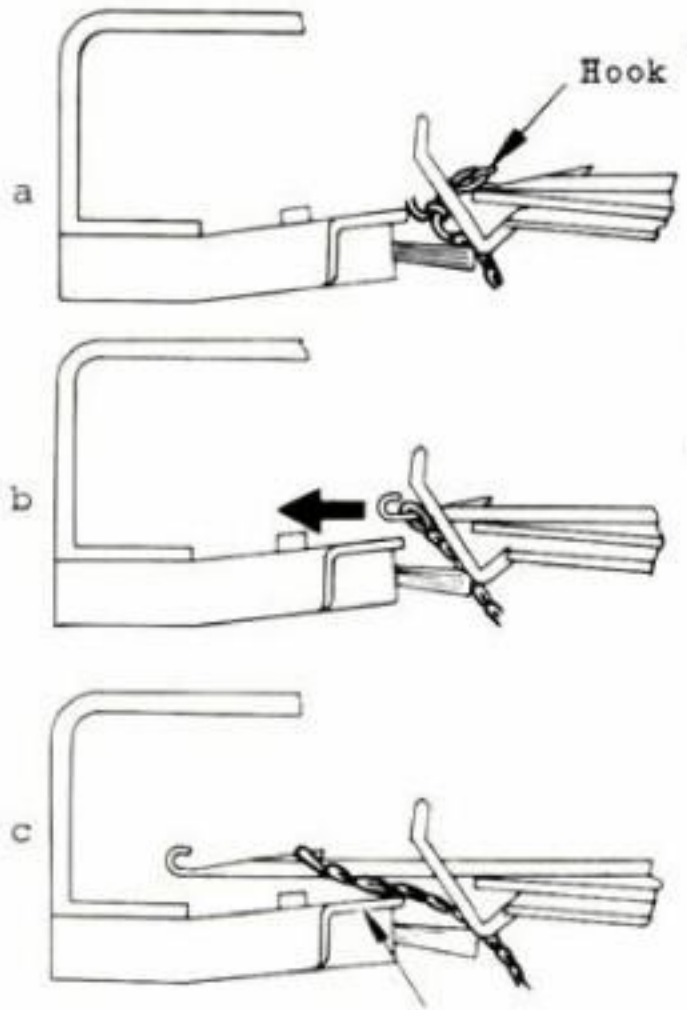


Fig. 114



* Problem caused by incorrect adjustment is illustrated below:-

a. A stitch is hooked on the needle.

b. As the needle moves forward, the stitch is also pulled together.

c. The function of the Fabric Presser is to press back the fabric so as the stitch in the needle hook easily moves over the latch. But if there is a clearance of more than 2.0mm. the Presser can not function properly and the stitch remains in the needle hook.

And when the needle retreats, a new stitch will not formed on the needle.

This is called "float of stitch".

Fabric Presser

Fig. 115

* How to Adjust the P.S. Clearance

Adjust the clearance between the edge of the Fabric Presser and the Sinkers so that it will fall within the range of 1.35 - 2.0mm.

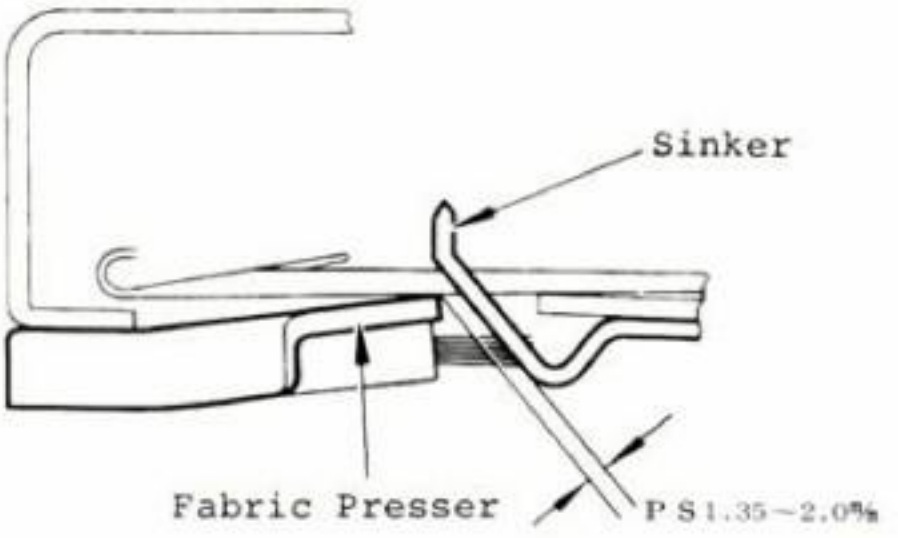


Fig. 116

1. Loosen four + Binding Head Screw (3 x 6) (two on each side) and two + Binding Head Screws (3 x 10) (one on each side), on the back of the Fabric Pressers.
   Make a clearance of more than 2.0mm. and tighten the screws to the extent that you can adjust the Fabric Pressers by Tapping them slighty with a Screw Driver Handle.

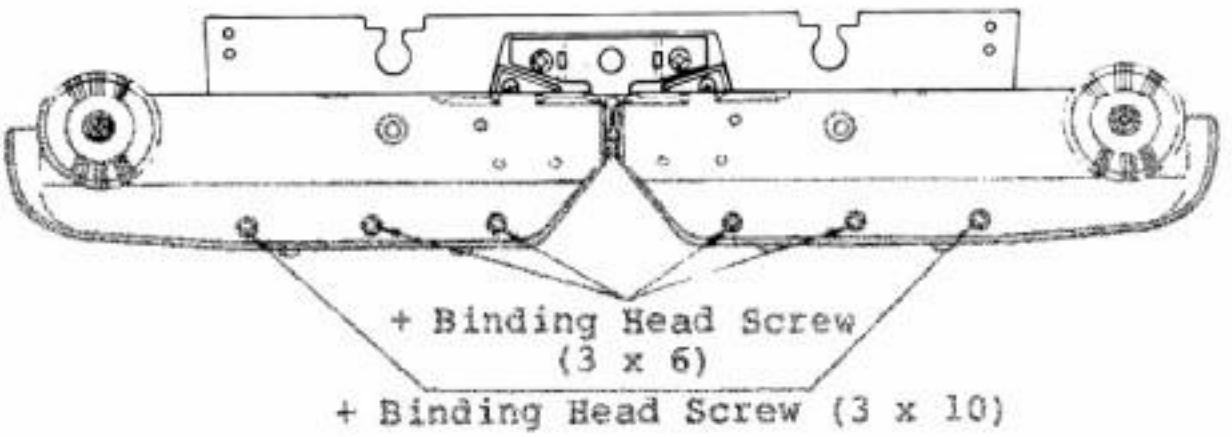


Fig. 117

2. Adjust the P.S. clearance to within the range of 1.35 - 2.0 mm., while tapping with the handle of a Screw Driver as described below.
   Upon adjusting the clearance within the said range, fasten the screws.

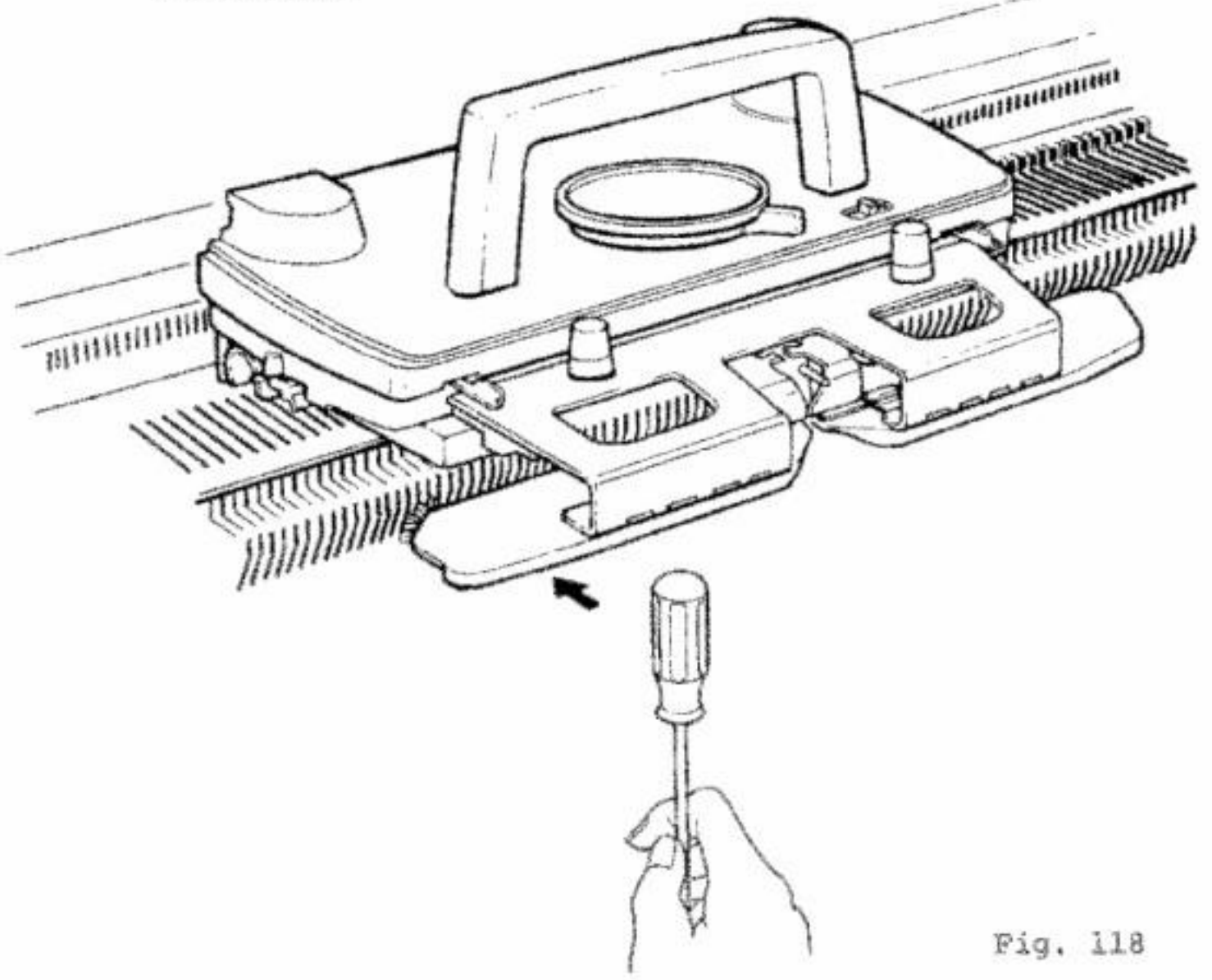


Fig. 118

8-4 Y.S. Clearance (the position of the Yarn Feeder)

* The clearance between the rear of the Yarn Feeder and the Sinkers should be within o.3 - 1.0mm.

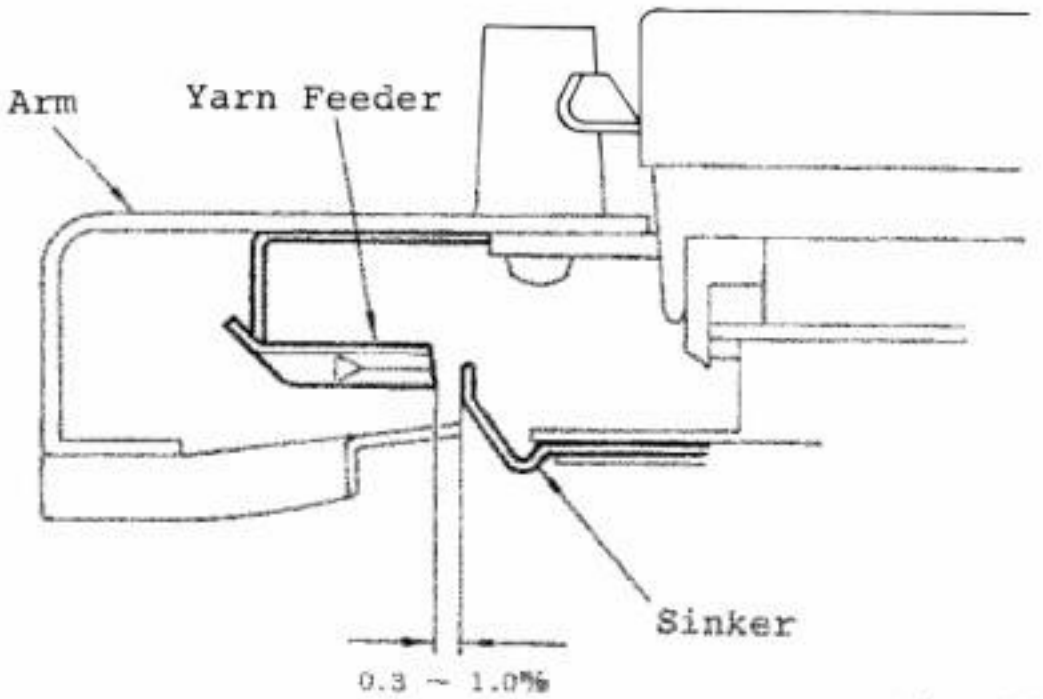


Fig. 119

1. In case the Y.S. clearance is narrower than the required distance:

   The Yarn Feeder touches the Sinkers and the Carriage becomes too heavy to operate.

2. In case the Y.S. clearance is more than 1.0mm:

   a) In knitting Punch Lace, the Nylon Thread cannot be caught inthe hook of the Needles which are to knit with the main yarn.

   b) In knitting the Knit-in and Punch Lace patterns, the Needles to knit with the contranst yarn, touch the Yarn Feeder.

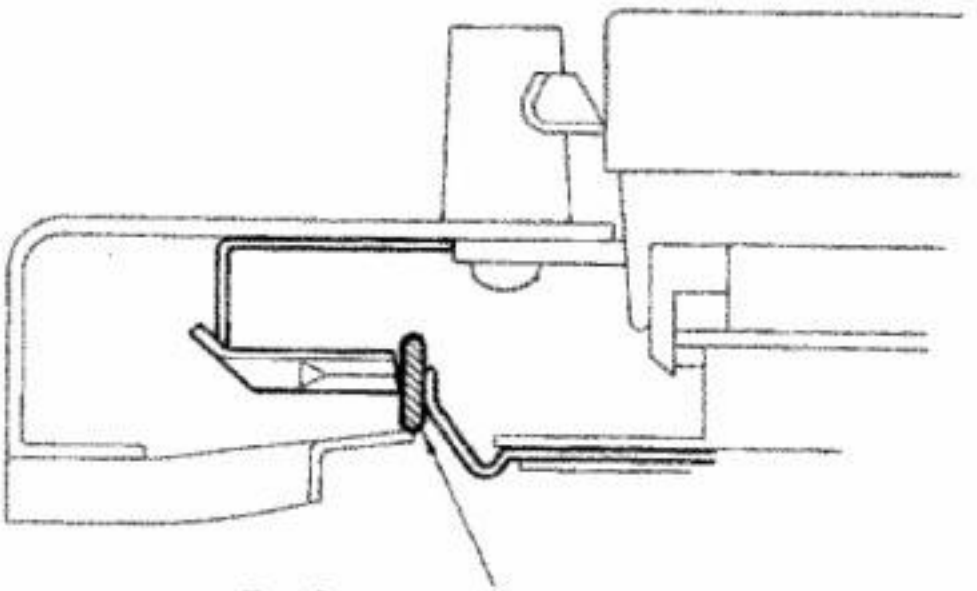


Fig. 120

8-5 How to reassemble the parts on the Arm after adjustment

1. Set the Weaving Lever to "ᔓ" mark, fit the Weaving Brushes onto their axes, reset the Weaving Lever to " O " mark, and fasten the Brushes with + Pan Head Screws (3x6.5).

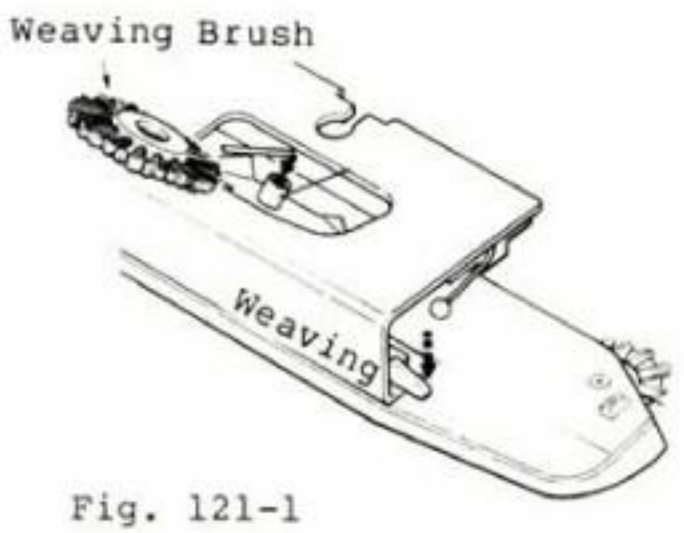


Fig. 121-1

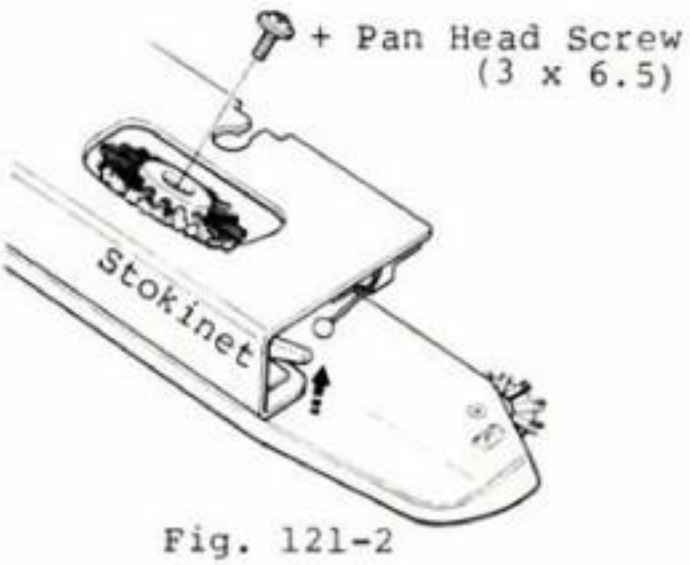


Fig. 121-2

Fig. 121

2. Turn over the Arm to the bottom side, and secure the Fabric Gear with PW Binding Head Screw and secure the Tuck Lever Base on the Fabric Presser with Binding Head Screw (3x4.5).

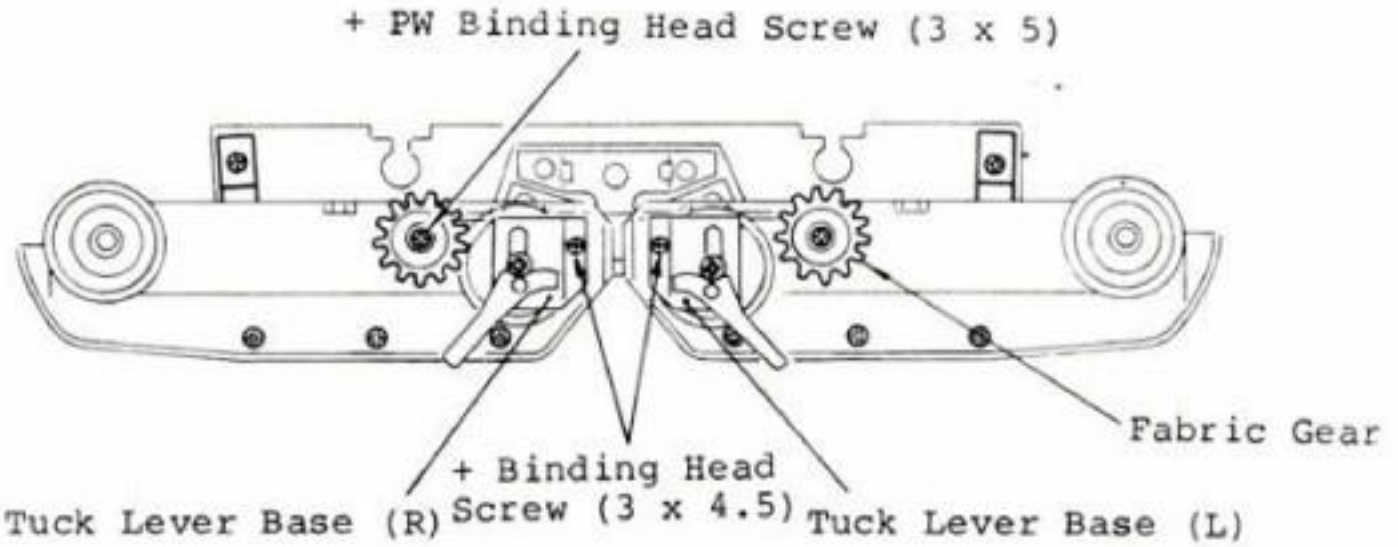


Fig. 122

9. HOW TO ADJUST WHEN STITCHES DROP DURING KNITTING

Causes

1. Insufficieant yarn tension.
2. The Needle latches do not open smoothly
3. Speed of knitting.
4. The Accessory Weights are not used.
5. P.N. and P.S. adjustment.
6. If there is a burr on the edge of the Fabric Presser.

Correction Method

Cause 1.

a) If the tension put on the yarn is too weak, the sitiches will come off when the Carriage returns owing to an imperfect take up of slack yarn. To correct this, adjust the Tension Spring with the Tension Dial, so that it will stop within the range illustrated in Fig. 125, depending on the thickness of yarn used.

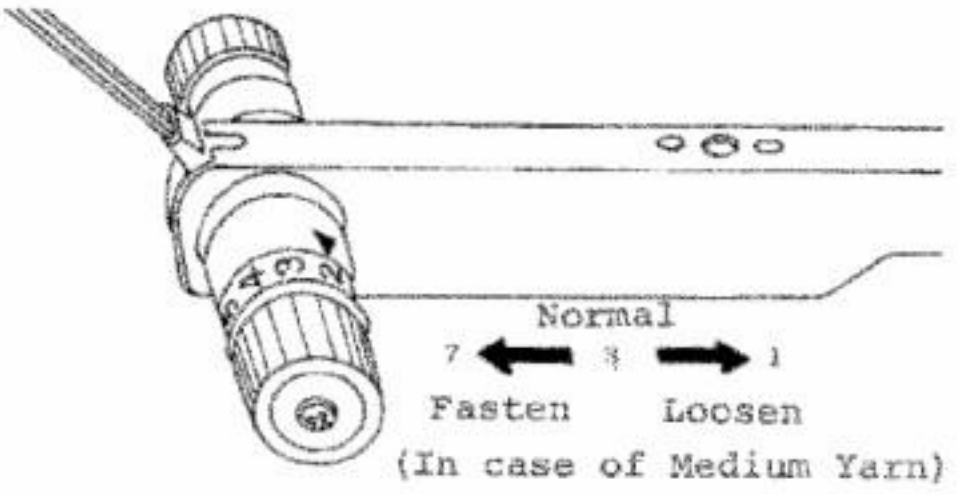


Fig. 123

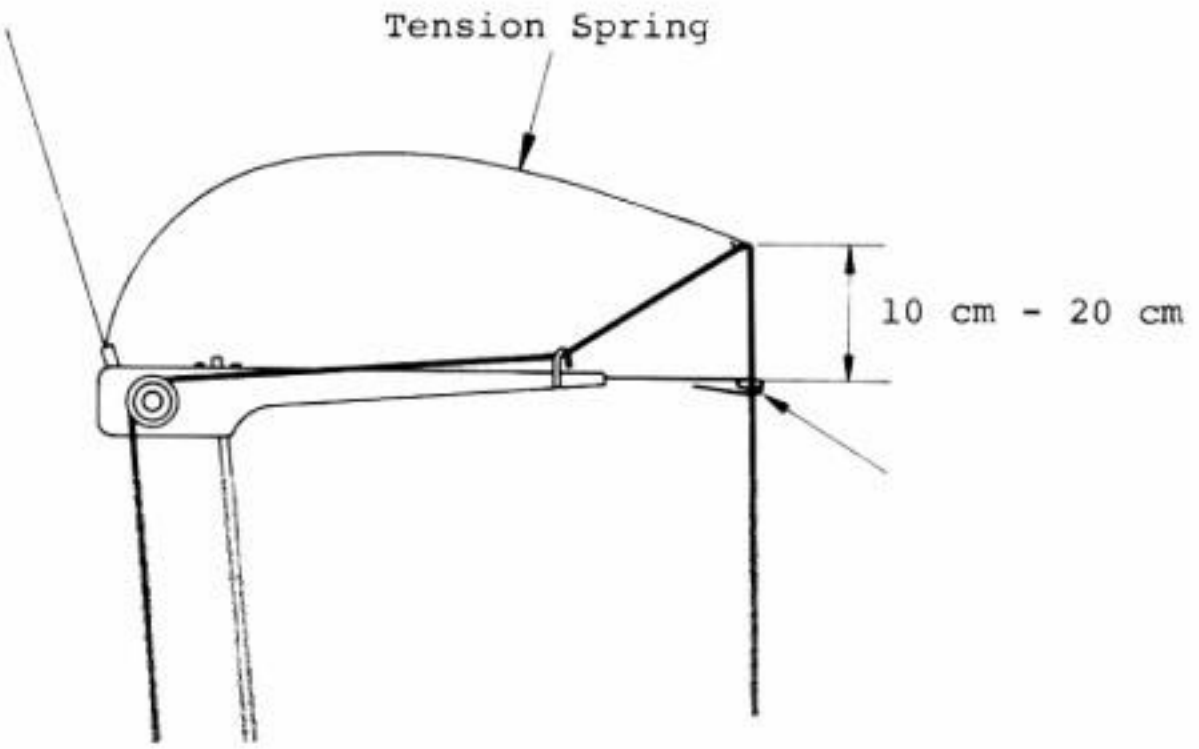


Fig. 124

b) If the yarn is wrongly threaded through the Tension, it will sag and the stitches will drop from the hooks due to insuffecient tension.
If this happens, rethread the yarn correctly.

Cause 2.
If the latch of the Needle is bent, it cannot open or close and this causes the stitches to drop. Straighten the latch with a pair of Pliers or, if irreparable, replace the Needle with a new one.

Cause 3.
If the Carriage is moved extremely fast, the stitches will become tight and the stitches on both sides tend to drop when the Carriage is returned.
Move the Carriage evenly and with reasonable speed.

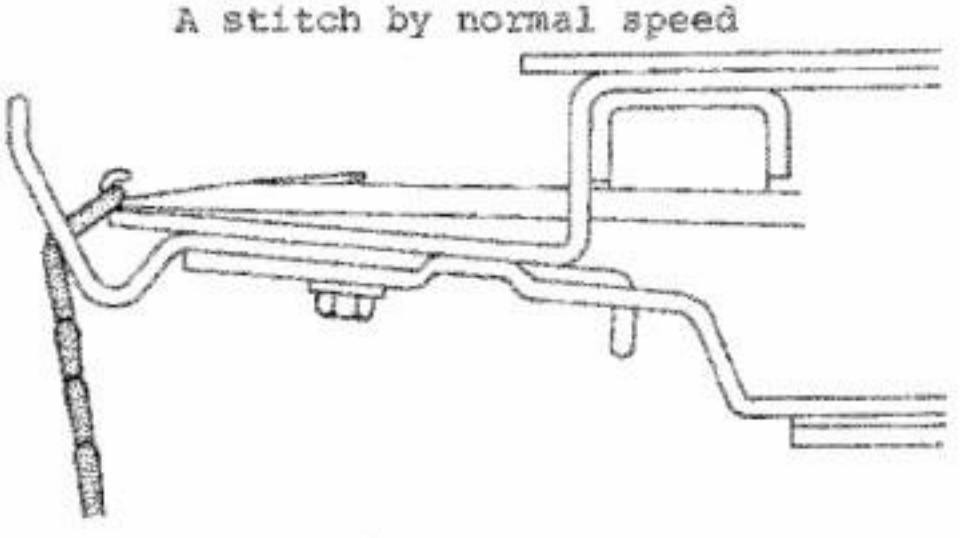


Fig. 125

A stitch by extremely fast speed

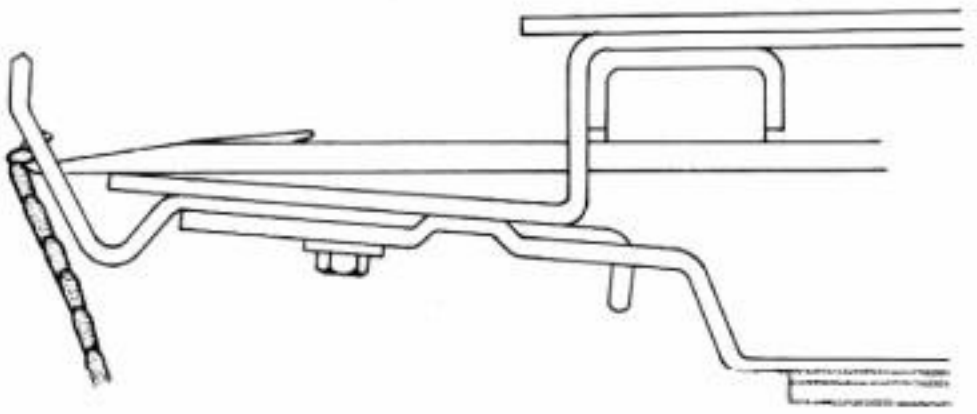


Fig. 126

Cause 4.
If the stitches on both sides of the fabric are loose or seem to drop easily, hang the Accessory Weights on the fabric as illustrated in Fig. 127.

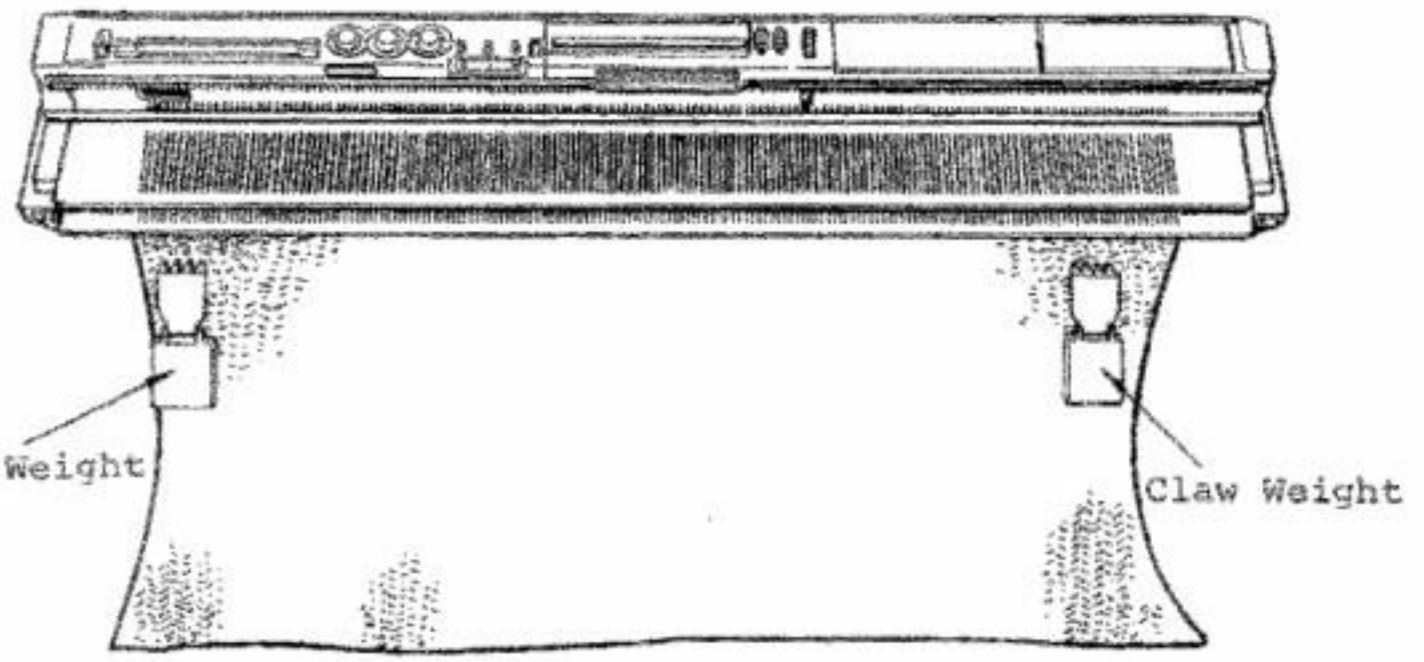


Fig. 127

Cause 5.
Please see pages of Arm Adjustment.

Cause 6.
If there is a burr on the edge of the Fabric Presser, the yarn may get caught, and, consequenly, the stitches may drop. File such a burr with either Emery Paper or with an Oil Stone.

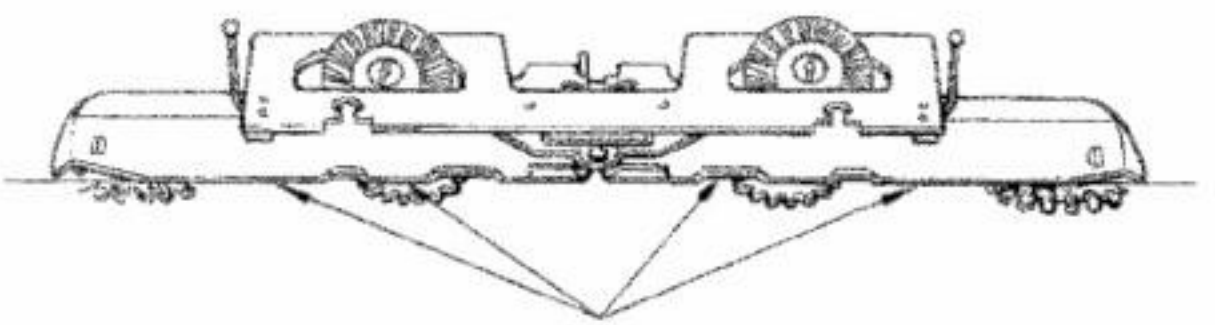


Fig. 128

[3] KNIT RADAR

1. NAMES OF MAIN PARTS

1-1 Knit Radar Unit

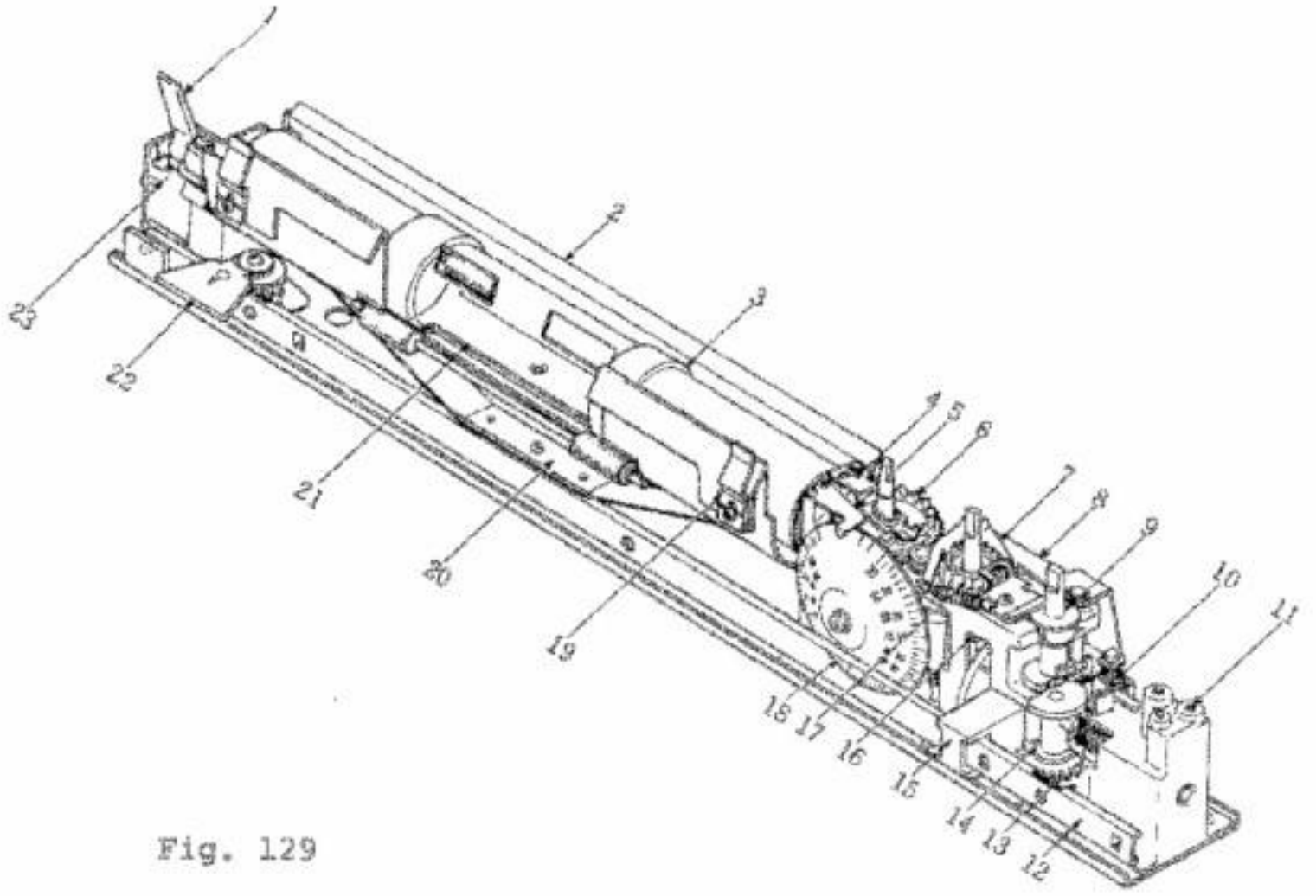


Fig. 129

1. Paper Lever
2. Roller Pan Unit
3. Platen
4. Wheel Spring
5. KR Row Indicator
6. Row Scale
7. Feeding Lever
8. KR Feeding Lever
9. Change Cam A
10. KR Feeding Plate
11. Frame (R)
12. Connecting Bar
13. KR Feeding Cam Collar
14. Row Feeding Lever
15. Connecting Bar Support
16. Friction Wheel
17. KR Ratchet Wheel
18. Row Scale
19. Scale Holder
20. Pan Spring U
21. Roller Holder
22. Row Feeding Lever
23. Frame (L)

2. Principle and Mechanism

2-1 Knit Radar (Contour):

The Knit Radar (Contour) is a device used for shaping a garment, where to increase, decrease the stitches and so on, necessary for knitting.

Pattern Paper:

A set of ready-to-use Pattern Papers is included with the machine. There patterns are reduced to half-size. Refer to the Knitting Machine Instruction Book for usage.

Stitch Scale:

7 Stitch Scales are included in the Accessory Box of the machine, ranging from 23 to 50 stitches per 10cms. Refer to the Knitting Machine Instruction Book for knowledge on how to use them.

2-2 Mechanism of Row Scale:

The marks on the Row Scale comply with the feeding amount of the Platen.
Supposing you set the Row Scale at 44, the Platen will feed the Pattern Paper 5 cms. (actual size 10cms.) 44 times, which means 44 rows are knitted per 10cms.

The movement of the Carriage revolves the Friction Wheel at a constant pace through the KR Feeding Lever, then the Friction Wheel transmits the movement to the Friction Disc affixed to the Platen Shaft.
Therefore, the feeding amount of the Platen is determined by the position of the Friction Wheel relating to the Friciton Disc.

3. KR ADJUSTMENT

3-1 If the Pattern Paper is fed crookedly

Causes:

The Platen is incorrectly assembled and moves laterally.

Correction Methods:

If the Platen moves laterally, insert washers as shown in Fig. 130. The allowance for movement is limited to between 0.1 - 0.3mm.

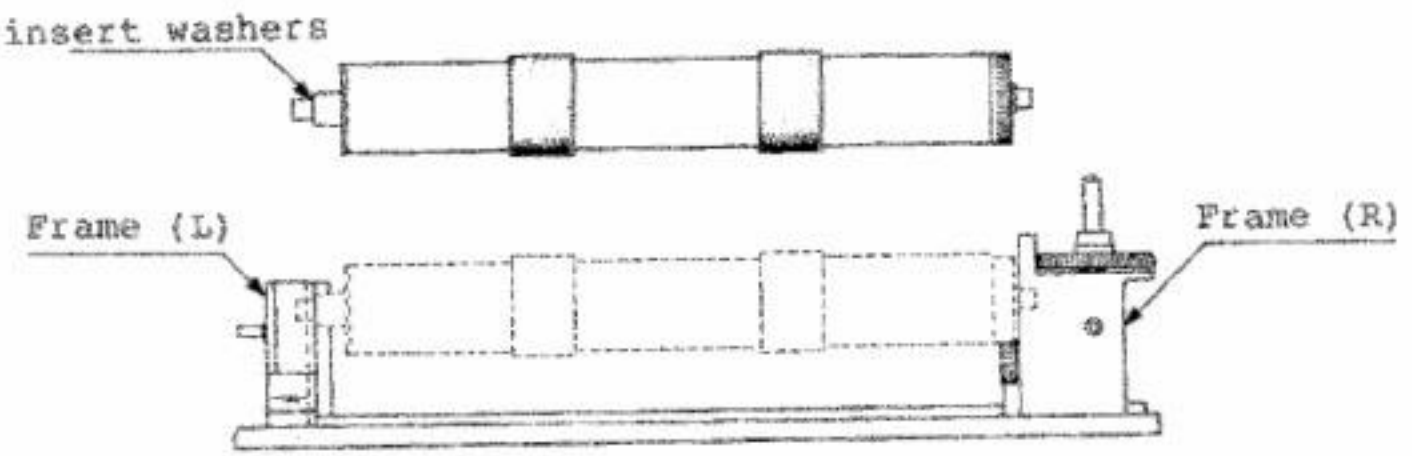


Fig. 130

3-2 If the Pattern Paper slips sideways

Causes:

1. Incorrect insertion of the Pattern Paper.
2. Incorrect insertion of the Stitch Scale.
3. Incorrect adjustment of the Scale Holder.

Correction Methods:

Cause 1.
Insert the Pattern Paper so that the horisontal lines on the Pattern Paper meet with the Stitch Scale, and both ends of Centre Line meet together.

Cause 2.
Insert the Stitch Scale into the Stitch Scale Holder correctly as far as it will go.

Cause 3.
Loosen the + Pan Head Screws (2.6 x 5) securing the Scale Holders and move them so that the horizontal lines on the Pattern Paper meet with the lines on the Stitch Scale.

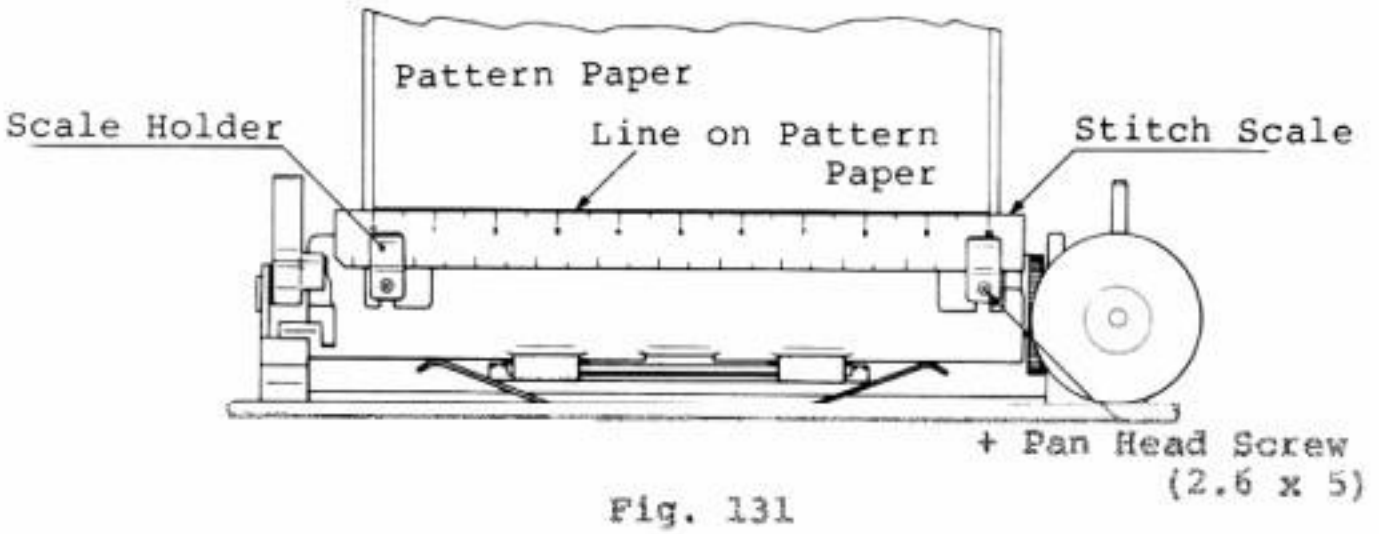


Fig. 131

3-3 If the Knitted Garment differs from the size of Pattern Paper

Causes:

1. The size of the Feeding Lever Collar is incorrect.
2. Platen, Roller Holder, Friction Disc and Friction Wheel are oily and the Pattern Paper cannot be fed correctly.
3. Incorrect adjustment of the Row Scale.

Correctly Methods:

Cause 1.

The Feeding Pawl engages the Ratchet Wheel incorrectly and the Notch Roller will come to the wrong position, If the Feeding Lever Collar is larger than the correct sized collar the feeding amount will be larger. If the Feeding Lever Collar is smaller, the Feeding Pawl cannot feed the Ratchet Wheel.

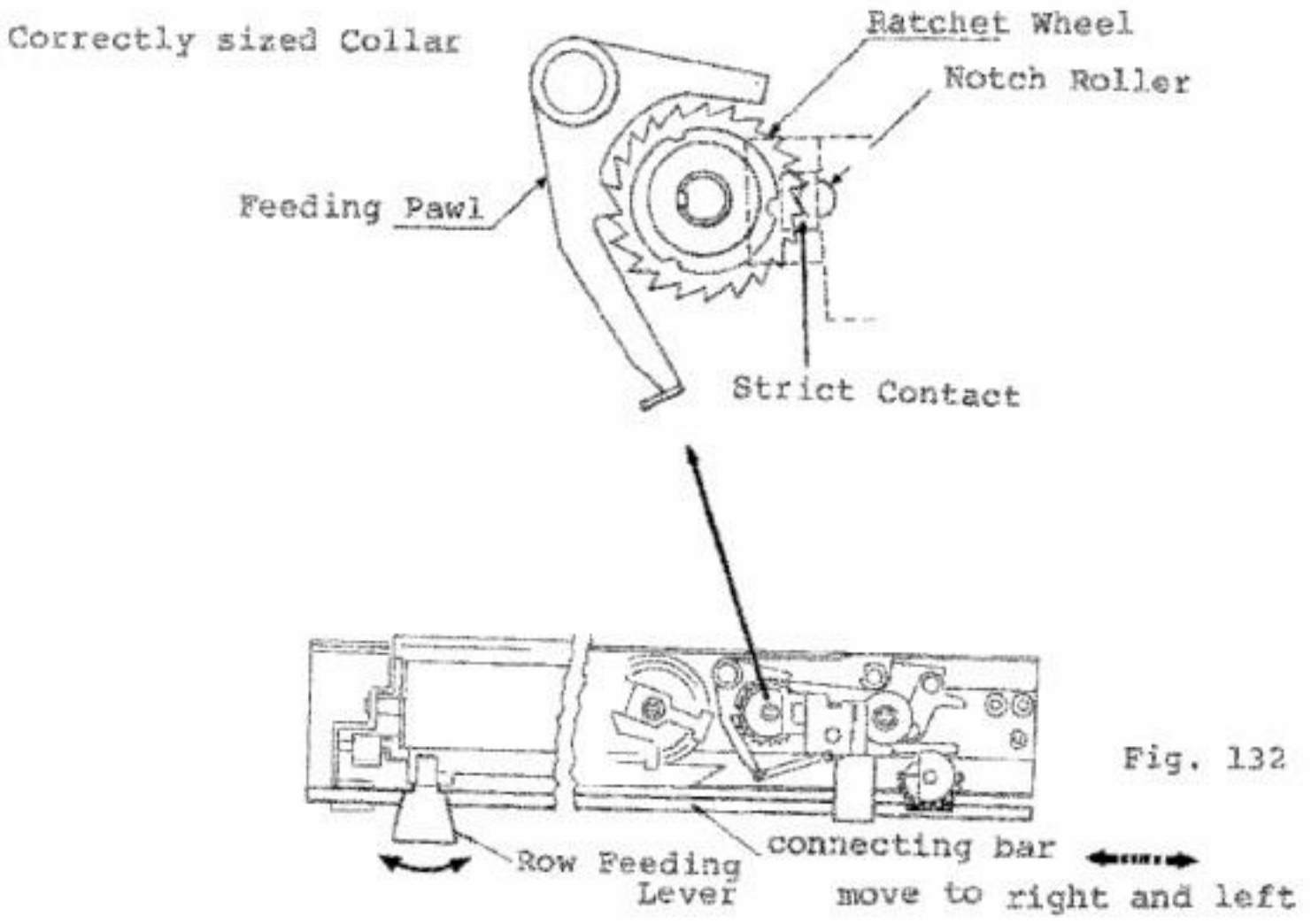


Fig. 132

Feeding amount is bigger than required: exchange the Collar for a smaller one.

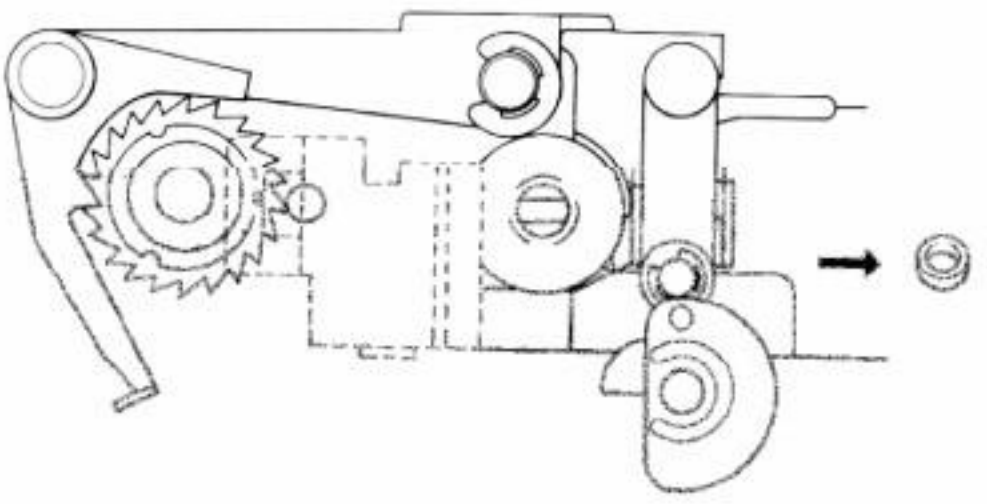


Fig. 133

Feeding amount is insufficient: exchange the Collar for a larger one.

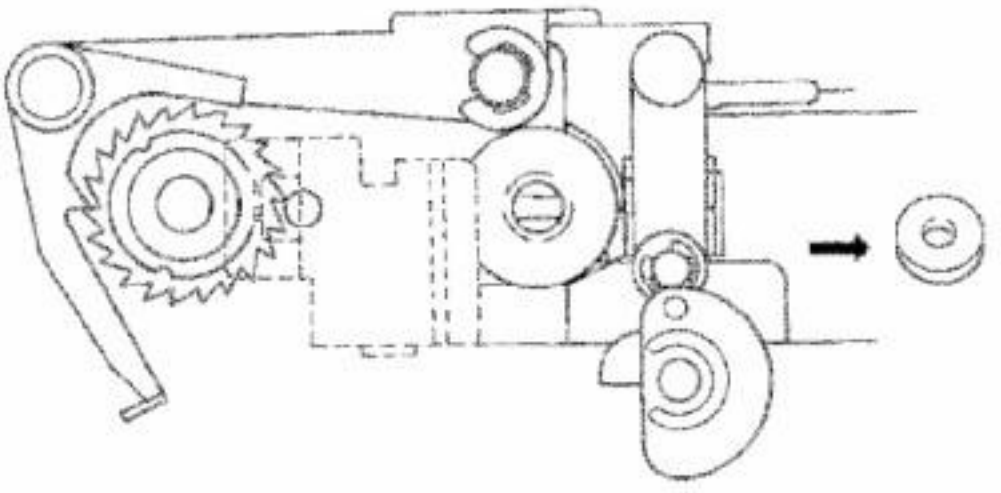


Fig. 134

3-4 Adjustment of the Row Scale

If the Row Scale is removed or loosened by mistake, adjust it in the following manner:-

1. Turn the Row Number Dial closkwise, to its extremity, in order to move the Friction Disc down as far as it goes.

2. Turn the Set Wheel so that the Row Scale is set at the centre between 30 and 60 and fasten the Hexagonal Nut temporarily.

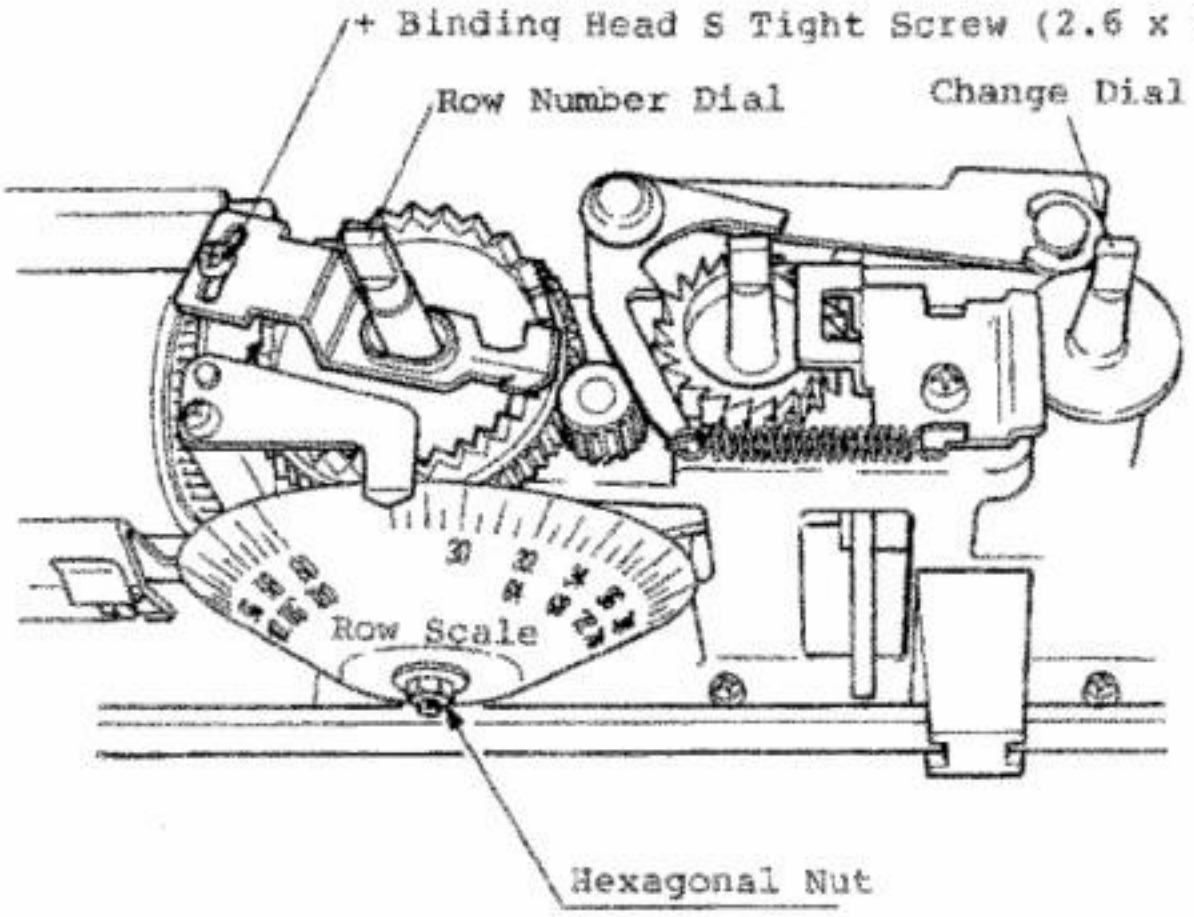
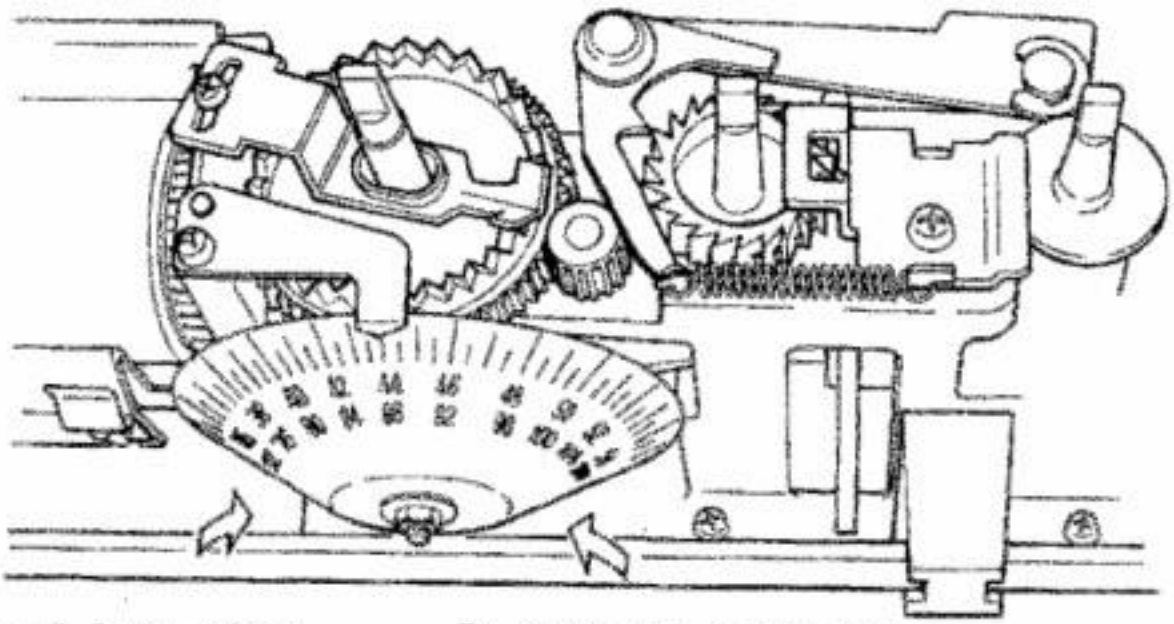


Fig. 135

3. Test the function of the Row Scale (rows to feed the pattern by 25 cms.). With the Row Scale set at 44, you are able to knit 220 rows± 4 rows within 25 cm. If the rows knitted are less than the standard number of rows (220 ±4), loosen the Hexagonal Nut and move the Row Scale in a clockwise direction to correct its position. On the other hand, if the number of rows knitted are more than the standard number, move the Row Scale in an anti-clockwise direction.

Example:

Row Scale	Standard Number of rows within 25cm.
30	150 ± 3
44	220 ± 4
60	300 ± 6



In case of less than the standard No. of rows, turn to the right.

In case of exceeding the standard No. of rows, turn to the left.

Fig. 136

4. After the adjustment of the Row Scale has been accomplished, place the tip of the Wheel Spring in between two teeth of the Set Wheel and fasten it with + Binding S Tight Screw (2.6x6).

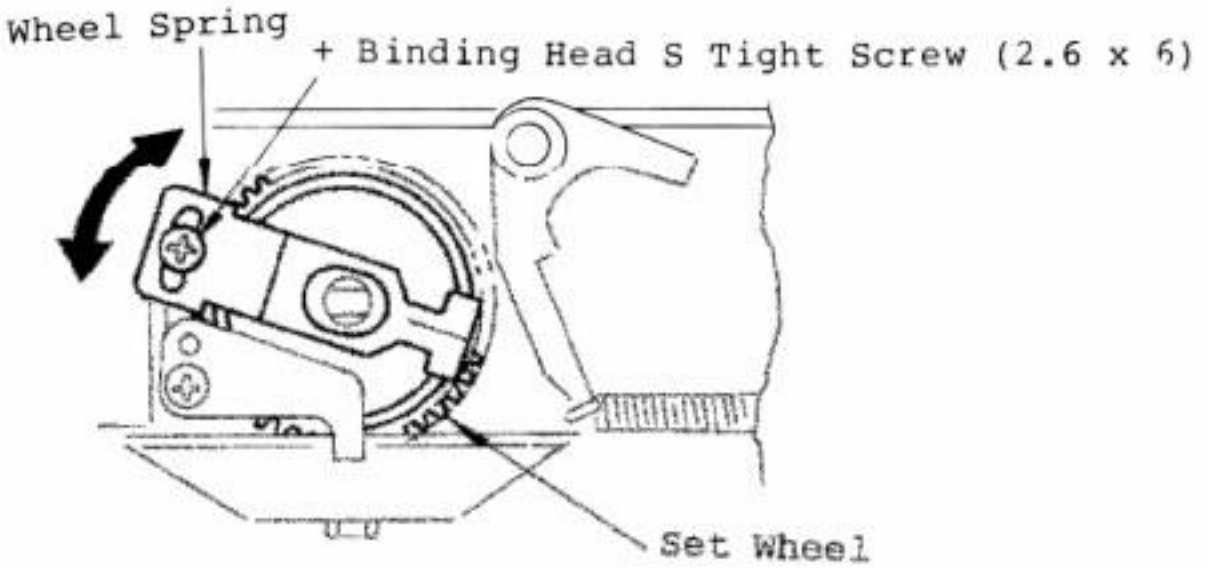


Fig. 137

Note: If the Wheel Spring stops at an incorrect position, feeding of the pattern paper will be incorrectly done.

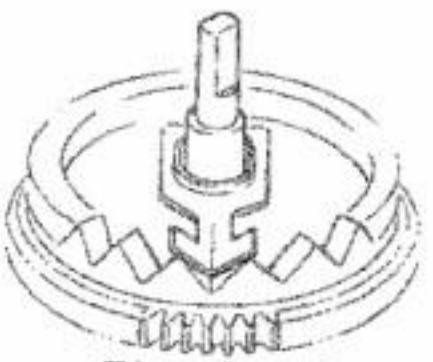


Fig. 137-1

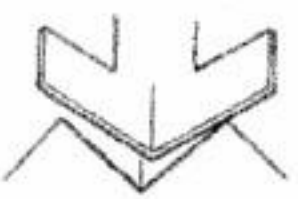


Fig. 137-2

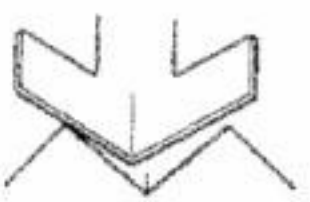


Fig. 137-3

3-5 How to remove the Connecting Bar

(1) Remove the + Pan Head Screw(3x8) fastening the Connecting Bar Support, and guide out the Connecting Bar while pulling the bar forward.

(2) Push the Connecting Bar Support to the right, and take it out.

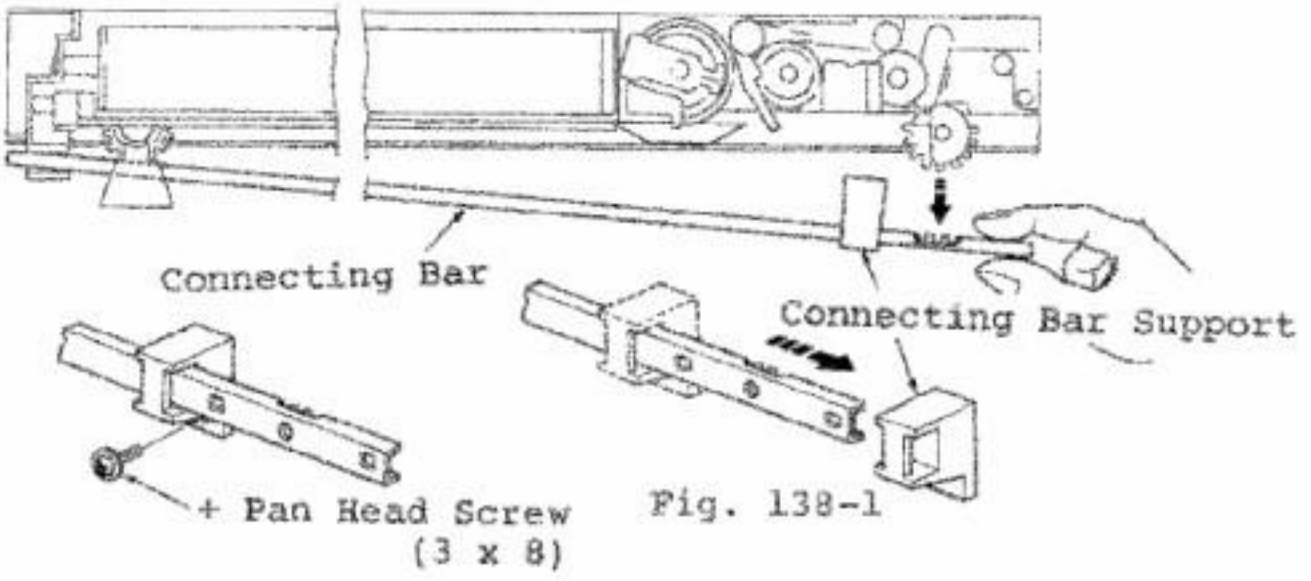


Fig. 138

3-6 How to reassemble the Connecting Bar

(1) Guide the Connecting Bar into the Connecting Bar Support and insert the left end of the Bar into the Frame (L).

(2) Mesh the Rack at the left end of the Connecting Bar with the gear of the Feeding Lever.

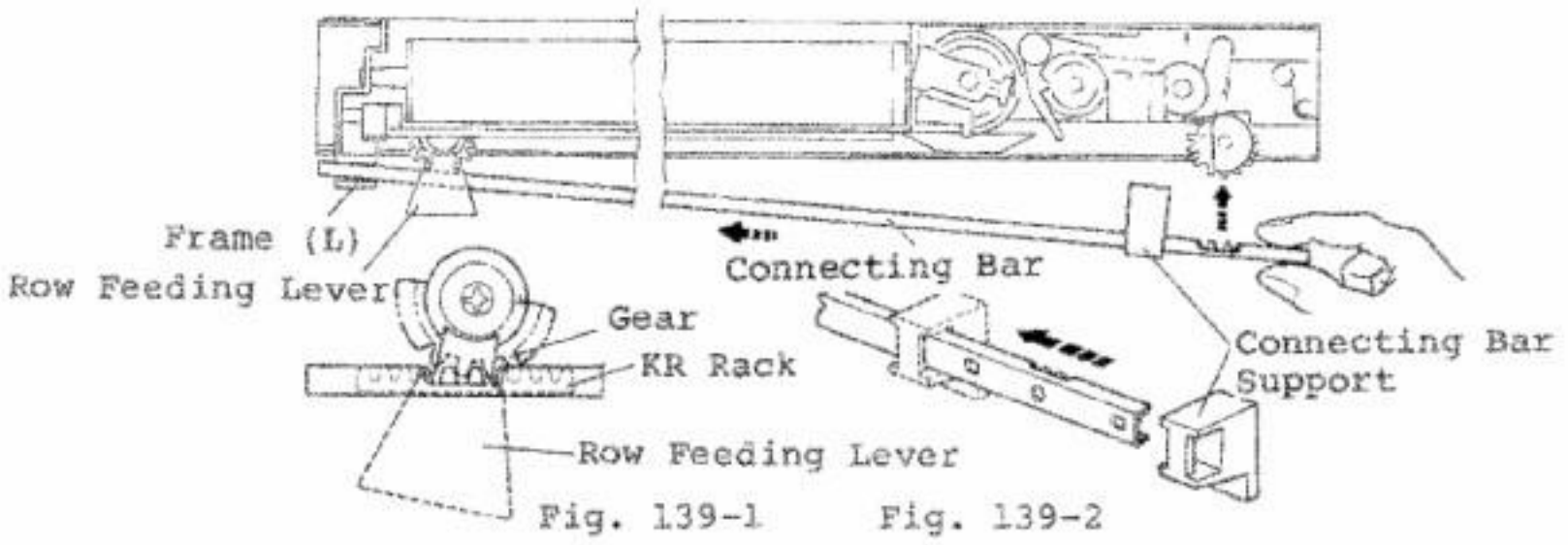


Fig. 139

(3) Adjust the meshing of the Rack and the Gears so that the front end of the Feeding Lever stays parallel with the Rack of the Needle Bed as shown in Fig. 140.

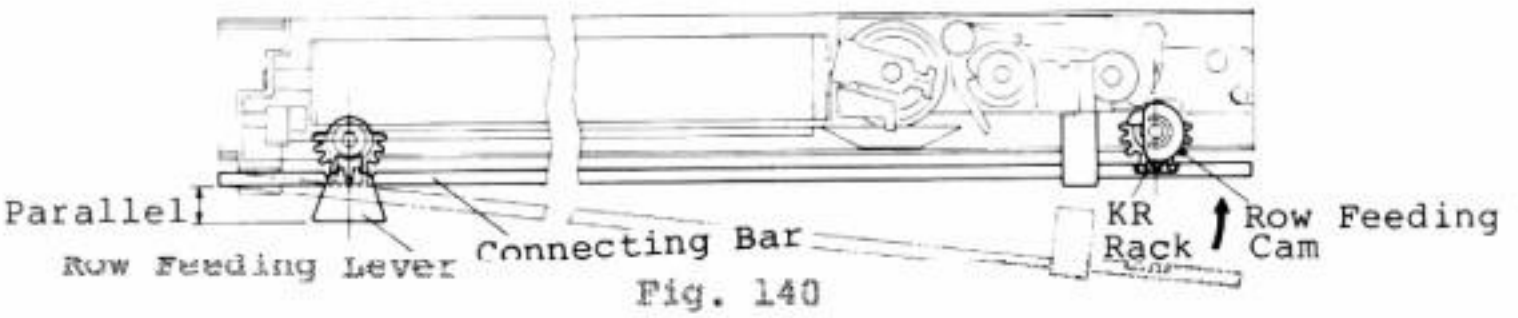
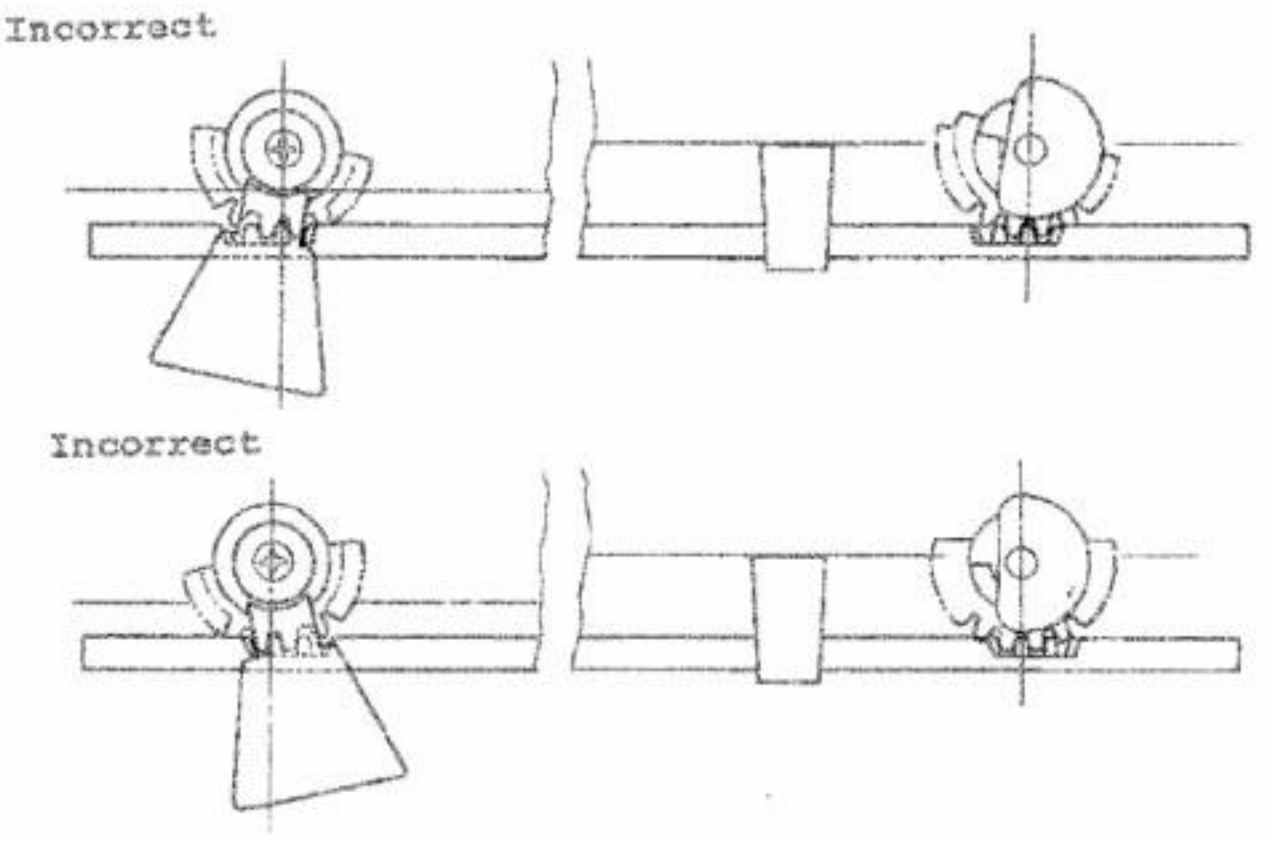


Fig. 140



(4) Fasten the Connecting Bar Support with the Pan Head Screw (3x8).

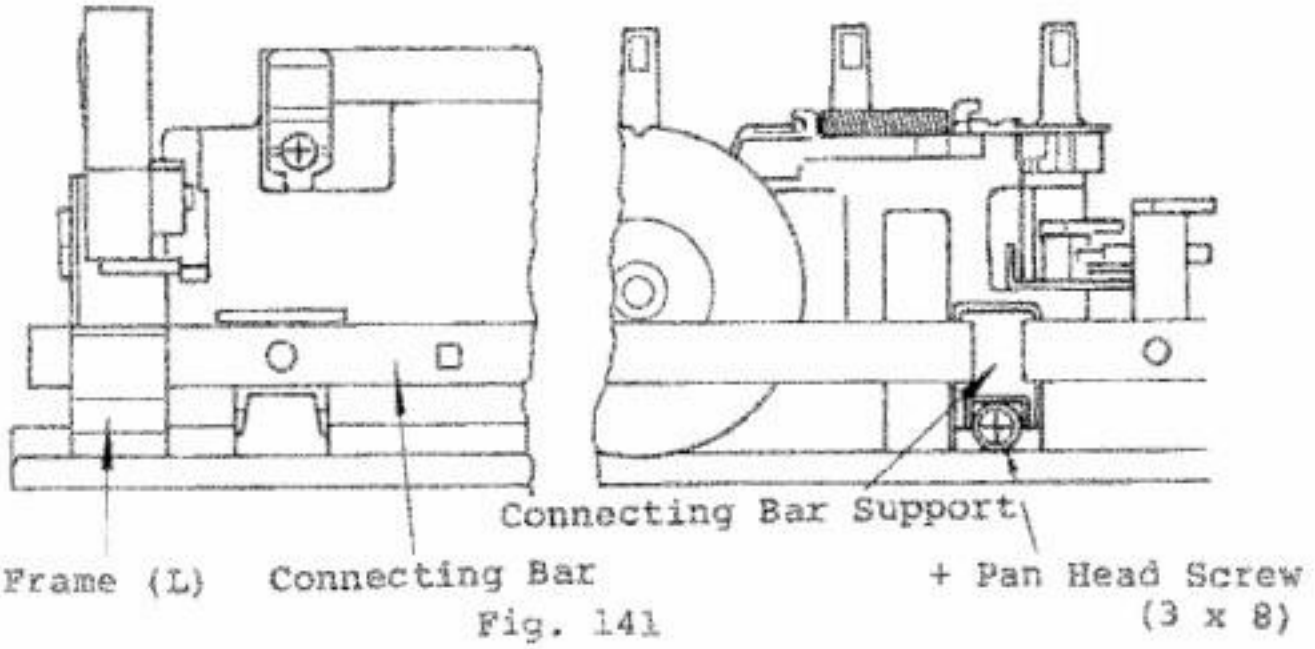


Fig. 141

CAUSES AND REMEDIES FOR KNITTER FAILURE

Nature of Trouble	Places to be inspected	Causes	Remedy
The length of both sides of the fabric differs.	Check the dimension between the Rail and the Sinkers. (L Dimention)	Dimensional differences at some points between the Rail and Sinkers, causes a knitted fabric to have different sized stitches resulting in differences in length of both sides of the fabric.	Adjust the dimension between the Rail and Sinkers to be precisely equal at all potints.
	Check the speed at which the operator starts and finishes a stroke of the Carriage.	Difference in speed between the time the operator starts and finishes a strode causes a knitted fabric to have different sized stitches due to the variable tension on the yarn. Consequently, both sides of the fabric will have different lengths.	Instruct the operator to operate the machine at as even a speed as possible, both at the start and finish of a stroke.
Stitches float.	Check how the Arm is attached to the Carriage.	The position of the Fabric Pressers against the Needle Bed gets out of order unless the Arm is properly attached to the Carriage. If it is not properly attached, it will result in the floatation of the stitches and this makes knitting impossible.	Attach the Arm properly to the Carriage.

Nature of Trouble	Places to be inspected	Causes	Remedy
	Check how the edge of the Fabric Pressers touch the Needles.	If a clearance exists between the edge of a Fabric Presser and the Needles, the yarn is prevented from slipping off of the latches due to insufficient pressing force on the fabric by the Pressers. This also causes the stitches to float.	Adjust the Fabric Pressers (P.N. clearance).
	Check the clearance between the edge of the Fabric Pressers and the Sinkers.	If the clearance between the edge of the Fabric Pressers and the Sinkers is too wide, the stitch is prevented form coming over and behind the latches because of insuffecient pressing force on the fabric. This causes stitches to float.	Adjust the Fabric Pressers (P.S. clearance).
	Check the condition of the Needles.	If the Needles get their hooks and latches bent, the yarn can neither pass over the hooks nor can it be pushed behind the latches, and stitches float as a result.	Correct the bent hooks and latches. If they are irraparable, replace those Needles with new ones.

Nature of Trouble	Places to be inspected	Causes	Remedy
The stitches on both edges of the fabric drop.	Auto Tension	If you continue knitting without noticing that the Tension Spring (a spring to take up the slack yarn) is jumping to its extremity and is not functioning the yarn sags at the starting point of knitting and the Needles cannot pick up the yarn. The stitches drop. (This often takes place when yarn is changed.	Adjust the yarn tension through turning the Tension Dial.
	Check if the yarn is wrongly threaded through the Auto Tension.	If the yarn is wrongly threaded through the Auto Tension, the yarn sags and stitches come off the hooks due to insufficient yarn Tension.	Instruct the operator to correctly thread the yarn through the Auto Tension.
	Check the speed at which the Carriage is moved.	If the Carriage is moved extremely fast, the stitches will become tight and the stitches on both edges tend to drop.	Instruct the operator to move the Carriage at a reasonable speed.
	Check the accessory Weights.	The end stitches of the fabric easily drop from the Needle hooks.	Hamg the accessory Weights on both sides of the fabric.

Nature of Trouble	Places to be inspected	Causes	Remedy
	Check if ther is a burr on the Fabric Presser.	If there is a burr on the edge of the Fabric Presser, the yarn may get caught and the stitches may drop.	File such a burr with Emery Paper.
Open holes in the knitted fabric. (Dropped stitches)	Check the clearance between the Fabric Pressers and the Needles (P.N. clearance).	If there is a clearance between the Fabric Pressers and Needles, the Needles become lower in position than the standard position, and the Y.S. (Yarn Feeder and Sinker) clearance becomes wider, so the Needles will not catch the yarn.	Adjust the P.N. clearance.
	Check how the Needle latches open and close.	When the Needle latches do not open or close smoothly, stitches tend to drop.	Correct the latches so that they open and close smoothly. If irraparable, replace them with New Needles.
A knitted fabric shows Course Strips (Irregular Stitches).	Check if both Main Cams are located at an equal distance form the inner surface of the Carriage Pipe. (Standard Level)	If the dimension between the Carriage Pipe (Standard Level) and one Main Cam is different from that of the other, Course Stripes occur.	Adjust the Main Cams so that they may be correctly positioned.

Nature of Trouble	Places to be inspected	Causes	Remedy
	The speed at which the Carriage is moved. (Speed at which knitting is done)	Speed difference between starting and finishing a stroke, or between one stroke and another.	Instruct the operator to knit at an even speed. (Even if the machine is in good order, Course Stripes happen depending upon the operator or operating methods adopted.)
The latch and hook of Needles easily bends.	Yarn Feeder.	In case the Needles are lifted too much by the Fabric Pressers, the hook of a Needle will get caught by the Yarn Feeder when knitting.	Adjust the P.N. and the Y.P. clearance.
Poor Needle Selection throughout the the fabric.	Pattern Unit.	If the perforated holes on a Punch Card are not aligned with the Scanning Fingers of the Touch Levers, the Scanning Fingers get caught by the holes, making the Touch Levers unable to work in accordance with the Punch Card and irregular pattern is knitted on the fabric.	Adjust the Card Drum so that the perforated hole on the Punch Card may be aligned with the Scanning Fingers of the Touch Levers.
	Check the Clear Wire	If the length of the Clear Wire is not correct, the Sub Drum Pieces cannot clear the used memory on the Sub Drum.	Adjust the Needle Bed Rack and Drum Unit.

Nature of Trouble	Places to be inspected	Causes	Remedy
	Clearance between the Touch Levers and the Main Drum Pieces.	If there is too wide a clearance between the Touch Levers and Main Drum Pieces, Touch Levers are prevented from pushing the Main Drum Pieces sufficiently and a poor memory results, accompanied by poor Needle Selection.	Adjust the clearance between the Touch Levers and Main Drum Pieces.
Poor Needle Selection appears every 24th stitch.	Main and Sub Drums. Touch Levers.	1. Inactiveness of Drum Piece. 2. Loss of Drum Piece. 3. Rebound Spring is bent. 4. MP Stopper is bent. 5. SP Stopper is bent. 6. Inactiveness of Touch Lever. 7. Touch Lever Spring is bent.	Replace Drum Piece. Replace Drum Piece. Replace Rebound Spring. Replace MP Stopper/Drum. Replace SP Stopper. Check Touch Lever Shaft. Replace the Spring.
Needle butts collide with the Carriage.	Drum Unit.	The mutual position of the Needle Bed Rack is incorrect along with the Needle Bed grooves and Drum Unit.	Adjust the position of the Drum Unit.
	The clearance between the Rail and Needle Bed Rack.	If the clearance between the Rail and Needle Bed Rack is incorrect, the Needle butts will collide with the Separation Cam.	Adjust the Needle Bed Rack and Drum Unit.

Nature of Trouble	Places to be inspected	Causes	Remedy
	Check the speed at which the Carriage is moved.	If the Carriage is moved extremely fast, the end Needle will be pulled out by a tightened stitch and the Needle will collide with the Separation Cam.	Instruct the operator to move the Carriage at a reasonable speed.
Carriage is heavy during operation	Check if the Rail of the Needle Bed, Slider, Carriage Pipe and Cams etc., are properly lubricated.	In the case of the Rail, Slider, Carriage Pipe and Cams etc., if lubrication is poor the Carriage becomes heavy during operation	Clean the soiled surface of those parts and apply the machine oil contanined in the Accessories.
	Check the position of the Fabric Pressers.	If the edge of the Fabric Pressers is too high or come in contact with the Sinkers, the Carriage gets heavy during operation because of an increased resistance upon a Fabric Presser.	Adjust the position of the Fabric Pressers.

LACE CARRIAGE

[1] NAME OF EACH PART

1-1 CARRIAGE UNIT

NAME OF THE PARTS

1 Arm Nut
2 Drum Base Unit
3 Moving Plate
4 Centre Cam
5 Latch Cam
6 Base Cam
7 Course A Cam
8 Hook Cam
9 Course B Cam
10 Main Cam
11 Thrusting Cam
12 Separation Cam
13 Edge Pin Course Cam
14 Slider

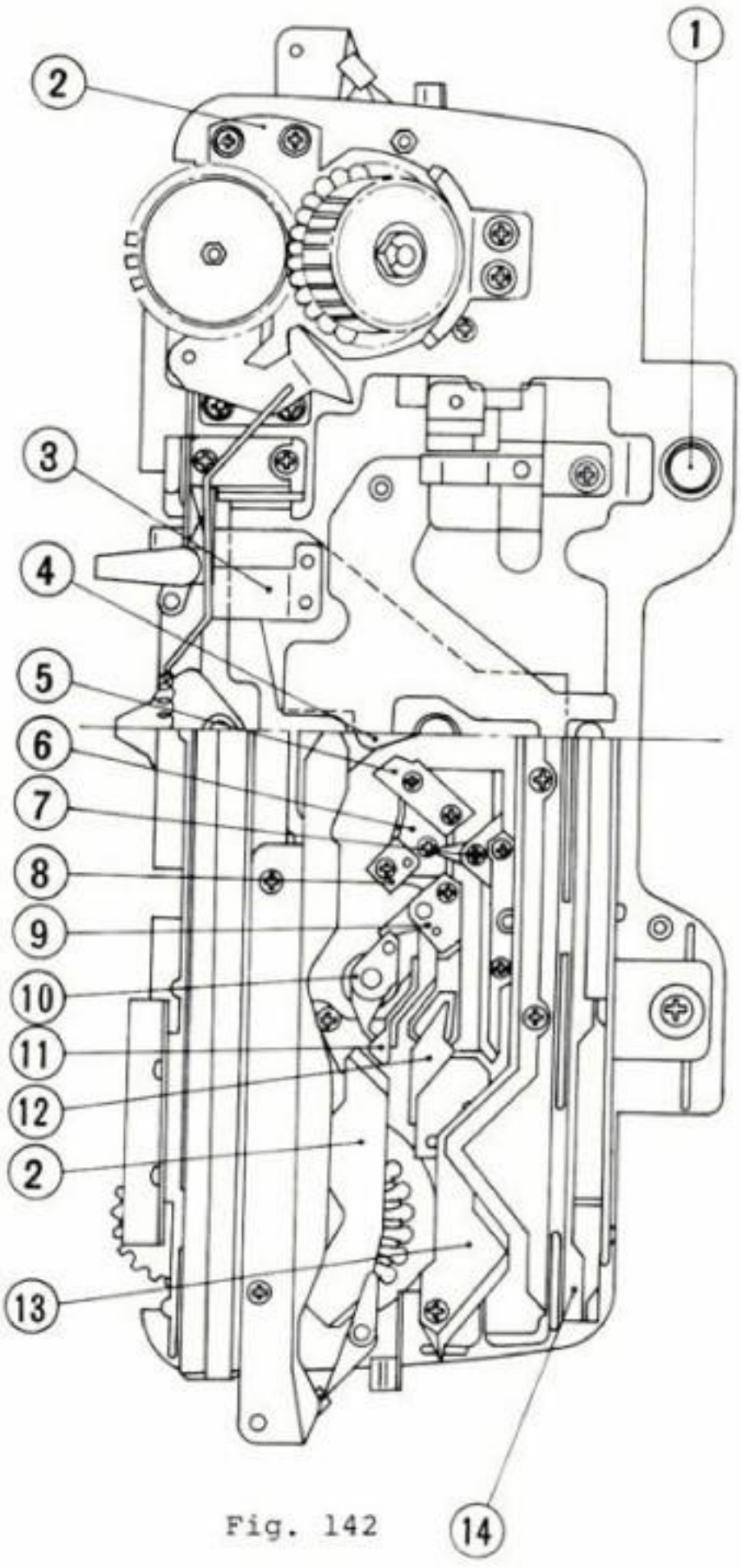


Fig. 142

1-2 ARM UNIT

NAME OF THE PARTS

1. Round Brush B
2. Latch Magnet
3. Loop Guide Base (L)
4. Latch Guide (L)
5. Lifting Cam A (L)
6. Loop Guide (L)
7. Return Cam (L)
8. Lifting Cam C Spring (L)
9. Lifting Cam C (L)
10. Yarn Feeder Guide
11. Yarn Feeder Brush
12. Yarn Feeder
13. Clearing Brush
14. Fabric Presser A
15. Bending Cam (L)
16. Fabric Presser B (L)
17. Latch Magnet Cover
18. Centre Round Brush

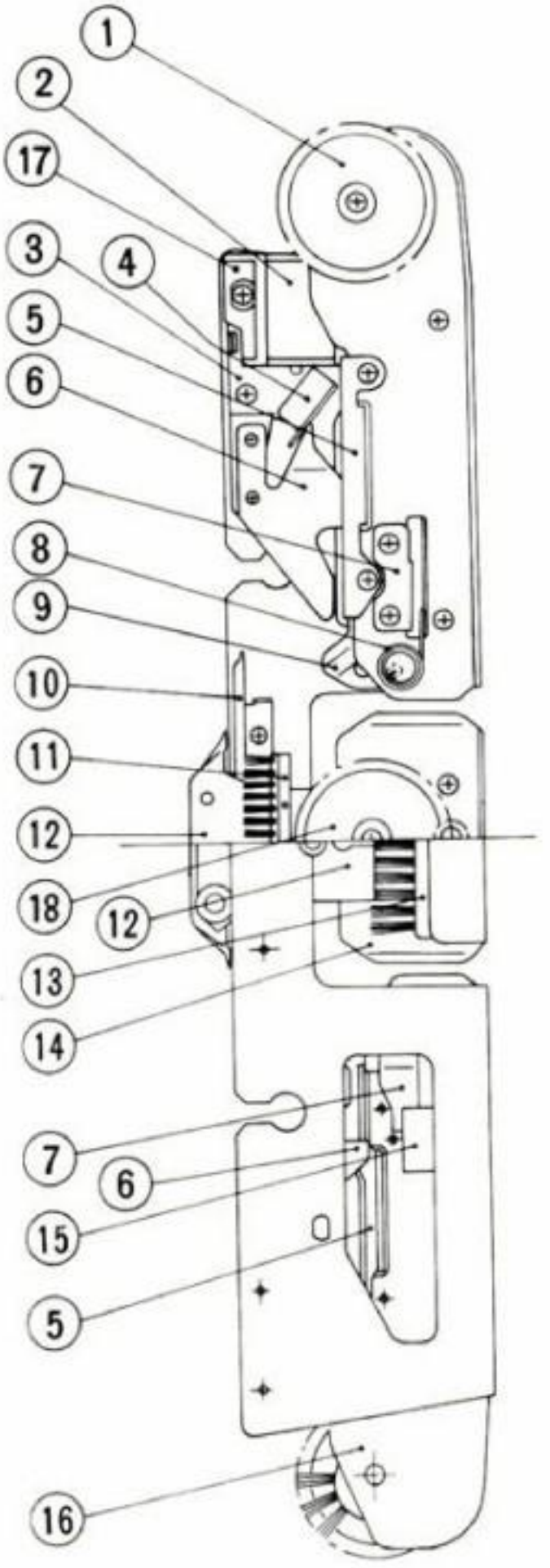


Fig. 143

[2] CARES TO BE TAKEN OWING TO FUNCTIONAL AND STRUCTURAL DIFFERENCE

1. Positions "C" and "D" on the needle bed must not bed used.

   * If the needles are placed in the positions "C" or "D", the needles will collide with the Carriage.

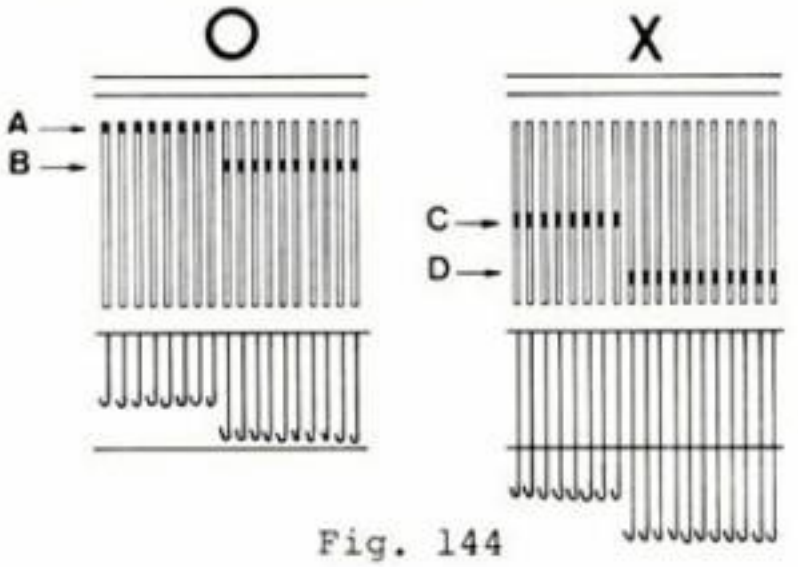


Fig. 144

2. The needles are for exclusive use on the Model 360/260 knitters.

   As illustrated below, the needle for the Model 360/260 knitters has longer cut-out at the bottom of the needle.

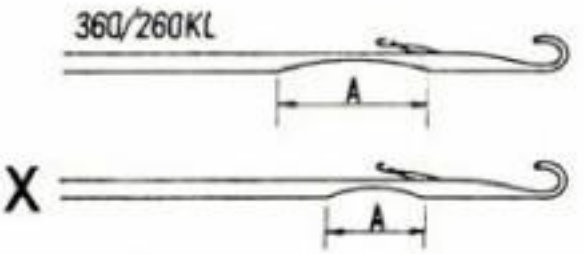


Fig. 145

* If the needle for the other models are used on the Model 360/260 knitters, the needle will touch the top of the Sinker Post when it crosses over the Sinker for transferring a stitch.

* The needle for the Model 360/260 can be used for the other models, but the needle for the other models' can not be used for this knitter.

* If the needle on the other models are replaced with the needles for the 360/260 knitter, the Yarn Changer, SC-3, must be used, because the SC-1, is constructed for the use on the knitters with the conventional needles.

* If the needle for the Model 360/260 knitters are used on the Model 500 knitter, incorrect needle selection will occur.

3. The height of the Sinker Post for the Model 360/260 knitters is lower than the other models', so the needles easily cross over the Sinker Post and transfer the stitch.

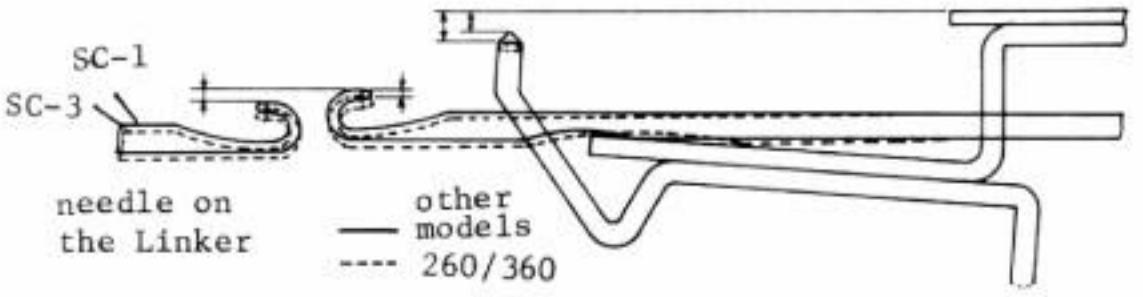


Fig. 146

4. The Needle Retainer for the Model 360/260 knitters has less depth of the metal support on the mortpren, and the needles are easily lifted up and cross over the Sinker Post for tranferring stitches.
The knob of the Needle Retainer is of yellow colour.

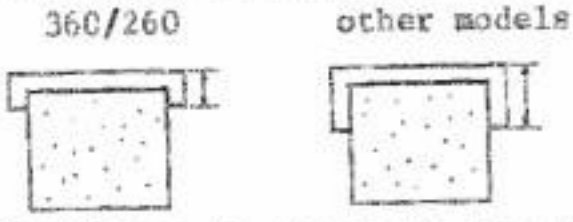


Fig. 147

5. If the Lace Carriage is used as the Ribber is attached to the knitter, the Ribber Joiner Screw will interfere with the Carriage Slider.

To use the Lace Carriage with the Ribber attached, exchange the screw for the ones with lower head, and drop the Ribber to its lowest position.

Ribber Bed Cover, optionally available, is indispensable for making a lace fabric with the Ribber attached on the knitter.

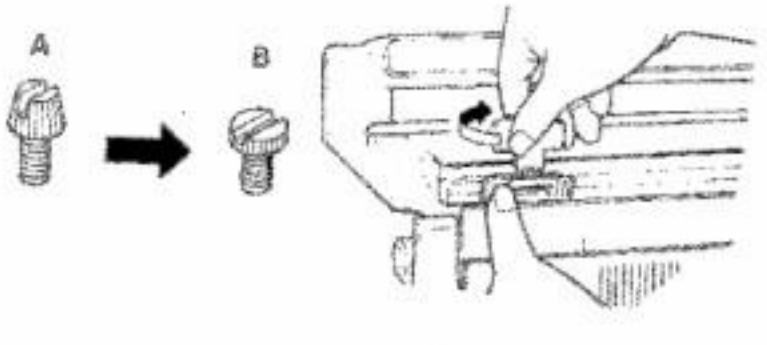


Fig. 148

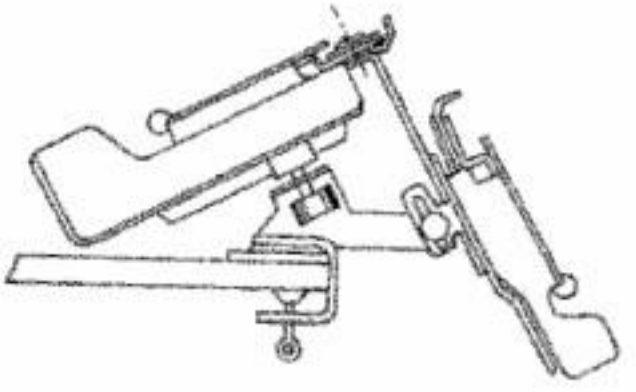


Fig. 149

CARES TO BE TAKEN FOR CASTING ON, AND KNITTING LACE FABRIC

A) Before starting to knit in lace pattern, knit 30-40 rows of plain knitting.

Important: If the Carriage is operated with the Side Levers at "▲" mark when no punch card is in the machine, all the needles will pass through the course of selected needles, lifted up by the Lifting Cam, and bent by the Bending Cam, but before the first needle is released from the bending cam, the following needle reaches to the Bending Cam, thus making the operation of the Carriage heavy and even breaks the needles.

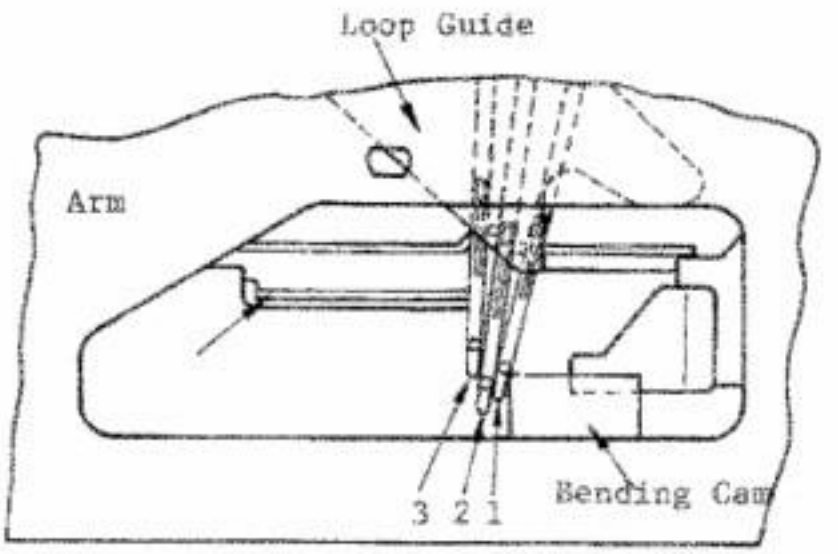


Fig. 150

B) Before starting to knit in lace pattern, hang weight evenly on the fabric as shown.

Move up the weights every 50-60 rows of knitting.

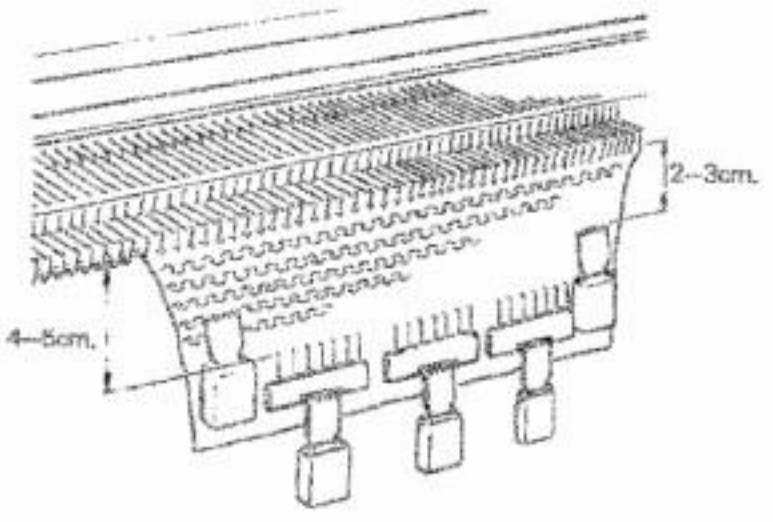


Fig. 151

[3] DISASSEMBLY AND ASSEMBLY OF THE CARRIAGE

3-1 Disassembly of the Carriage (up to opening the Carriage Cover)

(1) Lay down the Carriage Handle and remove the handle screws from both end of the handle.

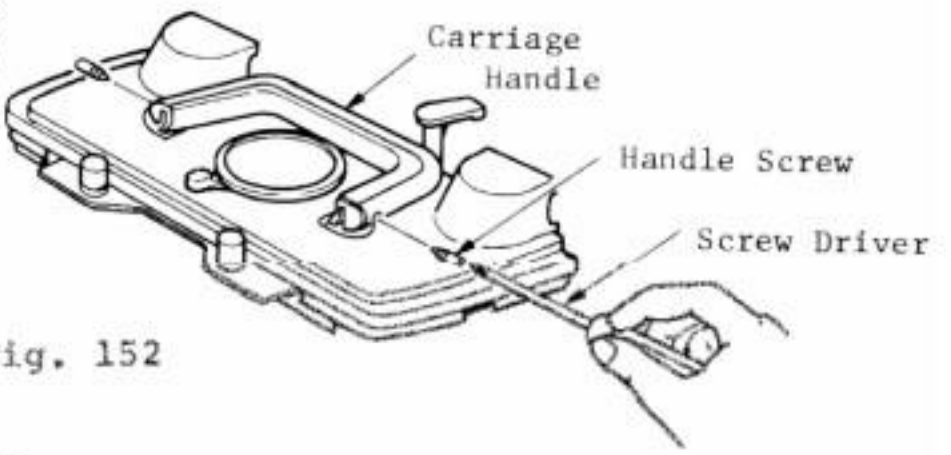


Fig. 152

(2) Turn the Stitch Dial counter-clockwise till it comes to a stop, then pull it off upwardly.

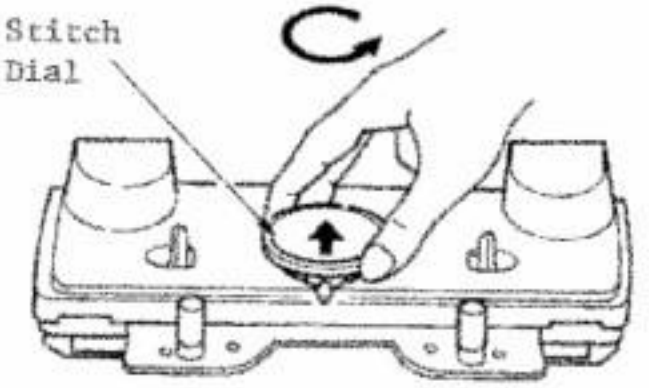


Fig. 153

(3) Remove two + truss head screws fastening the Carriage Cover. Turn the Cam Lever to "⋀" mark.

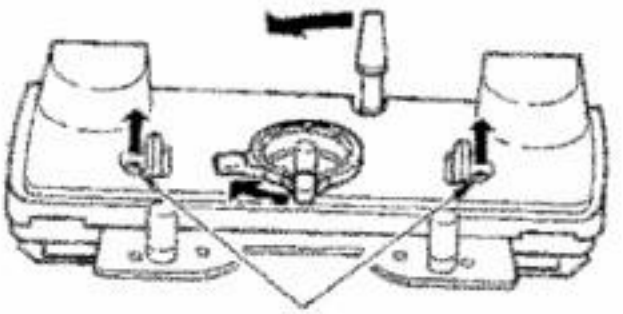


Fig. 154

+ truss head screw(3x6)

(4) While pushing the upper leaf of the Dial Spring toward you, lift up the Cam Lever. The Cam Lever will be disengaged from the Dial Spring and come off from the Dial Arbour together with the Carriage Cover.

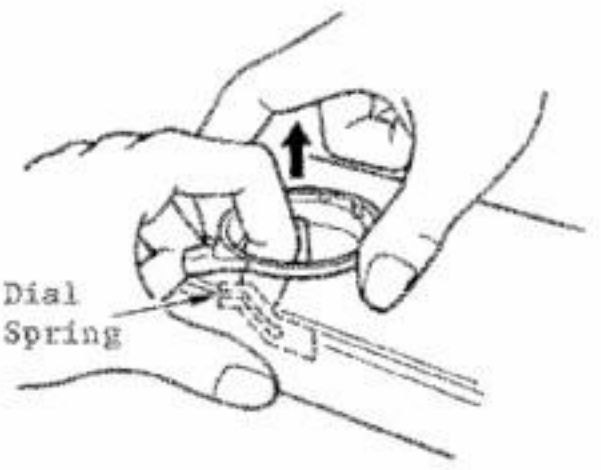


Fig. 155

3-2 How to assemble the Carriage

Reverse the procedure applied for disassembling the Carriage, to assemble it, but the following cares must be taken.

* Before fixing the Carriage Cover, set the RC Lever on the RC Lever Base properly, otherwise it will not function correctly.

* Install the Stitch Dial, pushing the main cams toward the Arm Nuts (to draw the Moving Plate Pin closer to the Dial Arbour).

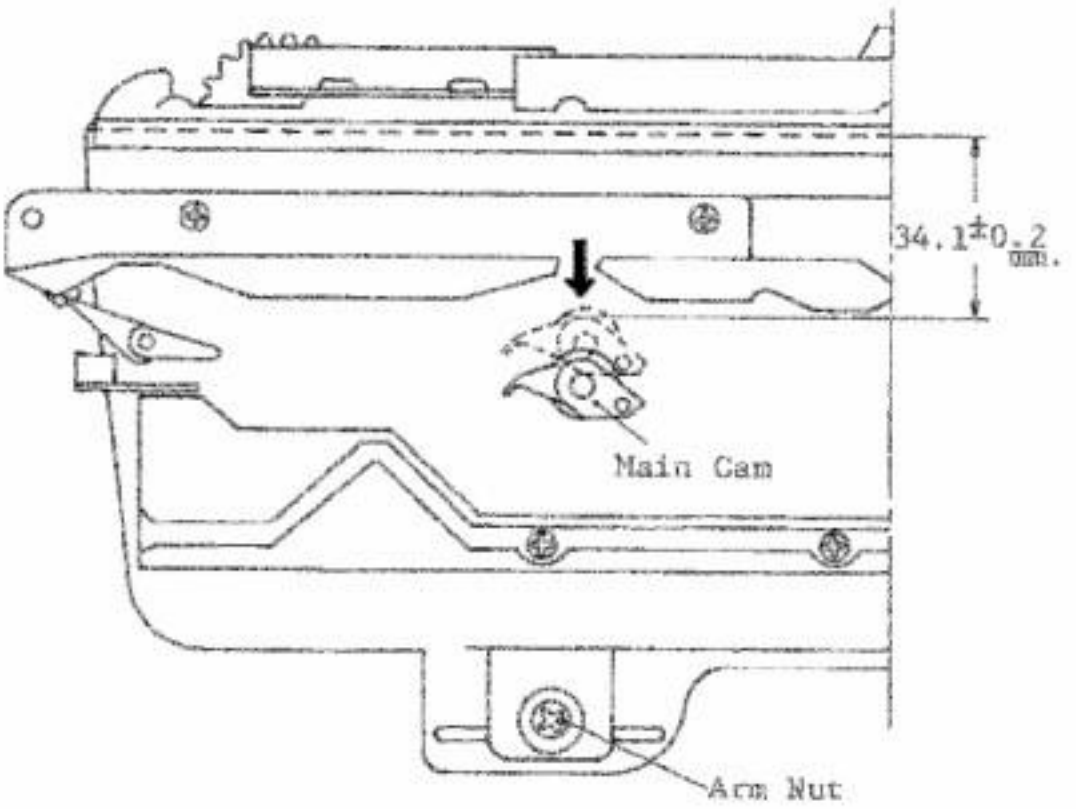


Fig. 156

** Relation between the position of the main cams and the Stitch Dial shall be as below:-

When the Stitch Dial is set at "3", the measurement between the main cams and the inner surface of the Carriage Pipe must be 34.1±0.2mm.

When the Carriage Plates "A" and "B" are separated and reassembled, the measurement must be checked and adjusted using the Course Standard Gauge for the K Carriage.

3-3 Disassembly and assembly of the Arm

3-3-1 Disassembly and assembly of the Yarn Feeder

Disassembly:

The Yarn Feeder can be separated from the Arm by removing the + Binding Head Screw (2x8).

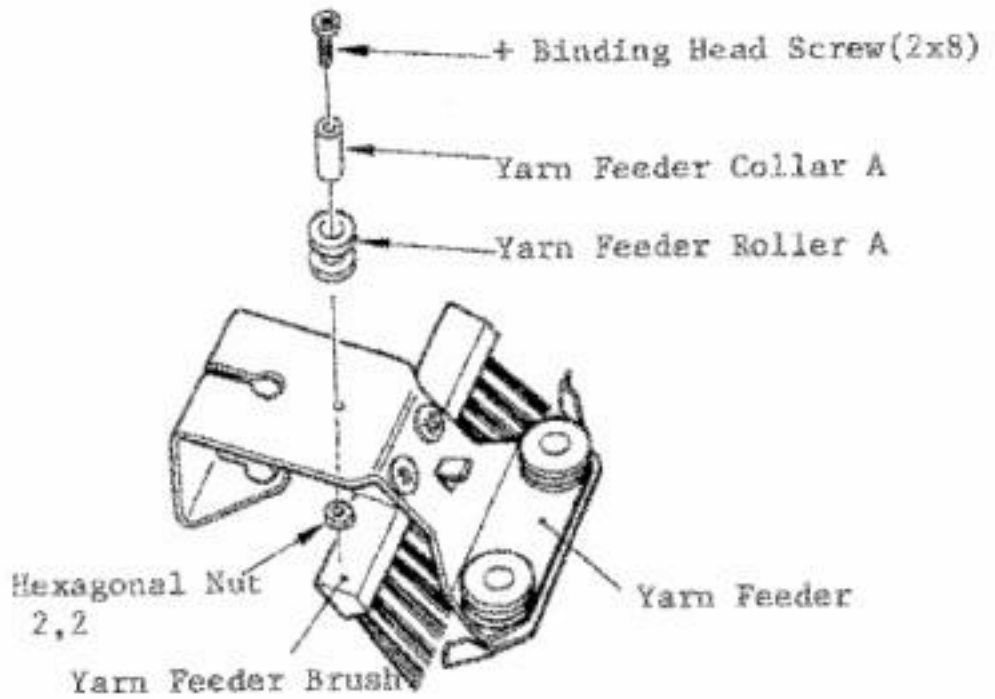


Fig. 157

3-3-2 Disassembly and assembly of Lifting Cam A

Disassembly: Remove two + Binding Head Screws (3x4).

Assembly: When fixing the Lifting Cam A, be sure to fix in the state as marked in dotted circle so that the Lifting Cam C is blocked by the Lifting Cam A.

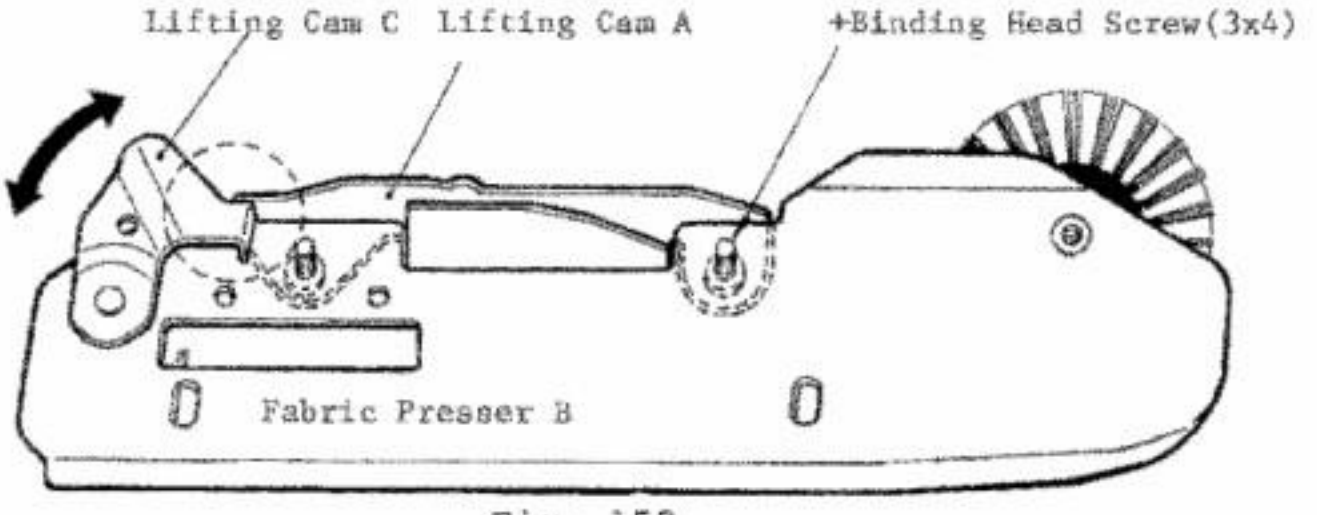


Fig. 158

[4] ADJUSTMENT OF EACH PART

4-1 PN,PS Adjustment of the Fabric Presser A

4-1-1 PN Adjustment of the Fabric Presser A

PN adjustment of the Fabric Presser A means the adjustment of contact amount of the Latch Needle.

(a) adjustment procedure and method

1) Set the Cam Lever and the Side Lever to "/\" and "●" mark respectively.

2) Push out one needle to B position at the centre (0) on the needle bed.

3) Adjust the up-and-down position of the Fabric Presser against the needle so as the Fabric Presser lifts up the needle as much as 0-0.3mm. measured at the front edge of the needle bed.

Note: If the needle is at the position of (A) or (B) at the time of measuring, the cut-off part of the needle comes on the front edge of the Fabric Presser, and accurate measurement can not be performed.

4) Adjustment shall be done by lifting up and lowering down the Fabric Presser A as for the other models.

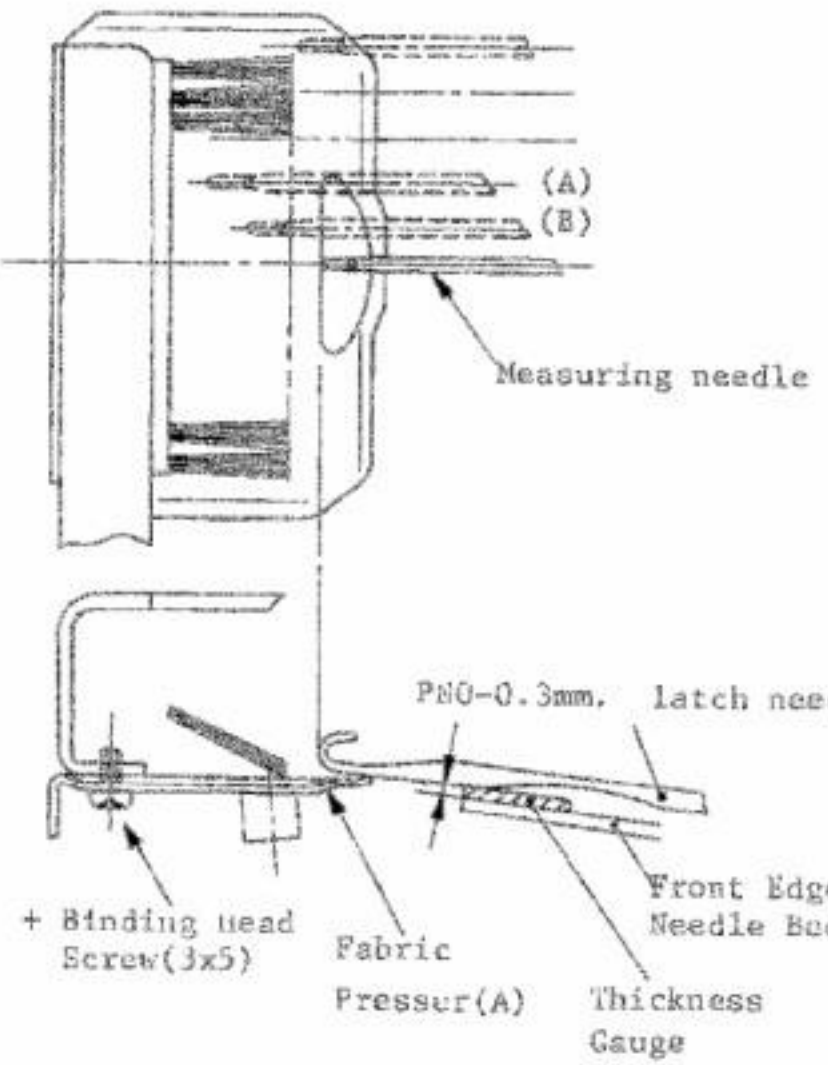


Fig. 159

(b) measurement

1) Placing the thickness gauge beneath the measuring needle, the state of the contact of the fabric presser A and the needle shall be visually checked.

Defective cases

1. The gap of PN becomes lessened.

Stitches tend to float and knitting sometimes becomes impossible. Or the edge stitches easily drop.

2. The gap of PN becomes large.

Operation of the Carriage becomes heavy and further the hook of the Latch Needle and the tip of the Fabric Presser hit together which makes the operation of the Carriage impossible.

Damages in the Centre Round Brush tend to occur which might lead to drop of stitches.

4-1-2 PS Adjustment of the Fabric Presser A

PS adjustment of the Fabric Presser A shall mean the adjustment of the gap between the Sinker Post and the edge of the Fabric Presser A.

*Required measurement: 1.0 ± 0.2m/m

(a) adjustment procedure and method

1) Return all the Latch Needles to A position.
2) Move the Carriage to the center of the Needle Bed.
3) Remove the center Round Brush from the Fabric Presser A.
4) Loosen two + Bind Head Screws 3 x 5, move the Fabric Presser A back and forth, and adjust within the specified sizes. (Fig.160)
5) Fix the Center Round Brush to the Fabric Presser.

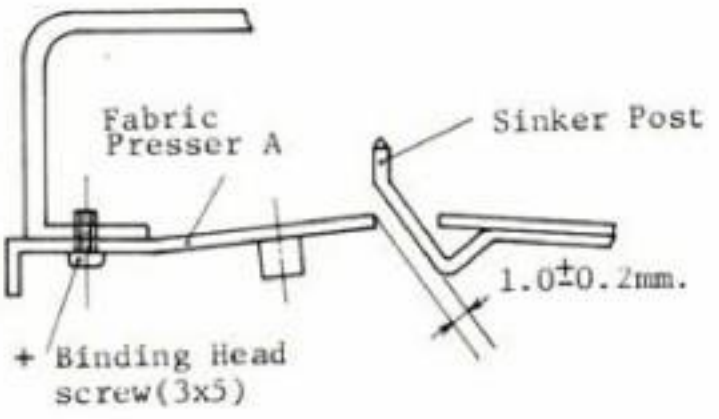


Fig. 160

(b) measurement

Using the thickness gauge, perform in the same manner as for the other models.

Defective cases

1. PS size is too wide.

Stitches tend to be loosened and missing stitch or knitting fault may occur.

2. PS size is too narrow.

Damage in the Center Round Brush tends to occur which might lead to the missing stitch.

4-2 PN,PS Adjustmnet of Fabric Presser B (R/L)

4-2-1 PN Adjustment of Fabric Presser B (R/L)

PN adjustment of the Fabric Presser B (R/L) shall mean the adjustment in contact amount of the Fabric Presser B (R/L) against the Latch Needle.

*Required measurement: PN=0-0.3m/m

a) adjustment procedure and method

1) Place "3" Latch Needles around the center of the Needle Bed on B position.
2) Set the Cam Lever and the Side Lever to "/\" and ● mark respectively
3) Insert a N.P. Card (Non-Perforated Card) into the Pattern Panel and memorize it on the Drums.
4) Set the Cam Lever and the Side Lever to "/\" and ▲ mark respectively.
5) Stop the Carriage when those three needles come to the place where the edge of the Fabric Presser B is parallel to the Sinker

Posts as in Fig. 161.
Adjust the PN clearance within the specified measurement.

6) Adjustment shall be done by lifting up and lowering down the Fabric Presser B in the same manner as for the other models.

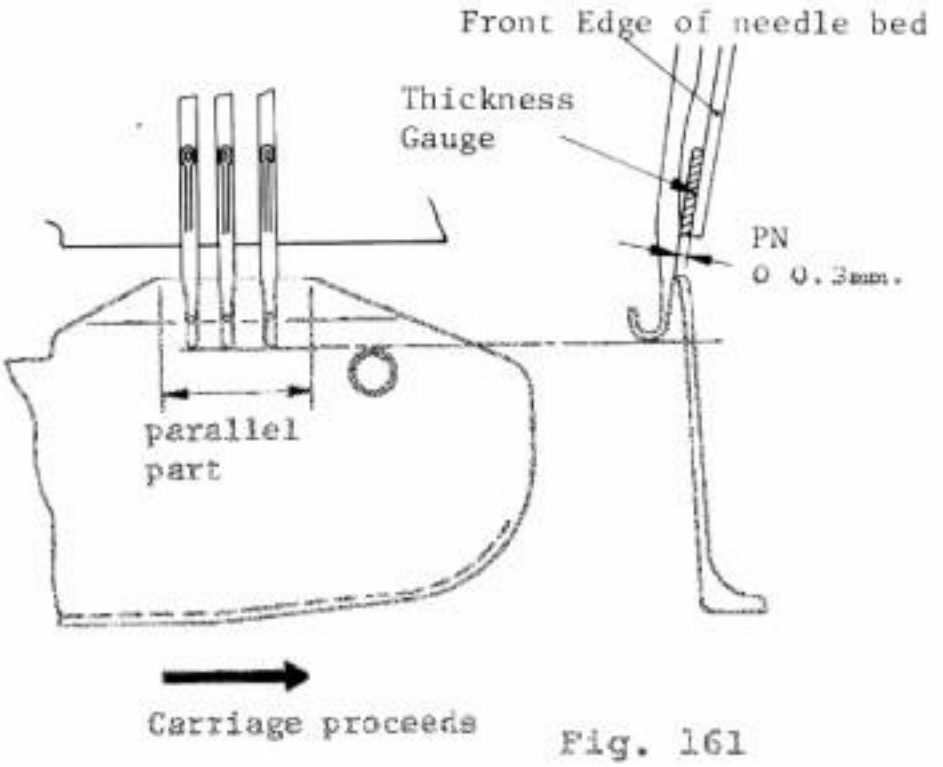


Fig. 161

(b) measurement

Placing the thickness gauge beneath the measuring needle, the state of the contact of the Fabric Presser B and the Needle shall be visually checked.

(c) cautions

Refer to "page 109" when PN adjustment of the Fabric Presser B (R/L) has been done.

Defective cases

1. Lifting up of the needle is too small.

* Crossing of the "A" needle over the Sinker Post tends to be carried out incorrectly.
°This is because the height of the Return Cam becomes low against that of the Sinker Needle (at the same time, the position of "A" needle become low) and there becomes no gap between "A" needle and the Sinker Post by which they come into contact each other.

"A" needle: comes forward
"B" needle: retreats backward

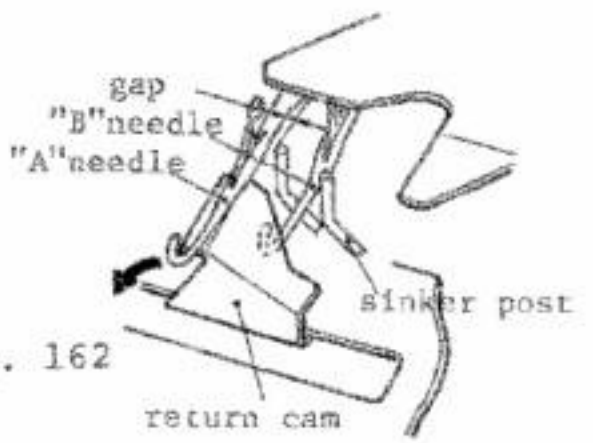


Fig. 162

* The bending amount of "A" needle which has been lifted up by the Lifting Cam "A" becomes small and "B" needle and "A" needle cannot overlap each other which might cause a failure in transferring a stitch.
----- refer to "adjustment of the Bend Cam", page 119.

* Since the height of "A" needle against the loop guide height

becomes low, "A" needle's latch tends to go under the Loop Guide which may cause a failure in transferring stitch.
----- refer to "adjustment of loop guide", page 113 .

2. Lifting up of the needle is too large.

* Carriage operation becomes heavy.
* Bending amount of "A" needle by the bend cam gets large and the needle tends to be bent. In the worst case, "A" needle becomes unmovable from the bend cam and carriage operation is stopped.
----- refer to "adjustment of the bend cam, page 116 .
* Since the height of the return cam becomes large, return timing of the needle becomes incorrect.
----- refer to "adjustment of return cam, page 119 .

4-2-2 PS Adjustment of Fabric Presser B (R/L)

PS adjustment of Fabric Presser B (R/L) shall mean the adjustment of gap between the Fabric Presser B and the Sinker Post.

*Required measurment
1) Clearance between the Sinker Posts and Lifting Cam C:
PS = 0.8 ± 0.2 mm.
2) Clearance between the Sinker Posts and parallel part of the Fabric Presser B:
PS = 1.0 ± 0.2 mm.

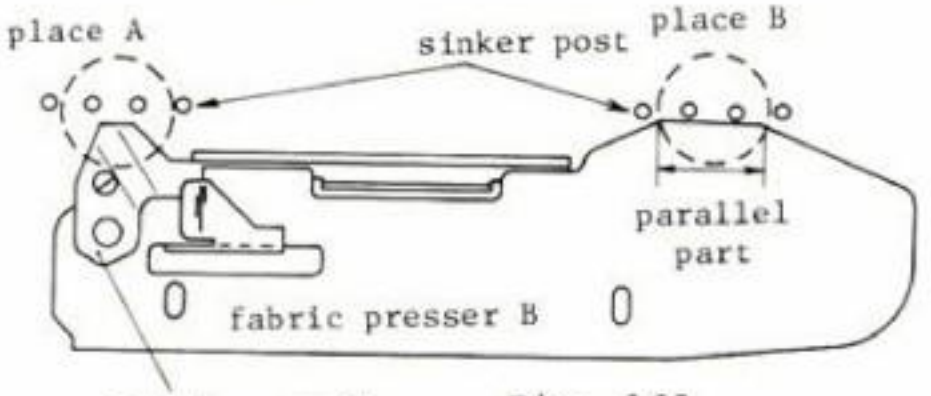


Fig. 163

(a) adjustment procedure and method

1) Return all the Latch Needles to A position
2) Move the Carriage to the center of the Needle Bed.
3) Remove the Center Round Brush from the Fabric Presser B.
4) Loosen two ⊕ Bind Head Screws 3 x 5, move the Fabric Presser B back and forth, and adjust within the specified measurement. (Fig. 164), (Fig. 165)
5) Fix the Center Round Brush.

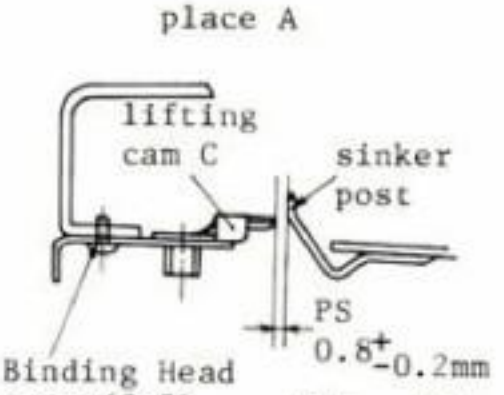


Fig. 164

(b) checking method

Use the thickness gauge.

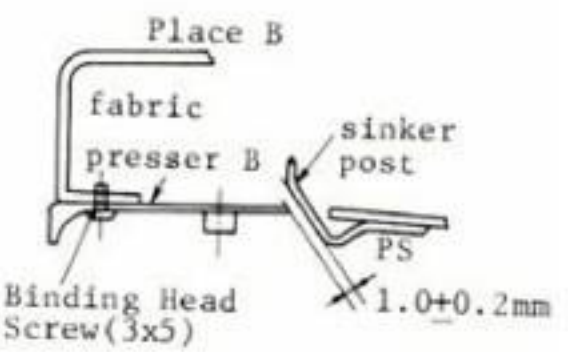


Fig. 165

(c) cautions

When either PN or PS adjustment has been performed for the Fabric Presser B (R/L), be sure to check the following items as in the order.

* Up and down adjustment of the Lifting Cam A ----- refer to P.110
* **Back/Forth & Right/Left adjustment for Loop Guide** refer to P.113
* Up and down adjustment of the Bend Cam ---------- refer to P.117
* Right and left adjustment of the Bend Cam ------- refer to P.117
* Adjustment of the Return Cam -------------------- refer to P.119
* Checking by a trial knitting (Using the Punch Card No.L-6, perform lacework on Stitch Dial 6 with medium yarn.)

Defective cases

1. **The clearance is too wide.**

* "B" needle tends to fall down from the Lifting Cam A which makes the Carriage operation unable. Also, "A" needle latch tends to go under the loop guide, which may cause a failure in transferring stitches or the stitch to drop.
* The position of "A" needle become as low as to touch the Sinker Post, and its bending amount is insufficient to cause the stitches to drop.
  ----- refer to up and down adjustment of Lifting Cam A, P.110

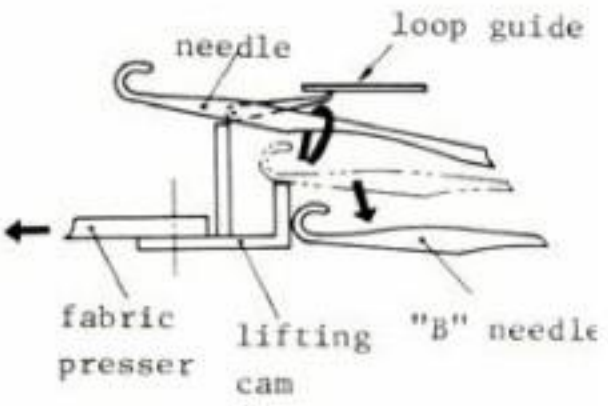


Fig. 166

* Because of a low position of the Return Cam, "A" needle and Sinker Needle come into contact, by which "A" needle becomes unable to return and tend to overlap with "B" needle, causing the stitch to drop.
  ("Return" means that "A" needle is returned to its original position by the Return Cam, after crossing over the Sinker Post.)
  ---- refer to adjustment of the Return Cam, Page 119

2. **The clearance is too narrow.**

Because of the change in position of the Lifting Cam A, falling time of "A" needle gets early and "A" needle cannot overlap with "B" needle, leading to dropping stitch.
(cause the same problem as in insufficient bending amount of "A" needle by the Bend Cam--insufficient bending.)

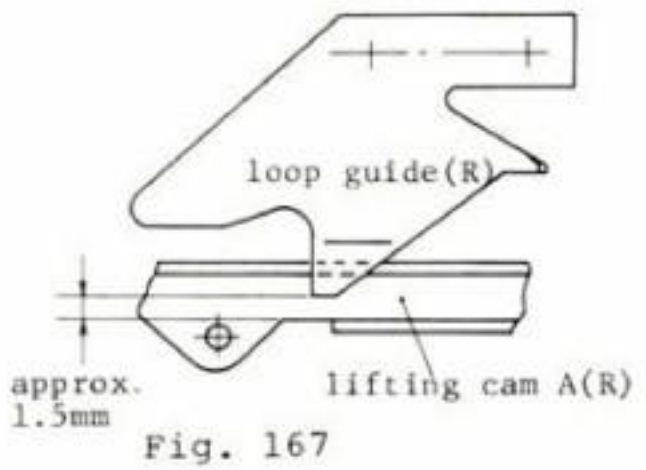


Fig. 167

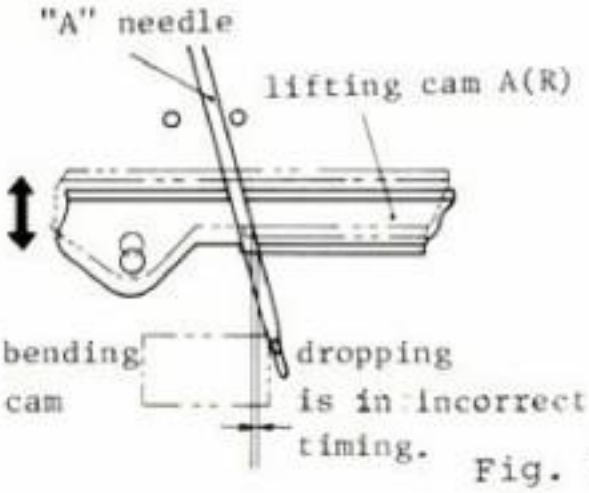


Fig. 168

"Bending Amount" means the degree of bending at the tip of the hook by the Bending Cam compared with that at the time no power is applied to the latch needle ("A" needle).

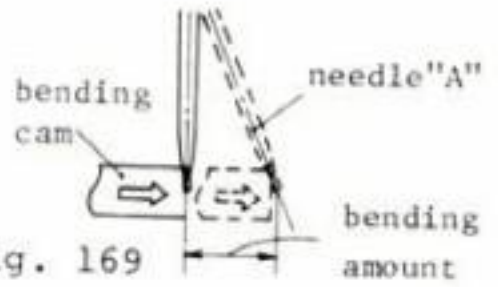


Fig. 169

4-3 Up and Down Adjustment of Lifting Cam A

* Up and down adjustment of the Lifting Cam means the gap adjustments between the Sinker Post and the "A" needle, and between the "A" needle and the "B" needle.

*Required mesurement

(A) gap between Sinker Post and the "A" needle 0.2-0.8mm.
(B) gap between the "A" needle and the "B" needle: approx. 0.2mm.

(a) adjustment procedure and method

1) Place ten Latch Needles around the center of the Needle Bed on B position.
2) Set the Cam Lever to "∧" mark, and the Side Levers to "●" markrespectively.
3) Insert a No.L-6 Punch Card into the Pattern.
4) Set the Cam Lever to "∧" mark and the Side Levers to "▲" mark respectively.
5) Place the Carriage at the end of the Needle Bed and remove two + binding head screws (2x3) to take off the loop guide (Fig. 171).

*1: gap between the Sinker Needle and "A" needle

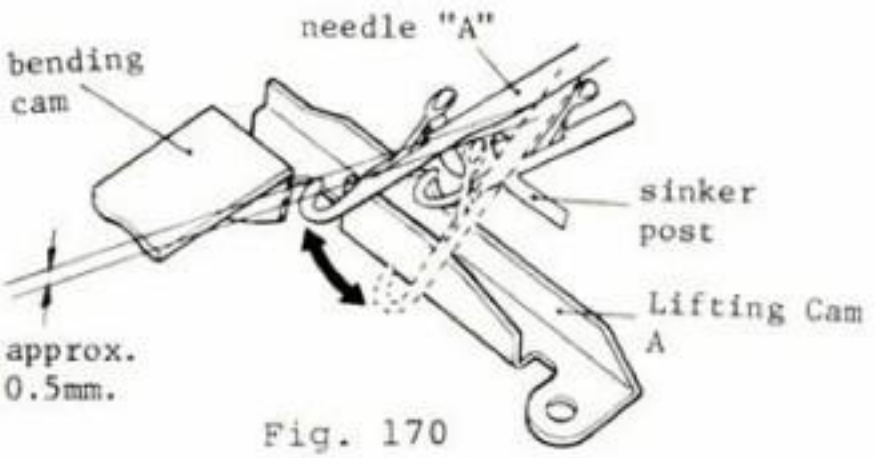


Fig. 170

*2: gap between "A" needle and "B" needle

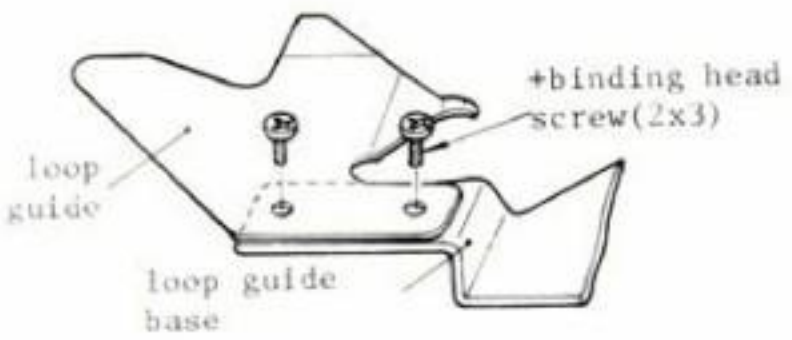


Fig. 171

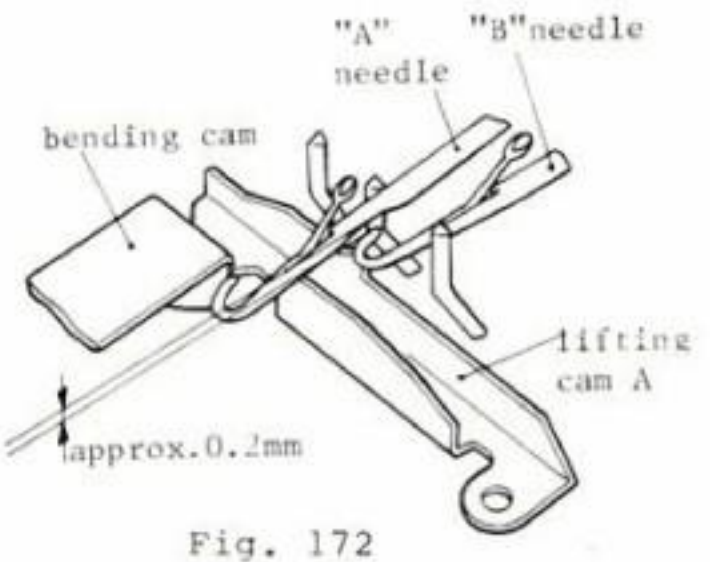


Fig. 172

6) Stop the Carriage immediately before the position where the "A" needle touches the Bending Cam, bend the "A" needle with your finger till the needle comes right above the Sinker Post, and check the gap between them visually. Also ensure that the "A" needle moves to right and left without any interference.

note) Be sure to keep the latch of "A" needle open.

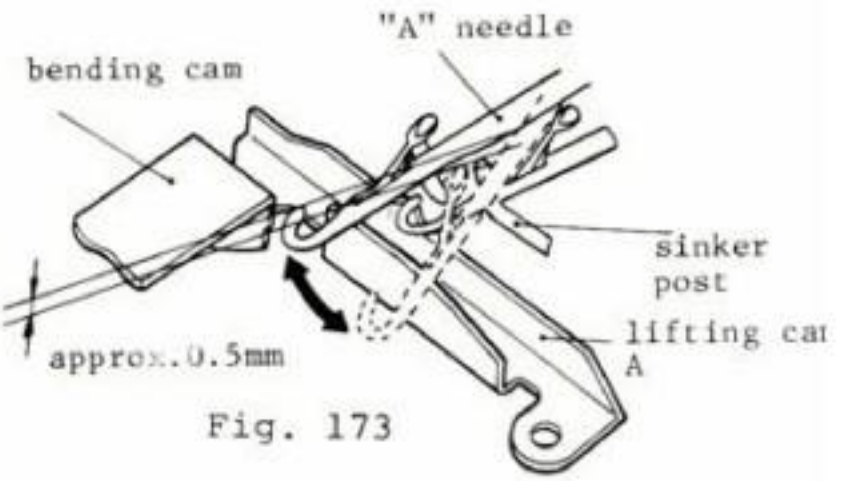


Fig. 173

7) Moving the Carriage again and stopping it where "A" needle comes right above "B" needle by the Bend Cam, check the gap by lifting up and lowering down with the use of a minus screwdriver on the bottom part of "B" needle as shown in Fig.174
* (A slight move will be sufficient.)

note) Be sure to keep the latch of "A" needle open.

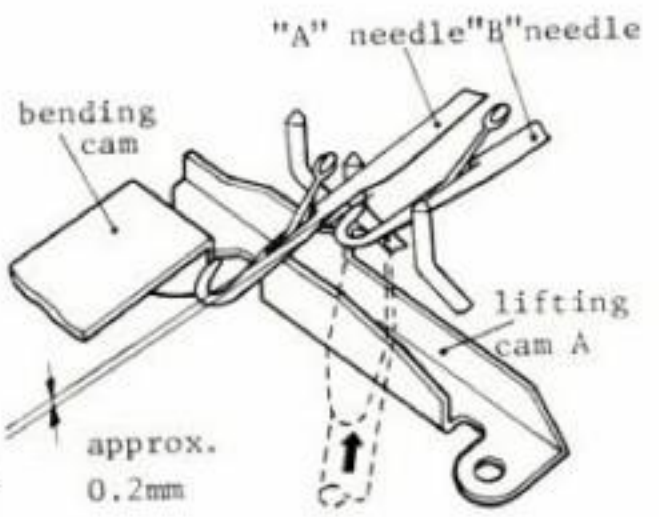


Fig. 174

8) Adjustment will be done by inserting an appropriate plain washer between the Lifting Cam A and the Fabric Presser B.

types of plain washers

type of washer

	d	D	t
(1)	3	8	0.2mm
(2)	3	8	0.5mm
(3)	3	8	0.8mm

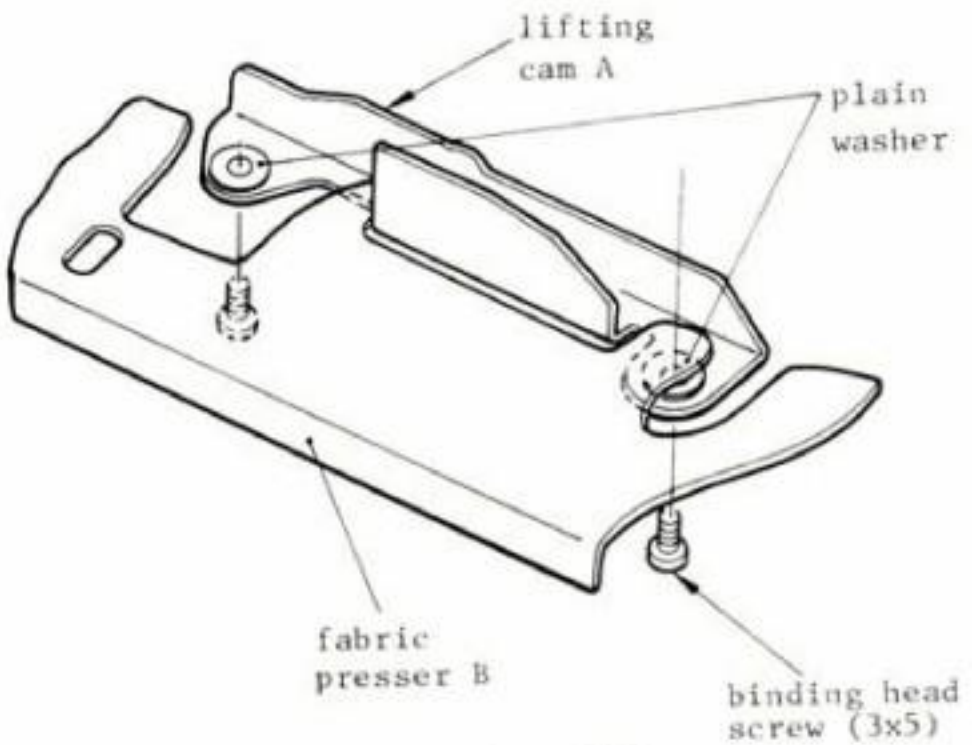


Fig. 175

*3: Cares to be taken in the adjustment

° In case there is too a wide gap taken between "A" needle and Sinker Needle, the gap between "A" needle and "B" needle becomes too narrow. So, select the appropriate plain washer carefully.

When the Lifting Cam "A" is positioned too high(the washer is thinner than required), the "A" needle is disturbed by the needle retainer strongly and to be bent, while the "B" needle stays relatively higher; which causes the hooks of both needles to contact each other. (Fig.177)

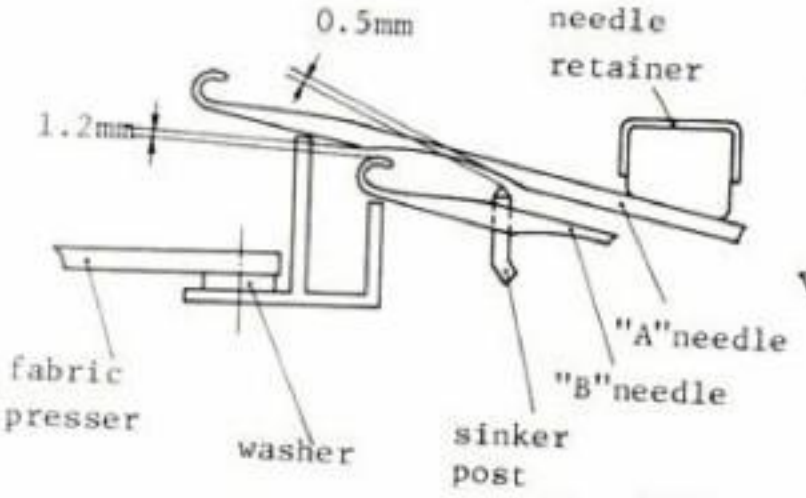


Fig. 176

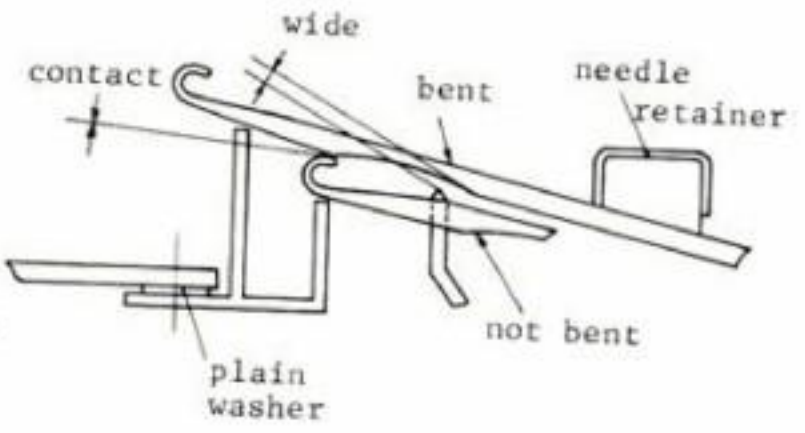


Fig. 177

(b) measurement

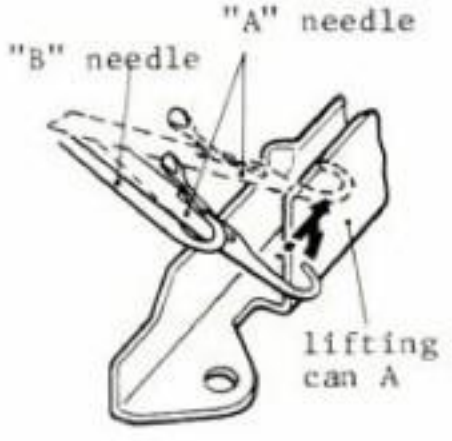
1) Gap between the "A" needle and the Sinker Post (Approx. 0.5mm)
2) Gap between the "A" needle and the the hook of the "B" needle (approx 0.3mm.)

1) and 2) should be checked functionally whether there is so much a gap as not to touch each other.

Defective cases

1. "A" needle comes in contact with the Sinker Needle tightly.

Since "A" needle is blocked by the Sinker Post bending becomes insufficient and "A" needle cannot overlap "B" needle which may cause the stitch to drop or a failure in transferring stitches.

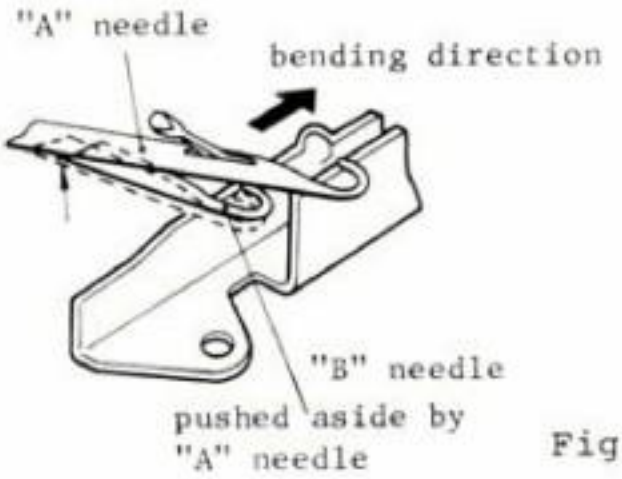


correct Fig. 178

incorrect Fig. 179

2. The "A" needle comes in contact with the hook of the "B" needle tightly.

Since the "B" needle is drawn toward the "A" needle by the Bending Cam, insufficient bending is resulted and which may cause the stitches to drop of a failure in transferring stitches.



----- correct position
——— incorrect position

Fig. 180

4-4 Adjustment of Loop Guide

4-4-1 Back and Forth, and Right and Left Adjustments of the Loop Guide

Back and forth, and right and left adjustments of the loop guide shall mean the adjustments of gaps on back and forth, and right and left positions of the loop guide against the Lifting Cam A; which shall be done by moving the loop guide base.

Required measurement

Back & Forth measurement of loop guide (a): 1.2-1.8mm

Right & Left measurement of loop guide (b): slightly wider than 1/2 of the width of the loop guide tip. (about 1.5mm)

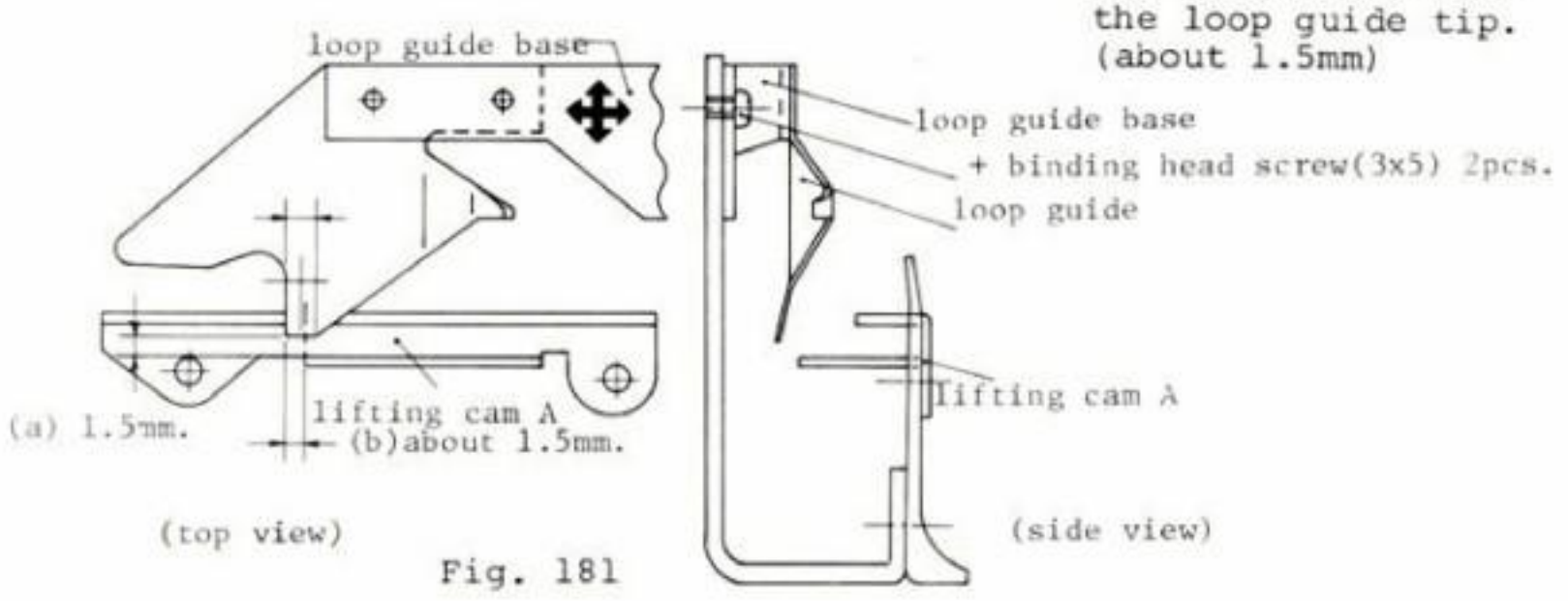


Fig. 181

(a) adjusting procedure and method

1) Return all the latch needles to the position A.
2) Move the Carriage as much as the Carriage Pipe is not slipped out of the Rail Bar.
3) Loosen two + binding head screws 3x5 which fasten the Loop Guide Base, and move the Loop Guide Base back and forth and right and left to adjust within the specified measurement.

4) Back and forth measurement shall be adjusted by using the thickness gauge, while right nad left measurement shall be adjusted to the measurement slightly wider than 1/2 of the width of the Loop Guide.

(b) checking method

1) Back and forth measurement: (a) use of a thickness gauge
2) right and left measurement: (b) visual check

Defective cases

1. If the adjusted measurement is too narrow.

* When casting on with the Stitch Dial (6-8), the "A" needle tends to touch the Sinker Post which can cause the stitches to drop or failure in transferring stitches.

In case the measurement at the positions "a" and "b" as indicated in the right figure are narrow, the Loop Guide touches the "A" needle loop immediately after the "A" needle starts to advance when the "A" needle loop is inside the Sinker Post where it may be pushed inside the Sinker Posts. (caught on the Sinker Post.)

If the "A" needle slips off from the Bending Cam in this state, the receiving needle of the loop ("B" needle) cannot come into the loop of the "A" needle and...

(a) dropping stitch
(b) failure in transferring stitch
(c) stitches caught in the Sinker Post may be caused.

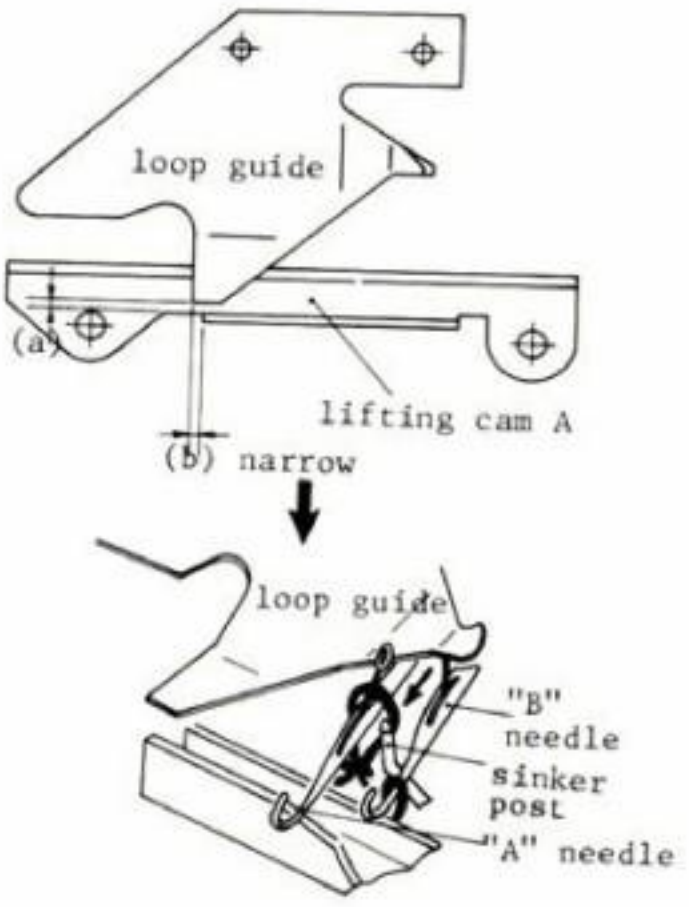


Fig. 182

* If the measurement at "a" becomes less than zero, "A" needle loop cannot be held until it comes off from the Bend Cam and dropping stitches tend to occur.

2. Adjusted measurement is too wide.

* Since the position of the Loop Guide does not match the locus of the latch, the latch tends to get underneath the Loop Guide, which leads to dropping stitches or failure of transferring stitches.

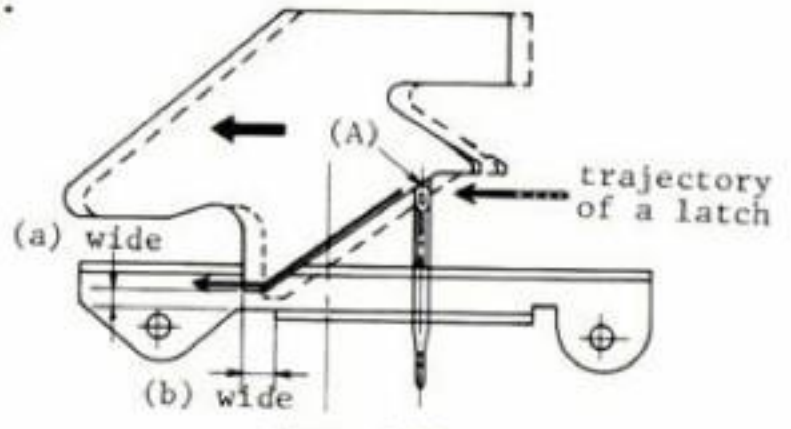


Fig. 183

4-4-2 Adjustment of the Gap between Loop Guide and Latch Needle

Adjustment of the gap between the Loop Guide and the Latch Needle means the adjustment of the height of the Loop Guide against the top surface of "A" needle stem.

*Required measurement
A_1 needle and the Loop Guide: touch lightly
A_2 needle and Loop Guide: approx. 0.1 - 0.5m/m

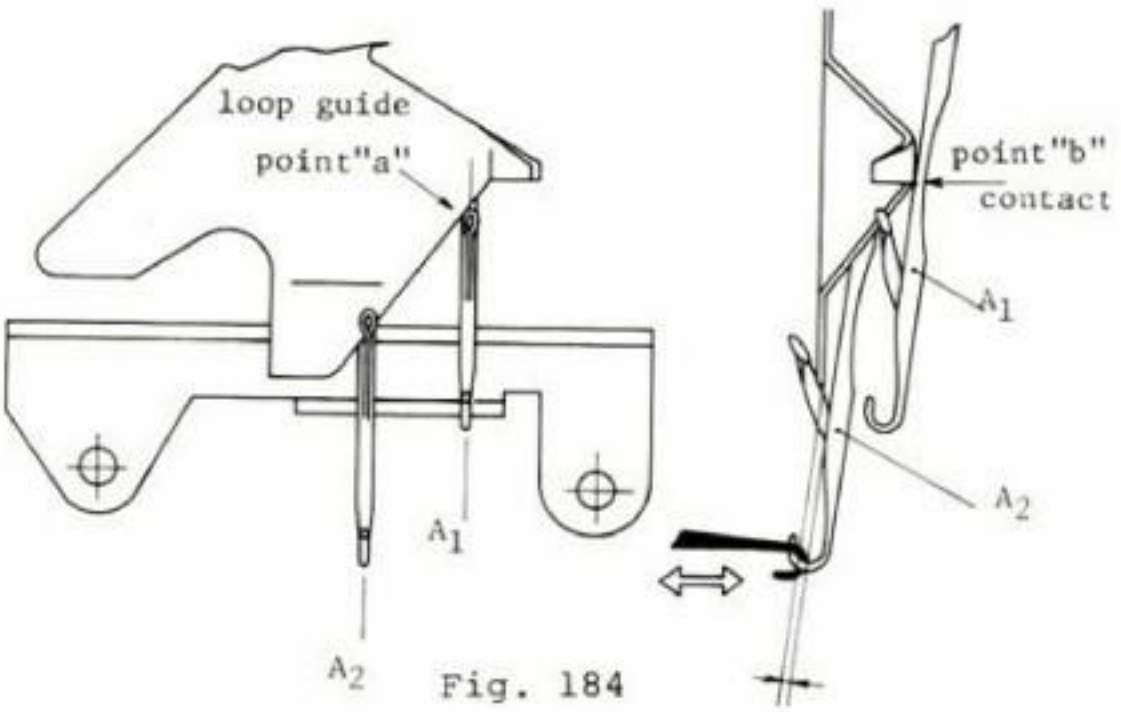


Fig. 184

(a) adjustment procedure and method

1) Align (40 - 50) Latch Needles around the center of the Needle Bed on B position.
2) **Set the Cam Lever to the "∧" mark and the Side Levers to the "●" marks respectively.**
3) Insert a No.L-6 Punch Card into the Pattern Panel Slit.
4) **Set the Cam Lever to the "∧" mark and the Side Levers to the "●" marks respectively.**
5) Move the Carriage and stop it where the latch of A_1 needle comes near touching the Loop Guide as in Fig.
6) At that time, the stem of A_1 needle and the Loop Guide shall be in contact and there shall be a slight gap (approx. 0.1 - 0.5m/m) betweem A_2 needle and the Loop Guide.

((The latch of "A" needle shall rides steadily on the Loop Guide.)

note) Be sure to keep the latch of "A" needle open before it touches the Bend Cam.

(Method)

1. gap adjustment between A_2 needle and the Loop Guide

adjustment: It shall be performed by bending the tip of the Loop Guide upwardly or downwardly as in the figure by using a minus screw driver etc., as it is installed in the Arm.

* Gap shall be so much as they do not touch each other. (0.1 - 0.5)

measurement: Measure functionally the gap by lifting up or lowering down the Latch Needle which is hooked on A_2 needle.

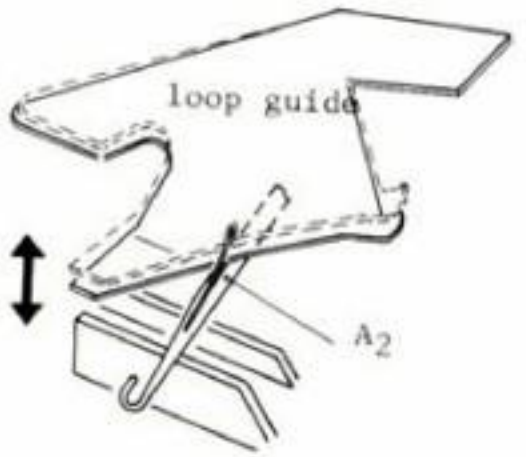


Fig. 185

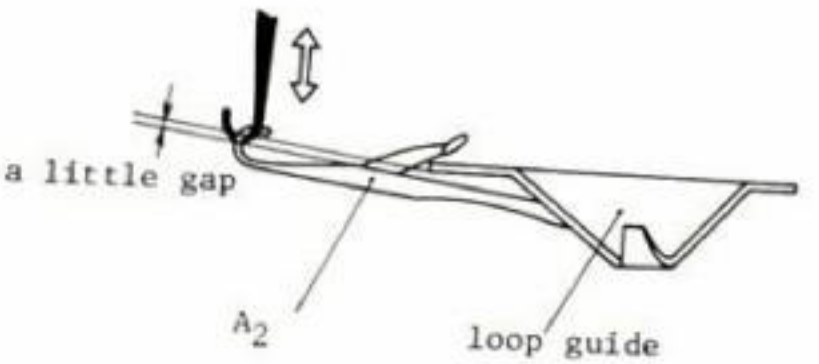


Fig. 186

2. gap adjustment between A_1 needle and the Loop Guide

adjustment: As in Fig.187, perform the adjustment by removing the Loop Guide and bending it little by little by hand.

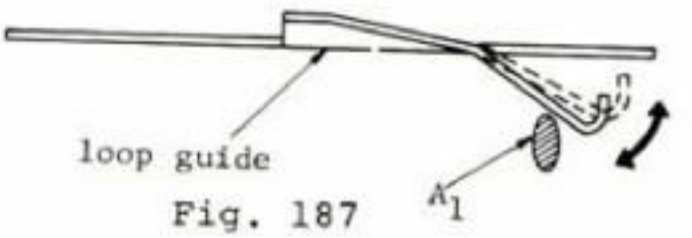


Fig. 187

* It shall touch the stem lightly and get the latch of A_1 needle steadily.

Measurement: Measure functionally the gap between the Loop Guide and the A_1 needle by moving the needle up and down, using the hook of other needle.

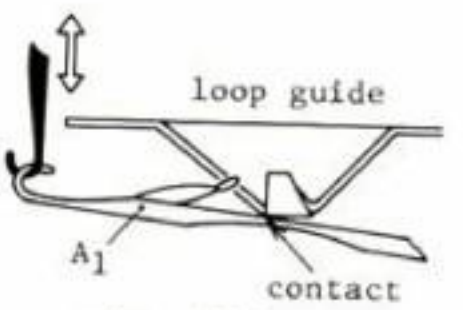


Fig. 188

Defective cases

1. A_2 needle and the Loop Guide do not touch steadily.

* Since the Loop Guide is lifted up by A_2 needle, the latch of A_1 needle tends to go under the Loop Guide, which may cause the stitch to drop or failure in transferring stitches.

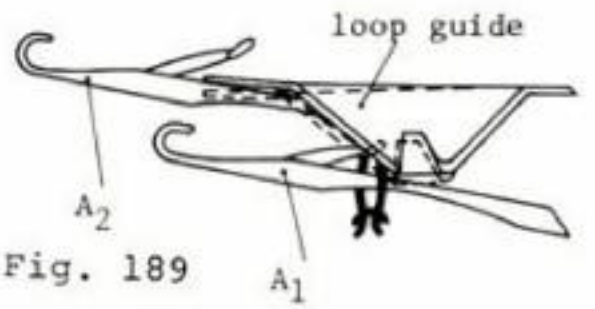


Fig. 189

2. There is a large gap between A_1 needle and the Loop Guide.

* As in the case 1, the latch of A_1 needle tends to go under Loop Guide.

4-5 Adjustment of Bend Cam

Adjustment of the Bending Cam shall mean the adjustment of bending amount, by the Bending Cam, of the "A" needle against the "B" needle and also the adjustment of timing that the "A" needle overlaps the "B" needle.

4-5-1 Up and Down Adjustment of the Bend Cam

Up and down adjustment of the Beinding Cam shall mean the gap adjustment in upward and downward direction of the Bending Cam against the "A" needle.

*Required measurement: 0.3 - 0.6mm.

(a) adjustment procedure and method

1) Align (40 - 50) Latch Needle around the center of the Needle Bed on B position.
2) Set the Cam Lever to "Λ" mark and the Side Levers to "●" marks respectively.
3) Insert a No.L-6 Punch Card into the Pattern Panel Slit.
4) Set the Cam Lever to "Λ" mark and the Side Levers to "▲" mark respectively.
5) Move the Carriage and stop it where an arbitrary "A" needle touches the notch at the edge of Bend Cam.

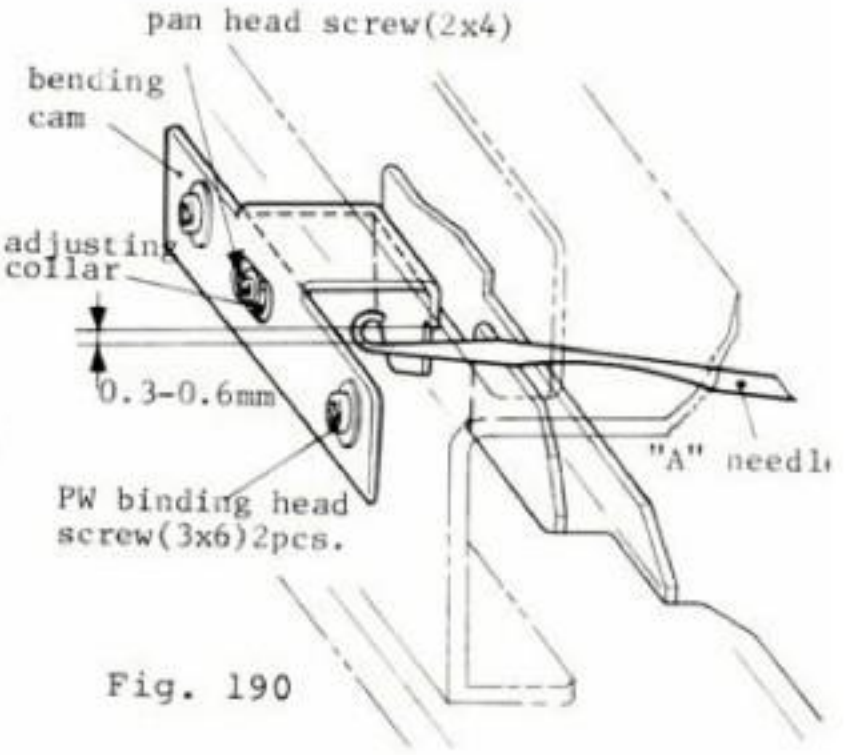


Fig. 190

note) Be sure to open the latch of "A" needle.

6) Loosen two + PW Bind Head Screws 3 x 6 and one + Pan Head Screw 2 x 4.
7) Adjust within the specified measurement by turning the Bending Cam Adjsuting Collar using the special tool.

4-5-2 Right and Left Adjustment of the Bend Cam

Right and left adjustment of the Bending Cam shall mean the adjustment of the bending amount of the "A" needle, by the Bending Cam, against the "B " needle.
* Required measurement: approx. 0.7 mm.

(a) adjustment procedure and method

1) Align (40 - 50) Latch Needles around the center of the Needle Bed on B position.
2) Set the Cam Lever to "Λ" mark and the Side Levers to "●" marks respectively.
3) Insert a No.L-6 Punch Card into the Pattern Panel Slit.
4) Set the Cam Lever to "Λ" mark and the Side Levers to "▲" mark respectively.
5) Move the Carriage and adjust with a Bend Cam adjusting tool

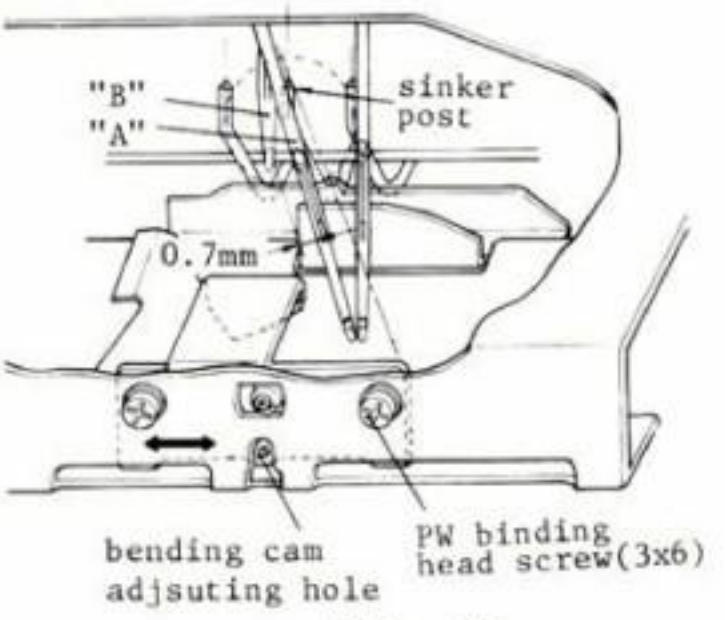


Fig. 191

when the bending amount of "A" needle by the Bend Cam against "B" needle gets as in Fig.192 (the gap between "A" needle and "B" needle 0.7), by loosening two + PW Bind head Screws 3 x 6 so that A needle comes off from the Bend cam and overlaps with "B" needle.

note) Be sure to keep the "A" needle latch open.

6) Adjustment shall be performed so that there will be approx. 0.7m/m of the gap between the hook of "B" needle and "A" needle and that it does not come off from the center of the Sinker Needle.

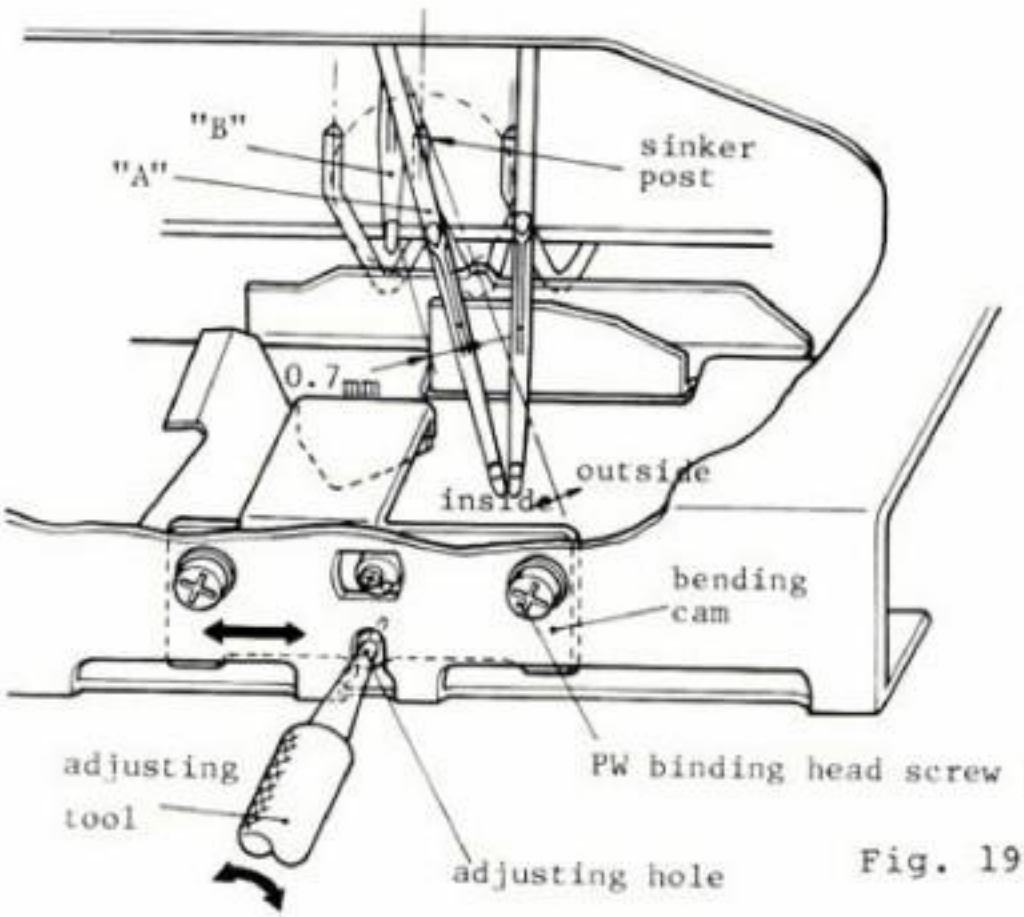


Fig. 192

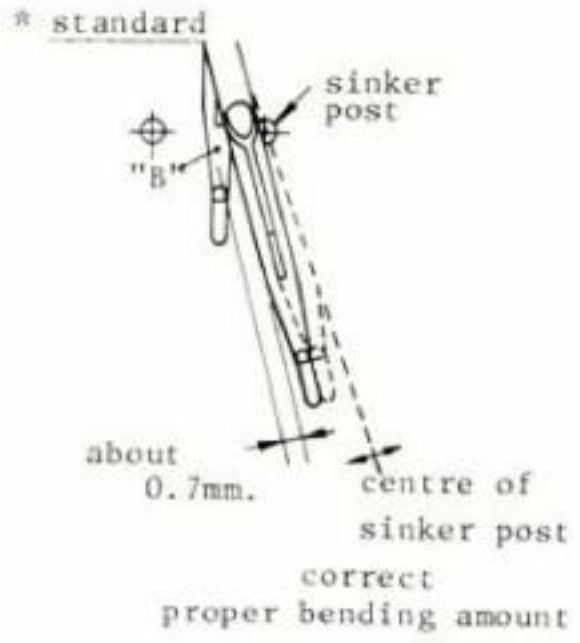


Fig. 193

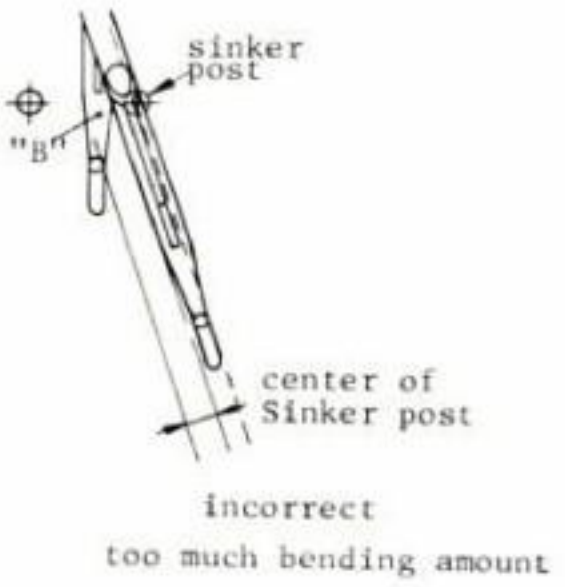


Fig. 194

(b) measurement

Perfrom the measurement by using the hook of the Latch Needle (0.7m/m)

Defective cases

1. Too small the bending amount

* "A" needle cannot overlap "B" needle and dropping stitches or failure of transferring stitches may be resulted.

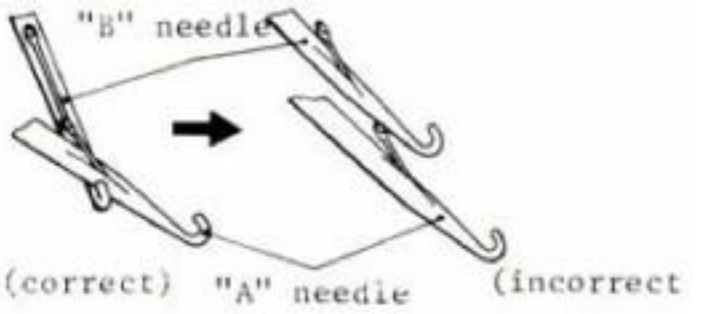


Fig. 195

2. Too large the bending amount

* Since the needle is bent far more than necessary, the needle gets a bend.

* Since the "A" needle comes to hit the Bending Cam rather strongly, the latch groove is damaged and causes improper function of the latch.

* Especially, the up and down gap between the Bending Cam and the "A" needle is exessively narrow, the needle will be stuck on the Bending Cam and the operation of the Carriage will be impossible.

Fig. 196

4-6 Adjustment of Return Cam

The adjustment of the Return Cam shall mean the adjustment of gap between the "A" needle and the Sinker Post at the time of returning.

*Required measurement: 0.2 - 0.8m/m

(a) adjustment procedure and method

1) Align about ten latch needles around the center of the Needle Bed on B position.

2) Set the Cam Lever to the "∧" mark and the Side Levers to "●" mark respectively.

3) Insert a No.L-6 Punch Card into the Pattern Panel Slit.

4) Set the Cam Lever to "∧" mark and the Side Levers to "▲" marks respectively.

5) Move the Carriage (while "A" needle latch shall be kept open just before the Bend Cam), and stop it when any "A" needle comes to slightly before the highest point of the Return Cam (Fig.197), hooking the Latch Needle etc. on "A" needle, moving it to the top, then check the gap.

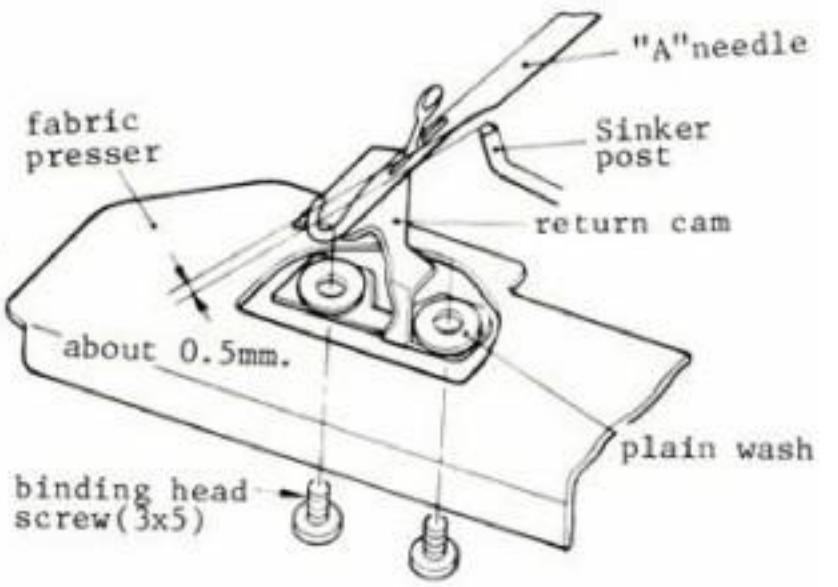


Fig. 197

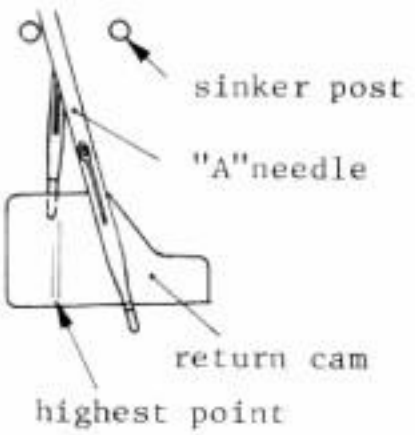


Fig. 198

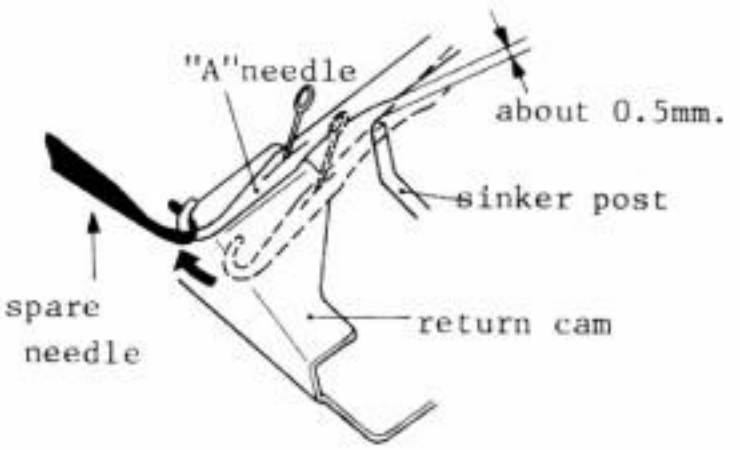
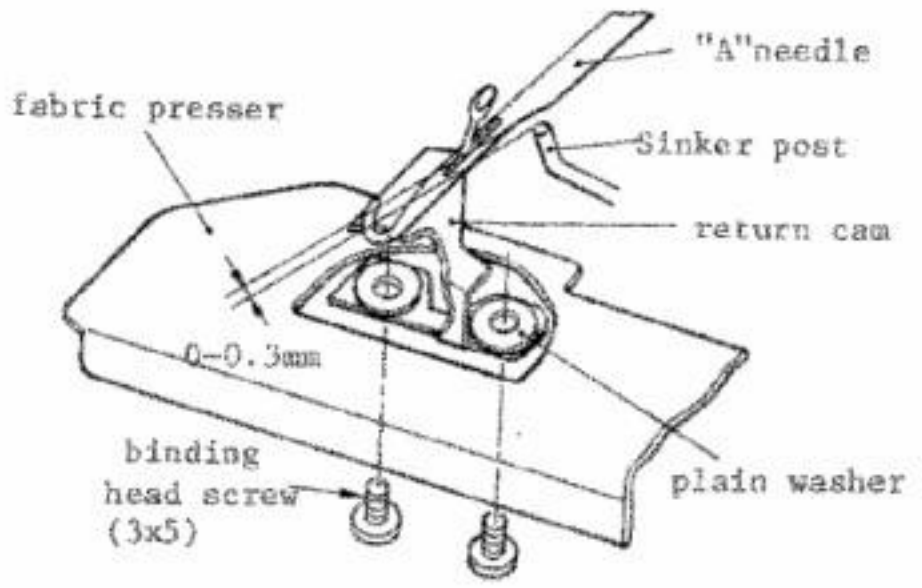


Fig. 199

6) Adjustment shall be done by loosening two Bind Head Screws 3 x 5 and inserting an appropriate washer between the Return Cam and the Fabric Presser B.

* The following three types of washers are available.



Defective case

Fig. 200

1. The "A" needle and the Sinker post hit each ther strongly

When the "A" needle returns, it stops at the top of the Sinker post, the loop on the "A" needle is drawn toward the Sinker post as the "B" needle retreats and at this time, the "A" needle returns causing the loop to caught on the Sinker Post.

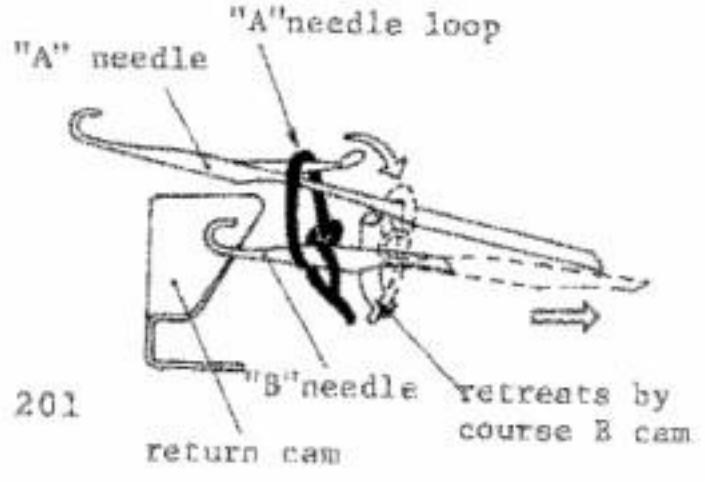


Fig. 201

4-7 Adjustment of Yarn Feeder

Yarn Feeder must roll to right and left smoothly on the Arm, and it must be place behind when the Carraige changes its direction since frictional resistance is given by the brush on the Yarn Feeder sliding along the Sinker Posts.

(a) adjustment procedure

1) Loosen two + Pan Head Screws 3 x 3.5 which fasten the yarn guide.
2) Check by slanting the Arm if the Yarn Feeder moves by its own weight with the minimum holding gap.

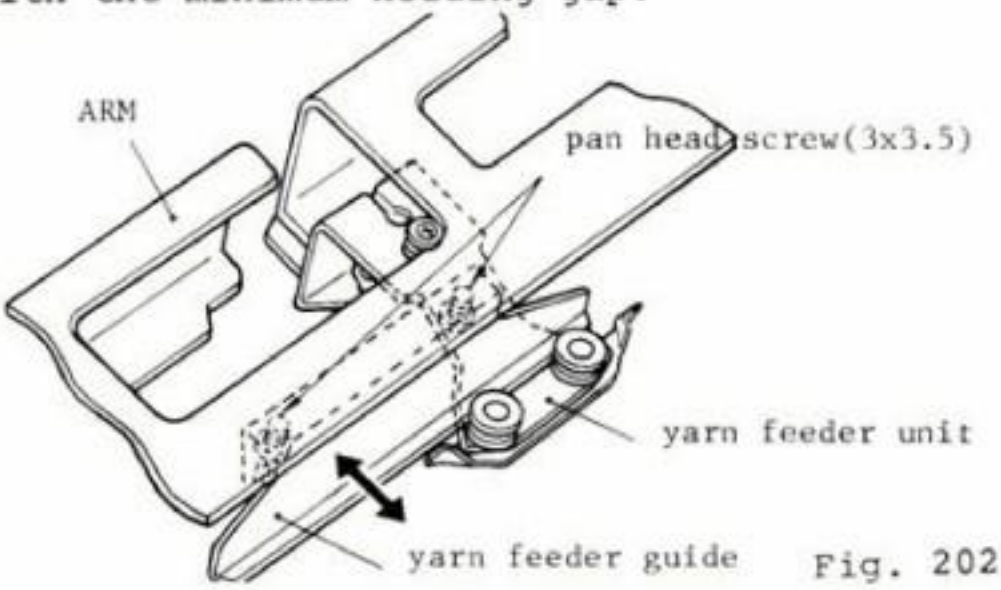


Fig. 202

3) Adjustment of the gap shall be done at two spots of both ends of the Yarn Feeder.

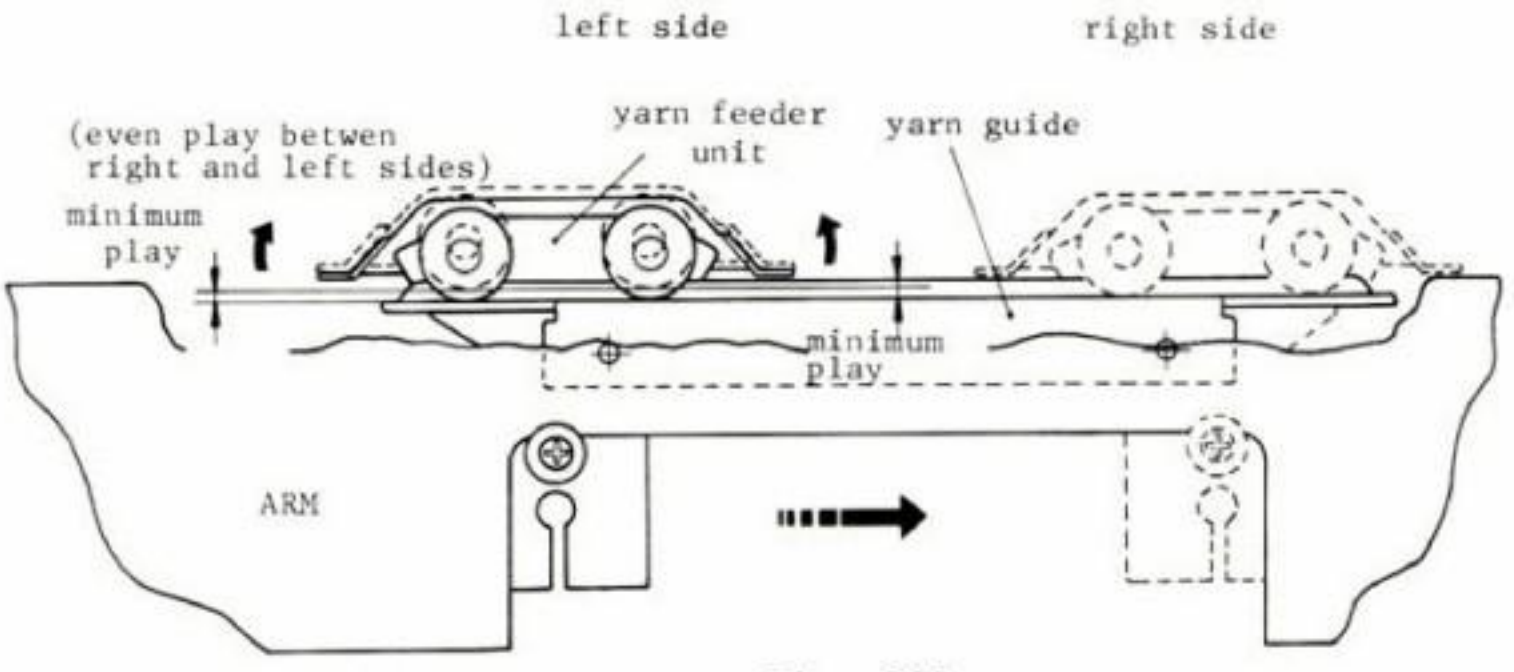


Fig. 203

Defective cases

1) If the movement of the Yarn Feeder is disturbed, or if it stops at the same position when the Carriage changes its direction, the yarn is fed to behind the latch of the needle causing drop of stitches.

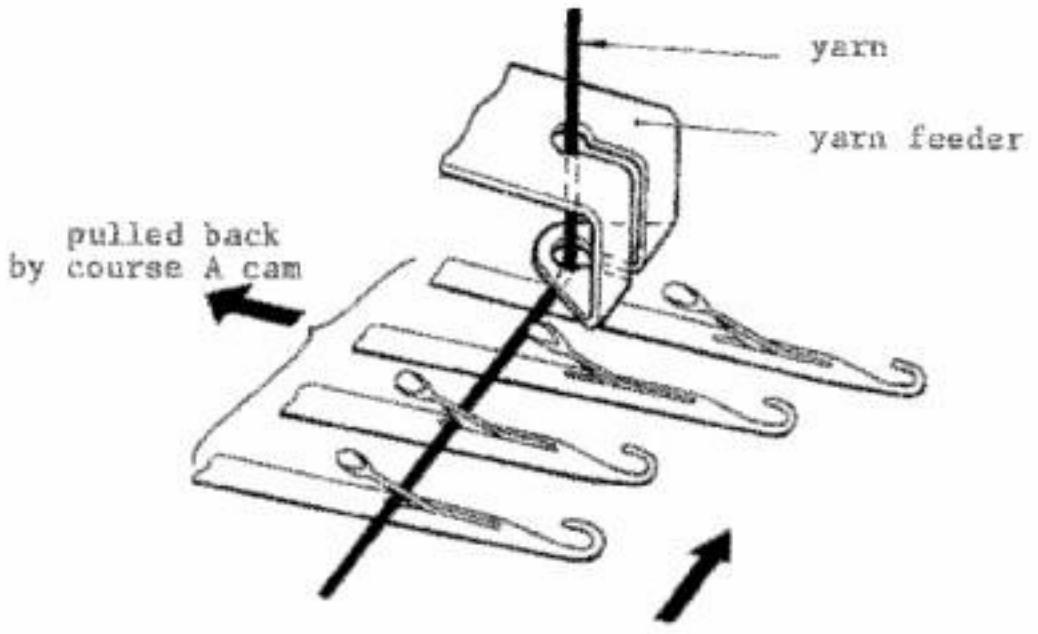


Fig. 204

2) If the Yarn Feeder stop at one side, the needles become ready for receiving the yarn after the Yarn Feeder passes over, resulting in drop of stitches.