

BERNINA

THE SETTING OF THE BERNINA SEWING MACHINES MODELS 730, 731, 732

**FRITZ BEGAUF LTD. BERNINA SEWING MACHINE FACTORY
STECKBORN/TG Switzerland**

I. Foreword

In the past years, sewing-machines have undergone an extremely rapid development and the expert is therefore frequently called upon to decide questions of a technical nature which he cannot answer without instructions.

The sewing-machine is one of the most important pieces of machinery in the world; and the BERNINA-Record 730 requires more knowledge than the straight or zigzag stitch machines. We have therefore decided to provide all dealers, mechanics and other persons engaged in the sale, repair, maintenance etc., with a manual, enabling them to acquaint themselves fully with the machine in all its details. The BERNINA-Record 730 is both a fully equipped zigzag sewing-machine with automatically guided needle, and a ornamental stitch machine, which

can easily be switched over to ornamental stitch gearing. It is therefore understandable, why we speak of two machines in one. The moments of both gear systems must be closely synchronized.

In the following explanatory notes we have endeavoured to explain everything in the simplest possible terms, and to supplement our explanations with suitable illustrations. Not only will this enable the future specialist to get to know this machine, but it will also be of a valuable assistance to the trained expert.

We hope that this manual will be of a real assistance to all BERNINA specialists and that it will facilitate their work and maintain the lead of the BERNINA sewing-machines.

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**FRITZ GEGAUF LTD., SEWING-MACHINE MANUFACTURERS,
STECKBORN TG / Switzerland**

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Model 730 BERNINA-Record

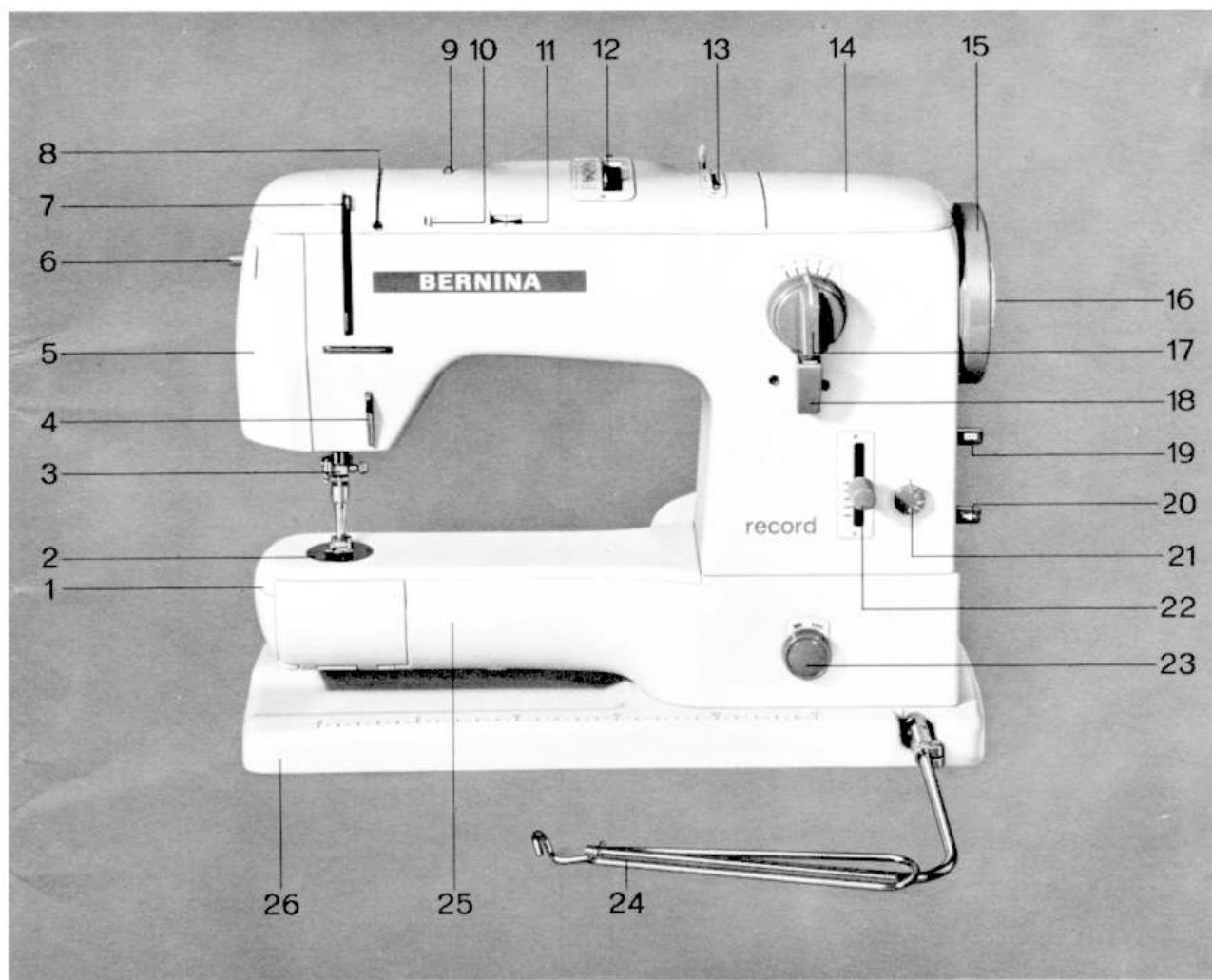


Fig. 1

Figure 1 shows a BERNINA Record Sewing-Machine, Model 730 (Knee operated). The controls referred to in the Operating Instructions can be identified on the following page.

Model 731 BERNINA

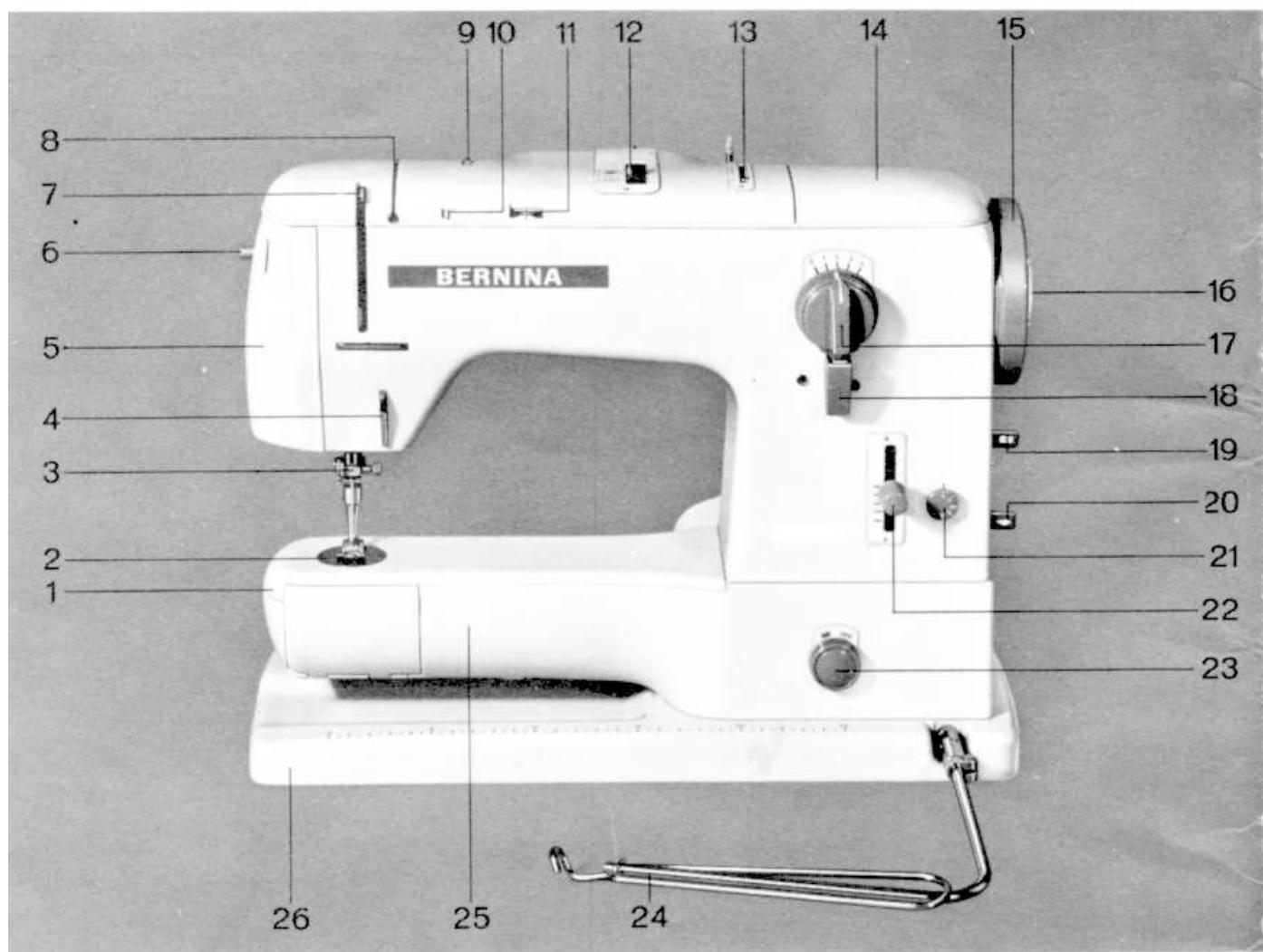


Fig. 2

- | | |
|-----------------------------------|------------------------------------------|
| 1 Open-arm cover plate | 6 Light switch |
| 2 Needle plate | 7 Take-up lever |
| 3 Needle holder | 8 Thread tension and guide |
| 4 Thread tension regulator | 9 Thread tension control disc |
| 5 Face plate | 10 Sight hole for tension control |

- 11** Sight hole for ornamental stitch control
- 12** Switch lever for ornamental stitch selection
- 13** Change lever for zigzag or ornamental stitch
- 14** Flap-plate covering spooling device
- 15** Handwheel
- 16** Handwheel release
- 17** Needle displacement lever LH. C. RH.
- 18** Plain stitch, zigzag and buttonhole sewing control knob
- 19** Push knob for buttonhole device
- 20** Button for satin stitch stop
- 21** Knob for adjusting closeness of stitches with buttonhole and satin stitch seams
- 22** Stitch length regulating lever
- 23** Drop feed knob
- 24** Knee control lever
- 25** Open arm
- 26** Bed plate

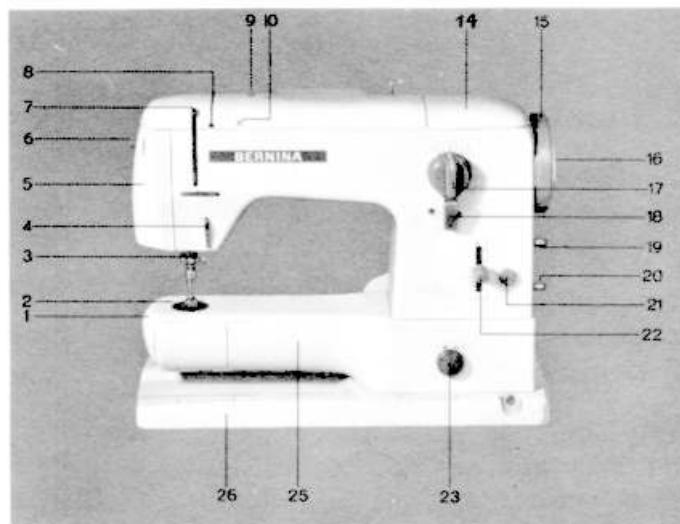
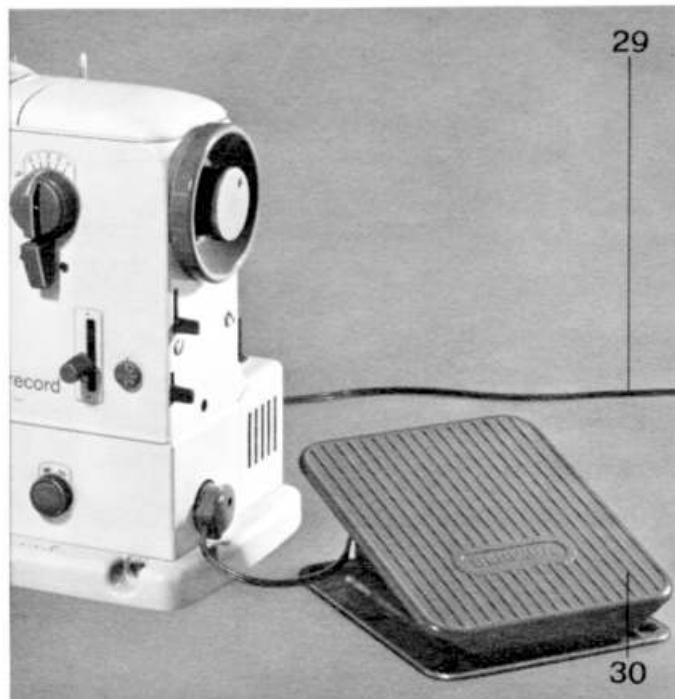


Fig. 3

Fig. 3 shows a BERNINA Sewing-Machine, Model 732 (Footstarter) whereon the controls referred to in the Operating Instructions are marked and identified.

Fig. 3 a



II. General

1. Description and important data

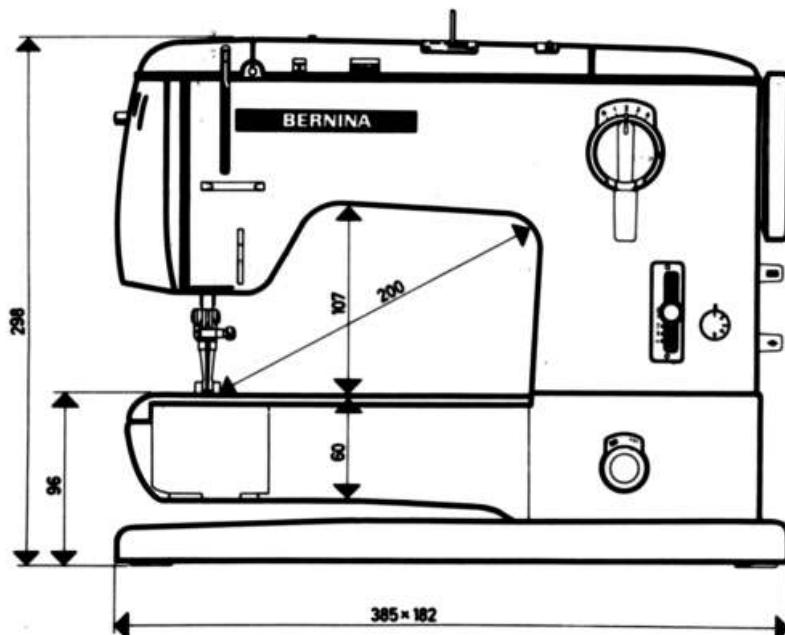
The BERNINA cl. 730 is a zigzag and ornamental stitch sewing-machine with 20 fixed cams. (Positive control).

The BERNINA cl. 731 is a zigzag and ornamental stitch sewing-machine with 4 fixed cams. (Positive control).

The BERNINA cl. 732 is a zigzag sewing machine with positive control of the lateral movement.

These 3 models have the following characteristics in common:

- Central bobbin case
- Oscillating needle holder
- Articulated take-up lever
- Zigzag gearing
- Stitch width regulator
- Left hand-center-right hand adjustment
- Device for lowering feed dog
- Darning mechanism
- Twin thread tension
- Built-in sewing light
- Foot attached without screws
- Forward and reverse sewing



Extreme width of zigzag movement:	4,5 mm
Stitch displacement:	Left hand-center-right hand
Maximum stitch length:	4 mm
Stitches per minute (Speed):	min. 1000 – max. 1250 per min.
Lift of presser foot:	7 mm
Dimensions of bed plate:	cl. 730, 731, 732 / 385 x 182 mm (15,14" x 7,14")
Needle system:	705

Weights:

	Cl. 730		Cl. 731		Cl. 731	
	Knee control kg/lbs	Foot control kg/lbs	Knee control kg/lbs	Foot control kg/lbs	Knee control kg/lbs	Foot control kg/lbs
Machine alone:	10,500 23 lbs 2 oz	10,300 22 lbs 11 oz	10,500 23 lbs 2 oz	10,100 22 lbs 4 oz	9,800 21 lbs 9 oz	9,400 20 lbs 11 oz
Accessories: (sew-kit, slide-on table, carrying case, foot con- trol etc.)	4,800 $10\frac{1}{2}$ lbs	6,400 14 lbs 4 oz	4,0 9 lbs	5,600 12 lbs 6 oz	4,0 9 lbs	5,600 12 lbs 6 oz
Packing alone:	2,700 5 lbs 15 oz	3,0 6 lbs 9 oz	2,700 5 lbs 15 oz	3,000 6 lbs 9 oz	2,700 5 lbs 15 oz	3,0 6 lbs 9 oz
Total kgs/lbs	18,000 39 lbs 10 oz	19,700 43 lbs 7 oz	17,200 37 lbs 15 oz	18,700 41 lbs 3 oz	16,500 36 lbs 6 oz	18,000 39 lbs 10 oz
Box-measurements (cm) inch	50x44x31 19,69 x 17,32 x 12,2	57x44x31 22,44 x 17,32 x 12,2	50x44x31 19,69 x 17,32 x 12,2	57x44x31 22,44 x 17,32 x 12,2	50x44x31 19,69 x 17,32 x 12,2	57x44x31 22,44 x 17,32 x 12,2

2. Running speed

BERNINA machines cl. 730 Record, 731 and 732 are designed for a normal running speed of 1100 stitches per minute. The actual number of stitches will vary between a minimum of 1000 and a maximum of 1250 per minute and will depend on the output of the motor and the qua-

lity of the assembly (easy running). When put to use, in the majority of cases the speed will increase within the limits indicated above, this being the result of the breaking-in of all the sliding surfaces.

3. Oiling and cleaning

All moving parts of the machine must be oiled occasionally. This is done best before using the machine. One principle should be rigidly adhered to:

«A little oil
at the right spot».

The importance of lubrication, as well as of the maintenance of the machine in general has already been taken into consideration when the machine was designed. All oiling points are easily accessible by detaching the frame cover plate, opening the hinged head cover and unscrewing the belt cover plate. Most oiling points are marked in red; this, however, does not imply that only these places need to be lubricated. Use clean sewing machine oil, free from resins and acids. Inferior oil may cause the machine to jam, due to the oil drying-up. By opening the hinged cover on the front of the free arm, access is gained to the shuttle,

the race of which should be oiled lightly but frequently where indicated by an arrow (Fig. 5). Proper lubrication ensures the smooth running of the machine and lengthens its useful life.

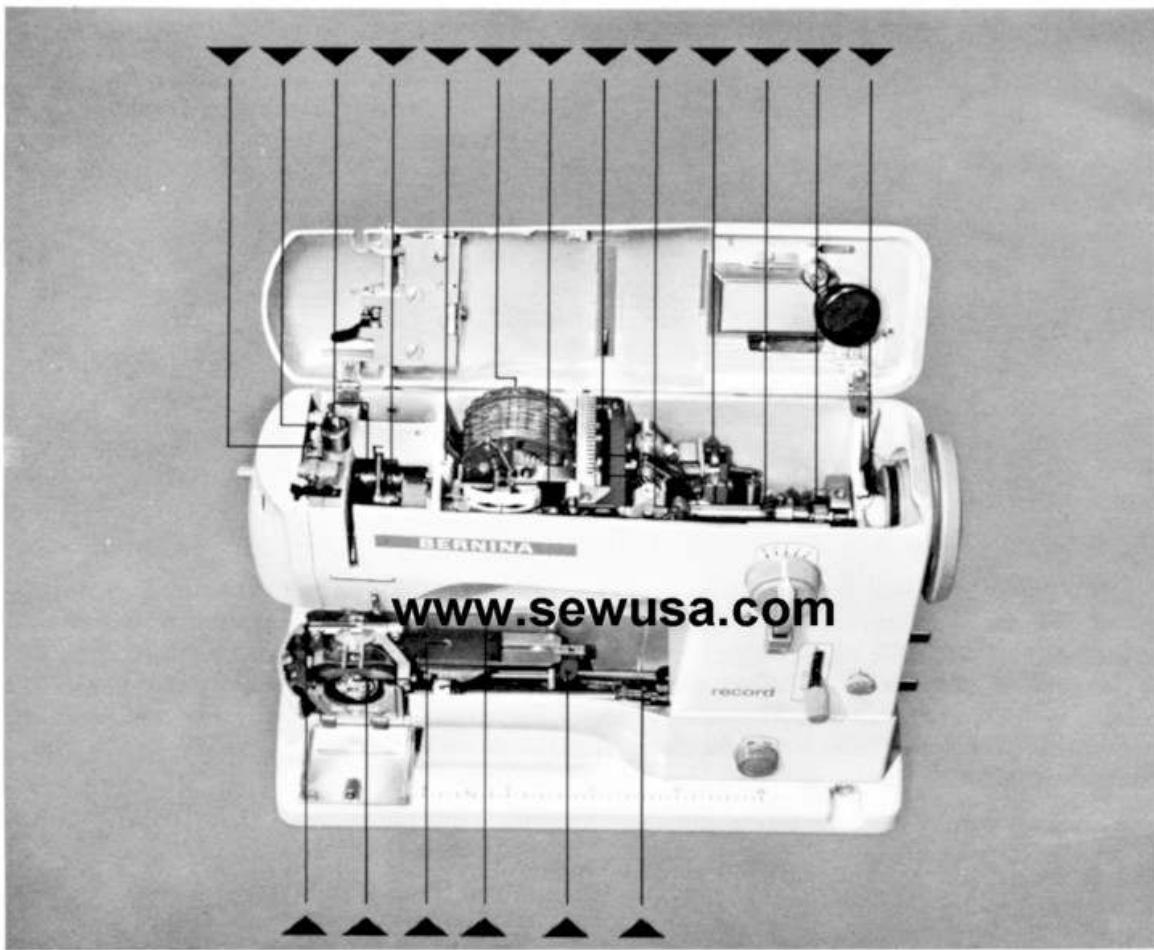
If a sewing machine has been kept in a cold room it should be placed open into a warm room about one hour before it is taken in use; this will restore the viscosity of the oil in the bearings.

Cleaning the machine

Proper cleaning after use is part of the efficient maintenance of the BERNINA Record. During sewing, thread-ends are collecting, particularly around the shuttle. This waste may detrimentally affect the proper working of the machine and must, therefore, be removed at frequent intervals.

From time to time detach the cover plate and remove the fluff accumulating under

Fig. 4



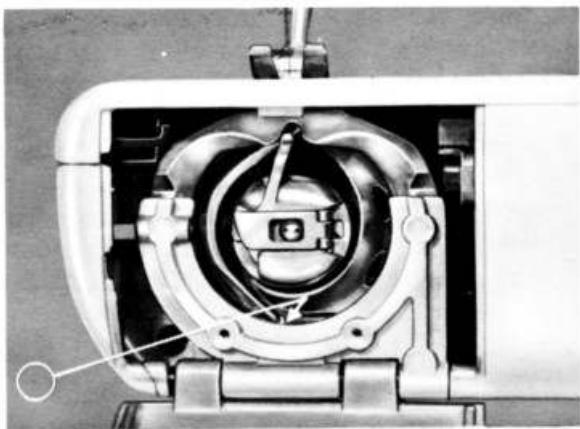


Fig. 5

the needle plate. For this reason the cover plate is quickly detachable so that cleaning and lubricating can be effected easily.

To detach the cover plate, open the hinged latch 32 giving access to the shuttle and press trip lever 50 with index of right hand (see Fig. 6). It is not neces-

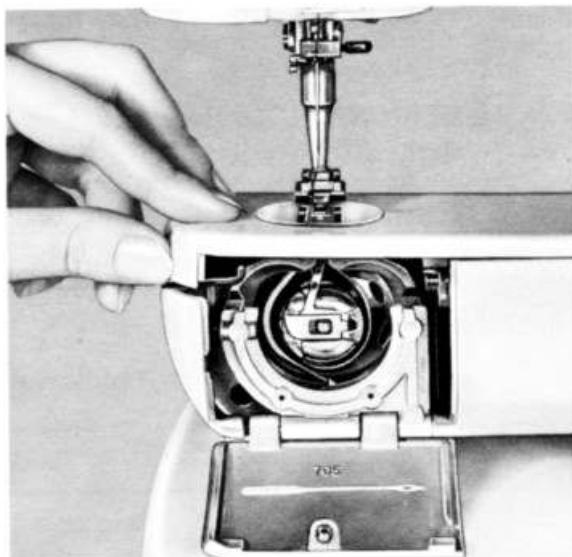


Fig. 7

front of the cover plate and the trip will engage automatically (Fig. 7).



Fig. 6

sary to remove the presser foot, but the needle should be placed in its uppermost position.

To insert the cover plate, slide it up to the side wall of the frame and insert the tongue of the cover plate into the guide provided in the frame. Then depress the

4. Choice of needle and thread

The needle is one of the most important components of the machine. Even the very best sewing-machine will not work properly, if the quality of the needle is not up to the requirements of the work. The needle used should be of the flat shank type, and its gauge should correspond to the material and thread used.

The upper, thicker, part of the needle is called the shank. It is flattened (flat shank needle). Then follows a short conical part, forming the transition to the stem, the end of which is finished into the point, with the eye arranged slightly above. Two thread grooves are arranged on both sides of the needle stem, one of them being short and one long. The short groove is on the same side of the needle as the flattened part of the shank, with the long groove opposite. The thickness of the needle is measured on the stem and given in hundredths of millimeters ($100/100 = 1 \text{ mm}$) e.g., No. 80

needle = 80/100 mm = 0,8 mm (appr. 0,032").

For the BERNINA cl. 730 Record, 731 and 732, system 705 needles with groove should be used exclusively. In order to obtain satisfactory sewing results, use only best quality needles and highest grade thread. First select the thread

suitable for the work and then the suitable needle to accomodate the thread. The relations between needle and thread is correct if the thread, when placed in the long needle groove, fills the latter well and can be freely pulled in either direction. The numbers usually used for sewing are Nos. 80, 90 and 100, those for crosswise darning Nos. 70 and 80.

Needle and thread table

Needle System 705	Sewing thread		Darning thread	
	No.	6-ply unglazed	3-ply unglazed	2-ply
60		—	170 — 200	80 — 100
70		70 — 100	70 — 140	50 — 80
80		50 — 60	50 — 70	30 — 40
90		40 — 50	30 — 40	—
100		20 — 30	—	

Suitable threads for sewing and darning

- For straight stitch sewing: Nos. 60—90, 3-ply and 6-ply, unglazed
For darning: Nos. 50—80, 2-ply
For zigzag-sewing: Nos. 60—90, 3-ply only
For ornamental stitches: Nos. 30 and 40, 2-ply

5. Preparing the machine for sewing

The following operations are necessary in order to prepare the machine for sewing:

- Setting the needle
- Correct selection of needle and thread
- Winding of the lower thread
- Taking out the bobbin case

- Insertion of bobbin in case and threading the bobbin thread
- Replacing case with bobbin in shuttle
- Bringing up the lower thread
- Fitting the presser foot

These operations are described in detail in the operating instructions and are here only repeated by means of the appropriate illustrations (Fig. 8—11).

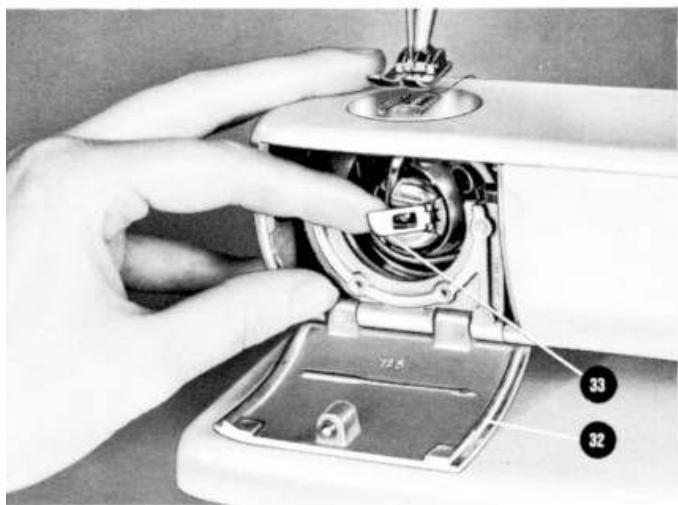


Fig. 8

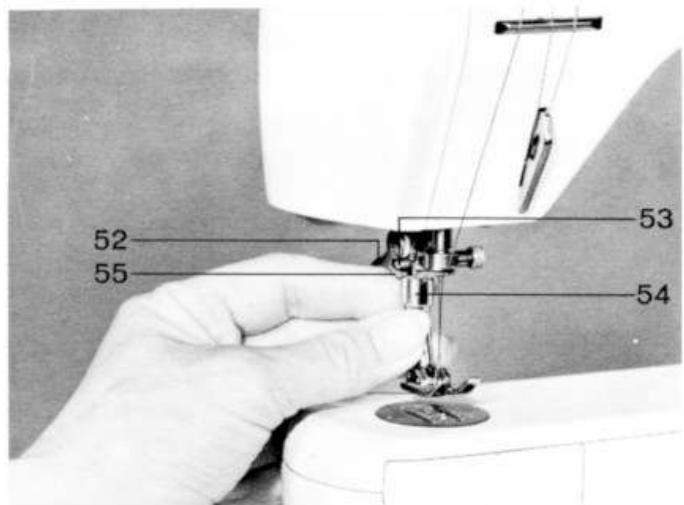


Fig. 9

Fig. 10

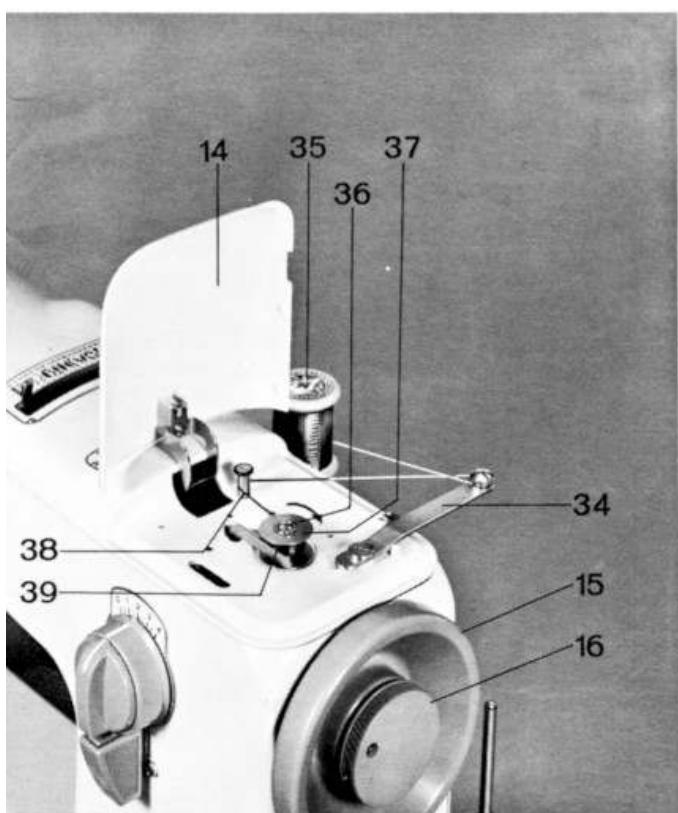


Fig. 11



6. Top thread tension and its adjustment; dismantling the tension box.

The setting of the thread tension is such that the same tension can be used for all ordinary sewing and darning work without additional adjustment. On BERNINA 730 Record and on cl. 731 and 732, below the upper-arm cover, the twin thread tension is installed. This device is assembled just below the slit which crosses the cover. From the outside there is only a small section of the control disc visible, and this in the center of

the upper-arm cover. Just in front of the machine operator, directly in his field of vision and slightly to the right of the slit, a small window serving to adjust the thread tension is placed. If the black marked line is right above the prism on sight hole, then correct normal tension is set.

When turning the control disc forward then the black line will move to the left. A - sign shows up in the window and signals that thread tension has become weaker. Turning the control disc backwards, there appears a + sign which lets you know that thread tension has become stronger. This device is necessary in order to modify thread tension when sewing ornamental stitches or when using bead-thread. For normal sewing work, correct thread tension is obtained by setting the black line on top of the V-groove. From time to time the thread-tension device has to be dismantled.

Refer to figure 13 for correct assembly.

35. support plate, 36. holding screw, 37. thread tension bolt, 38. holding nut, 39. washer, 40. thread tension nut, 41. disc, 42. thread disc, 43. intermediate disc, 44. thread tension disc, 45. stop bolt, 46. covering disc, 47. thread tension spring, 48. axle for regulating nut, 49. holding nut, 51. washer, 9. control disc, 53. disengaging pin, 54. axle for presser lever, 55. release presser lever.

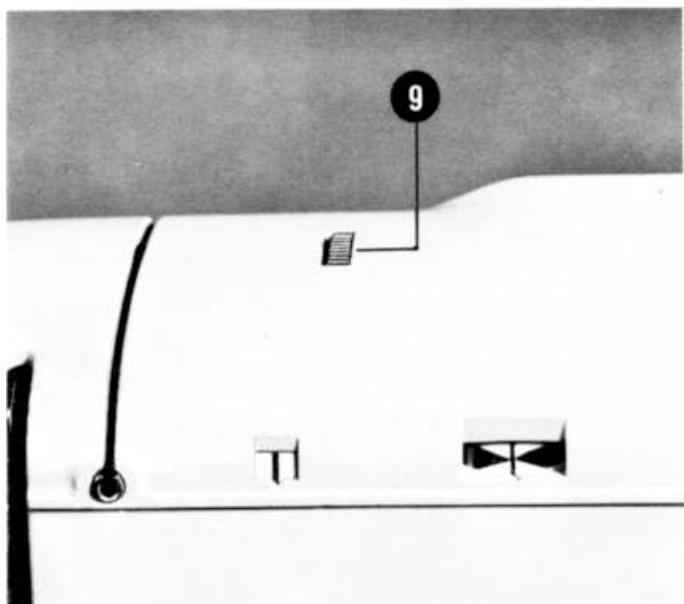


Fig. 12

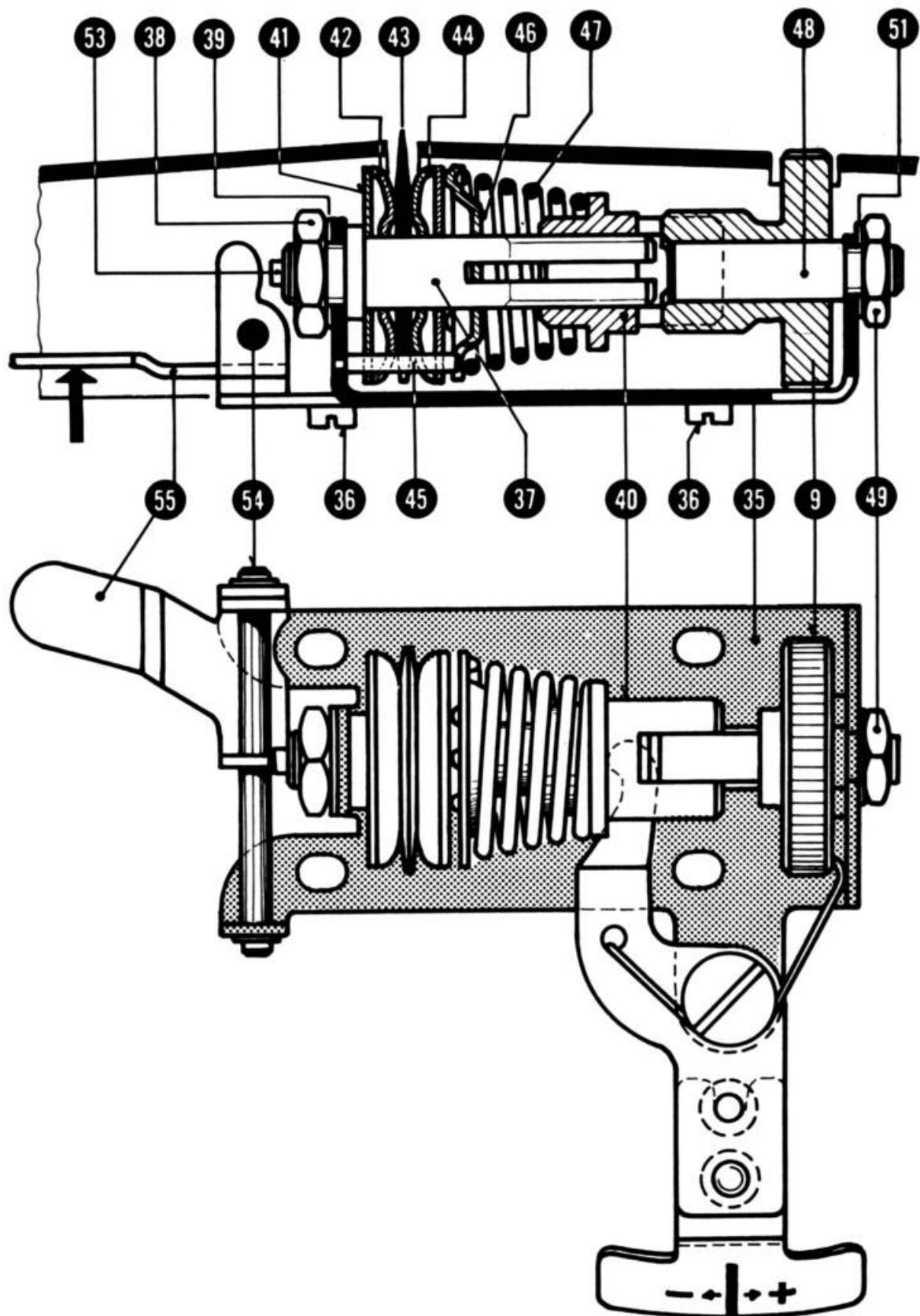


Fig. 13

**Top thread tension
(New design)**

(installed on machines leaving Factory beginning March 1964).

Unscrew both screws (196) and remove thread tension from cover. In order to

take apart, unscrew holding-nut (194) and remove mechanism from support (181).

Refer to figure 13 a for assembly.

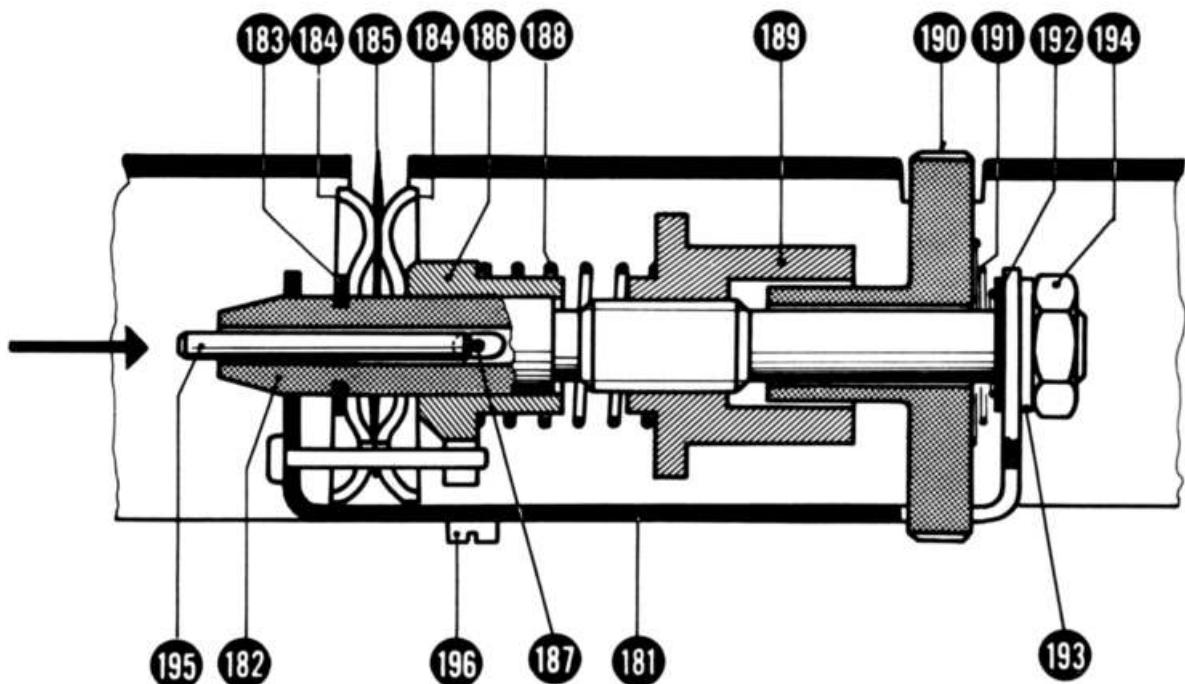


Fig. 13 a

181 = bracket
182 = tension bolt
183 = lock ring
184 = tension disc
185 = intermediate disc
186 = pressure bush
187 = tension sleeve
188 = pressure spring
189 = tension nut

190 = control disc
191 = conical spring
192 = washer
193 = washer
194 = holding nut
195 = release pin
196 = holding screw

7. Assembly of the pre-tension to the top thread tension (Fig. 14)

On the rear of the upper-arm, and just below the cross slit, the pre-tension for the top thread is located. This device consists of a tension bolt (56) fitted with a hole (57), a spacing disc (58), the pre-tension (59) and the spring (60). In order that the slanted slit (57) keeps its correct position, there is a small hole (61) on the face of the tension bolt (56). This hole is always turned upwards and in a vertical position. The tension bolt is screwed to the stand by means of the nut (62).

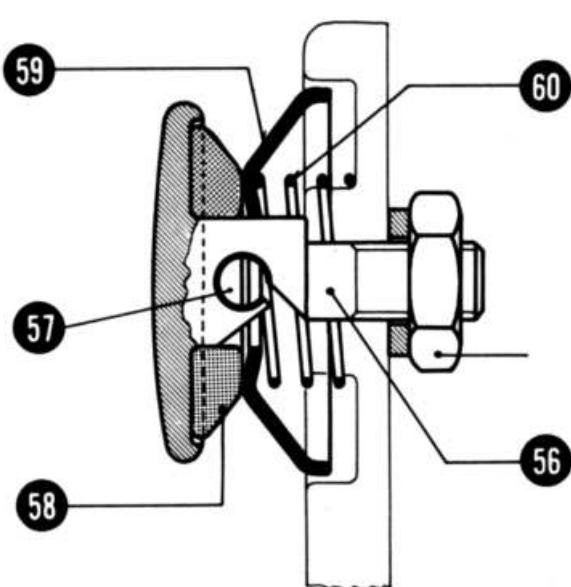


Fig. 14



7 a. New type

A by-pass ring (Fig. 14 a) will be used instead of the old pre-tension (Fig. 14). Place the sewing thread in this loop and in the cross slit of the top thread tension.

- 197 = by-pass ring
- 198 = bolt
- 199 = hexagonal nut

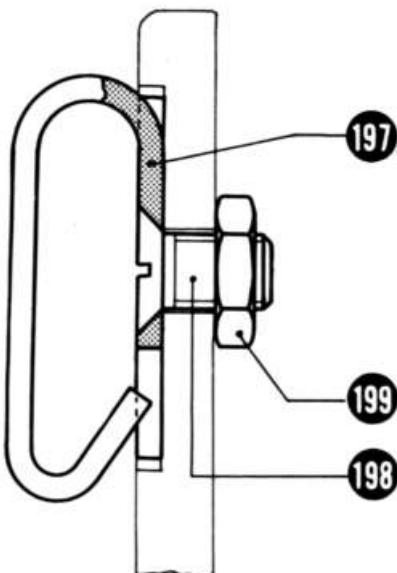


Fig. 14 a

8. Adjusting the thread control

Contrary to the machines built up to now, on models 730 Record, 731 and 732 — the thread control mechanism is not built together with the thread tension, but is placed below the take-up lever in its lowest position. It is fitted on a bracket (65) which can be guided through the thread control slit and can be screwed with screw (66) onto the housing.

On bolt (67), fitted with nut and jam-nut (68 und 69) on bracket (65), a regulator

spring is arranged (70). It will find its fixed rest on the satin stitch stop (71) which is connected firmly with shoulder screw (72).

Adjustment can be made in locking shoulder screw (72) on stop (71) being itself under pressure from spring disc (73). Pressure is regulated with nut and jam nut (74 and 75). With screw driver and applied pressure, the stop can then be moved higher or lower.

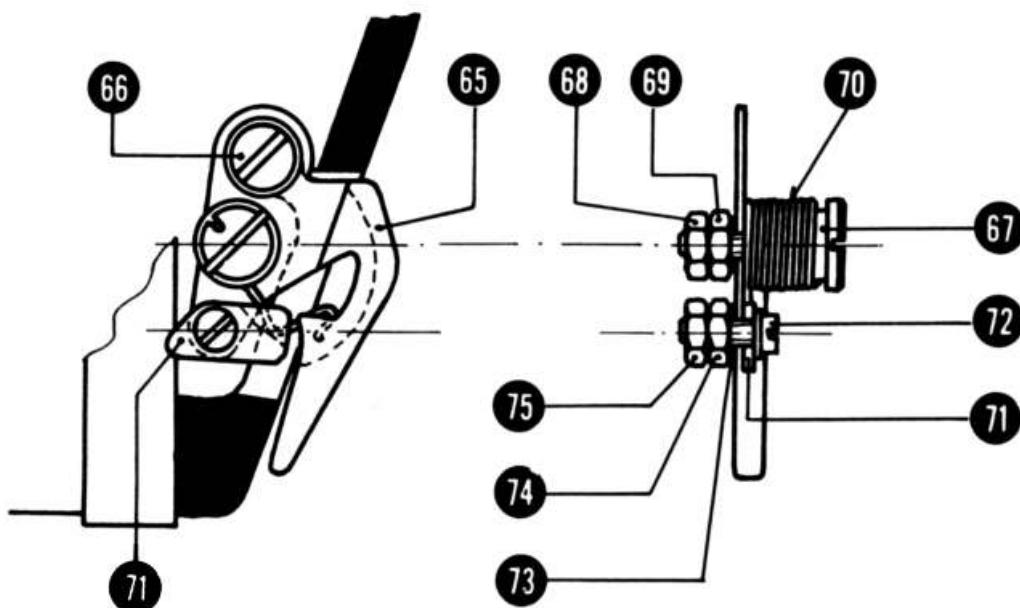


Fig. 15

9. Adjusting the lower thread tension

For certain types of work, e.g. embroidery, raised buttonholes, etc. it may be desirable to adjust the lower thread tension. The tension is mounted on the bobbin case in the shape of a flat spring, and is adjustable by means of a screw mounted in its center. For normal sewing, no adjustment is required. The thread tension, pre-set in the factory, takes 27,5 gr of No. 60 thread, whilst the same tension takes 18 grs. of No. 120 DMC yarn.

This makes it possible to carry out all ordinary sewing work as well as darning



or cross-weaving without altering the tension. The thread tension is tested by means of tension weights, which can be inserted into the bobbin case in the same manner as the shuttle. The free thread is held tight and the case and weight are allowed to unwind slowly and evenly. (Fig. 17). It is necessary that the spring presses against the thread discharge with its entire width and that the thread is pulled out evenly in every position.

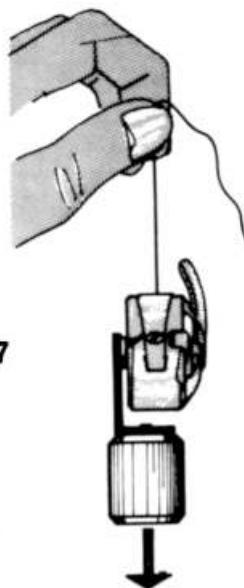


Fig. 17

10. Adjusting the foot pressure

The success of a good seam depends on the pressure of the foot on the layer of fabric to be sewn. For normal work this pressure should amount to approx. 1,200 grs (42½ oz) whilst it is somewhat less for light and somewhat higher for heavier materials. It is adjusted by means of a screw (77) at the top of the cloth presser bar (76). Turning this screw by means of a screw-driver in a clockwise direction increases the pressure, whilst turning it in the opposite direction will decrease same.

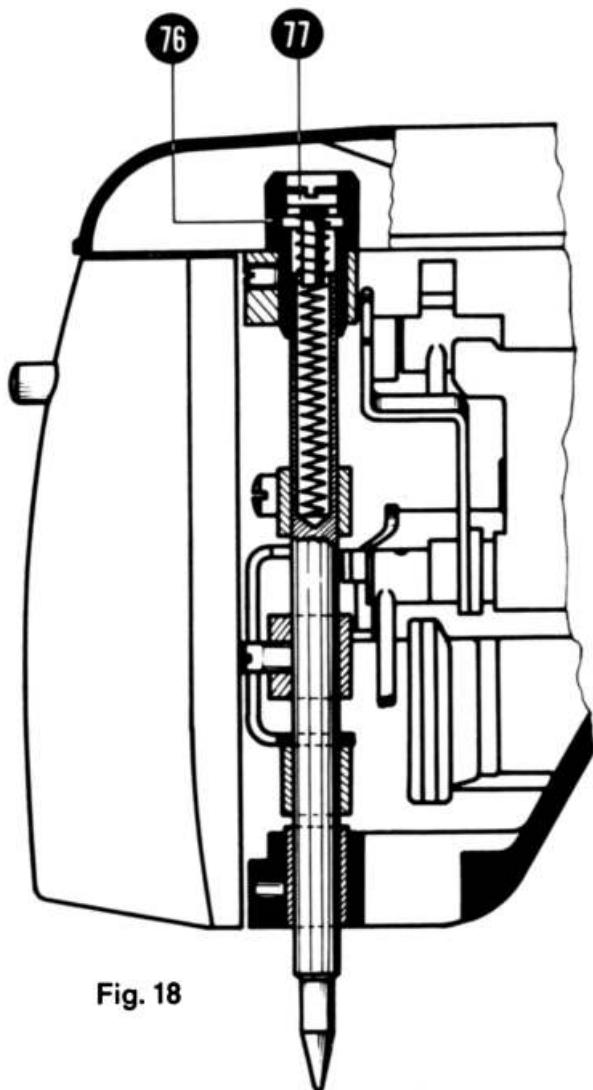


Fig. 18

III. Adjustment of the machine

1. Seams, sewing components and their functions

The BERNINA models 730 Record and 731 permit three different kinds of stitches to be made:

11. The straight seam (Fig. 19)
12. The zigzag seam (Fig. 20)
13. The various ornamental stitches

With BERNINA cl. 732, only two kinds are possible, e.g. the straight seam and the zig-zag seam. Ornamental stitches are possible when guided by hand. For

the purpose of producing the seam, the sewing machine is equipped with certain components, the individual functions of which must be precisely synchronized.

These parts are the following:

1. The needle
2. The needle plate
3. The shuttle
4. The thread feed
5. The feed dog
6. The cloth presser foot
7. The thread tension and the tension adjustment.

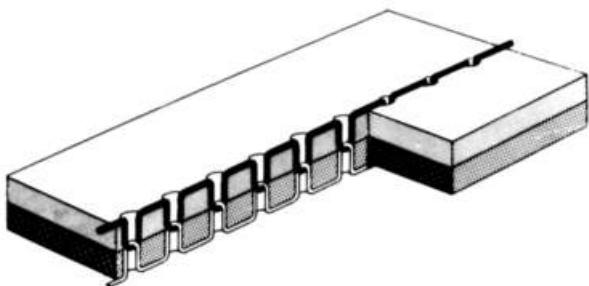


Fig. 19

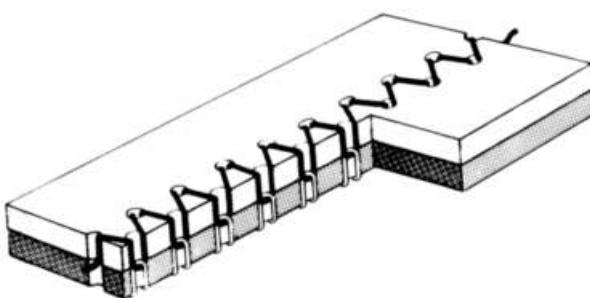


Fig. 20

11. The needle

The needle has the task of piercing the fabric and to bring the top thread which is to be knotted with the bottom thread, down to the shuttle, and thus to form the loop which is necessary for the action of the shuttle. This loop forms after the needle has pierced the fabric and reached its lowest position. The taut thread is positioned in the long groove on the front part. On the rear it lies in the short groove and further up between the needle stem and the pierced fabric. If the needle now lifts a little, the so-called loop-lift, the braking effect of the friction between fabric and needle then results in a loop near the eye, and this on side of the needle having the short groove, and into which the tip of the shuttle engages.

21. The needle plate

It serves as a base for resting the fabric layers to be sewn and has a hole for the passage of the needle. The plate is hardened and polished so that the top and bottom thread can pass without friction. In addition, it possesses a cut-out in the shape of the feed dog, which automatically advances the fabric.

31. The shuttle

The shuttle of the BERNINA - Record class 730 as well as of classes 731 and 732 is an oscillating shuttle (also known as hook) with reciprocating movement. Amongst its essential parts are the shuttle hook, the shuttle race and a pin for the bobbin case which, in turn, holds the lower thread bobbin. The bobbin ca-

se is locked on the shuttle pin and is provided on the outside with a lower thread tensioner. The shuttle is positioned centrally on the shuttle guide and is termed a central bobbin shuttle.

Its task is to take the top thread from the needle, to widen the loop and to guide it around the shuttle. All surfaces touching the thread are highly polished.

41. The thread feed (take-up)

The thread feed (take-up) of the BERNINA 730 Record and models 731 and 732 is an articulated thread lever and its individual parts are capable of performing movements which are adjusted to the thread requirements. During the downward travel of the needle it supplies as much thread as the needle needs, and is called the needle thread. After formation of the loop it supplies the loop thread, i. e., a sufficient amount of thread for the extension of the loop and for its travel around the shuttle. Finally it takes up the excess amount of thread and tightens the stitch, thus forming a firm knot inside the fabric.

51. The feed dog

The feed dog is a serrated, hardened piece of steel, which engages into the slits of the needle plate. Its task is to advance the sewing material after every stitch. In order to achieve this, it performs a rectangular movement, it advances the fabric (towards the rear), descends below the needle plate and returns to the initial position. During its return, the needle perforates the fabric for a new stitch. When the needle has left the fabric, it emerges from the slots and advances the material, thus completing the cycle.

61. The presser foot

Its task is to press the layers of fabric onto the needle plate and to ensure that the fabric is held firmly whilst the stitch is being formed. The pressure applied can be adjusted and is synchronized

with the movement of the feed dog. The base is smoothly polished so that the advance takes place without jamming.

71. Thread tension and thread adjustment

The thread tension arrangement has the purpose of restricting the amount of thread used in the formation of the stitch and to take as much thread off the spool as is needed for the next stitch. It consists of three thread tensioning plates, which are kept under pressure by means of an adjusting nut and spring. The complete thread tension apparatus is built below the top arm cover and is adjusted by means of a control plate showing from the top cover. From the sight hole which lies directly in the field of vision, the thread tension can be read. On each side of the marked line the symbols + and - are printed indicating whether tension is weaker or stronger. Thread adjustment is made by means of the thread regulator situated on the lower end of the machine head. The thread tensioning spring withdraws the loose thread when the needle pierces the material.

The thread tensioning device is rendered inoperative by lifting the presser foot lever, the pressure on the three tensioning plates is then eliminated.

2. Setting the machine

When setting the machine, care must be taken to rotate the handwheel in the rotating sense, i. e. towards the front. Before beginning with the setting make sure that the machine has been assembled correctly. No component must be allowed to cause hard running. All parts must be fitted tight and there must be no play; this applies in particular to the needle guide support, as otherwise no perfect straight stitch is possible.

To ensure greatest sewing safety, the BERNINA Record 730 and models 731 and 732 must be carefully adjusted. In addition to straight sewing adjustments, there are also the zigzag stitch setting

and the setting of the ornamental stitching arrangement.

The machine should be first adjusted as zigzag machine, and then as ornamental stitching machine. The movements must be fully identical in the sequence of both adjustments. For the setting, a perfectly straight No. 705 needle with size 90 groove should be used.

The cranked transmission for the needle bar cannot be adjusted and supplies a needle stroke of 33,73 mm.

The same applies to the articulated thread lever (take-up). Also in this case no adjustment is provided. The eye of the thread lever has a stroke (measured between the top and bottom position) of 60,5 mm.

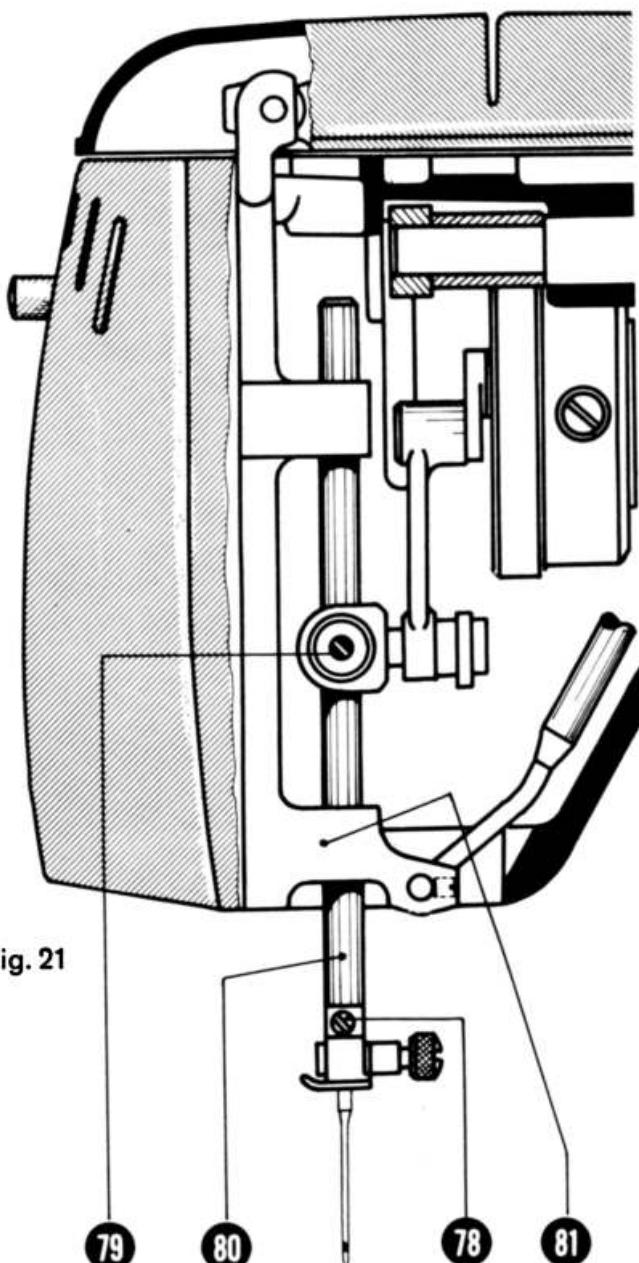


Fig. 21

21. The needle bar

First remove the frame cover, the base cover plate and head cover, and move the lever for the ornamental stitch gear towards the front. Then proceed with the provisional adjustment of the

1. needle bar.

The needle bar, without needle, is positioned in such a manner that the upper edge of the needle stop (78) is in line with the lower edge of the needle reverse support (81).

The adjustment is carried out by loosening the screw (79) of the needle bar carrier, shifting the needle bar in a vertical direction, and tightening the set screw. Care must be taken to maintain the needle stop parallel to the needle hole.

2. Next, fit the adjusting needle No. 90, set the zigzag to zero, i.e., to straight sewing, attach the base cover with the needle plate and check the movement of the needle in the needle hole.

- The needle must be exactly in the middle of the needle hole, both longitudinally and across.

(See Fig. 22).

- A = correct
- B = wrong, stitch too far to the left
- C = wrong, stitch too far to the right
- (L) = left stitch
- (R) = right stitch
- (M) = centre stitch

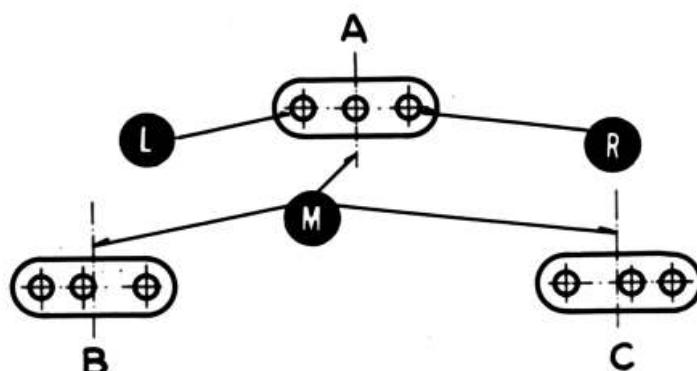


Fig. 22

22. Centring of needle movement

If a longitudinal correction must be made (in direction of the fabric advance), unscrew the bakelite handwheel and the drive pulley, unscrew the four frame screws (accessible by means of a long screw driver from the frame cover side) and press frame into correct position. Retighten all screws.

If a lateral correction must be made (i.e., at a right angle to the direction of the fabric advance), unscrew the connecting bar set screw (84) in the guide fork, i.e. in the part correcting the zigzag of the stitch width, set the needle centrally in the needle hole, and tighten the set screw.

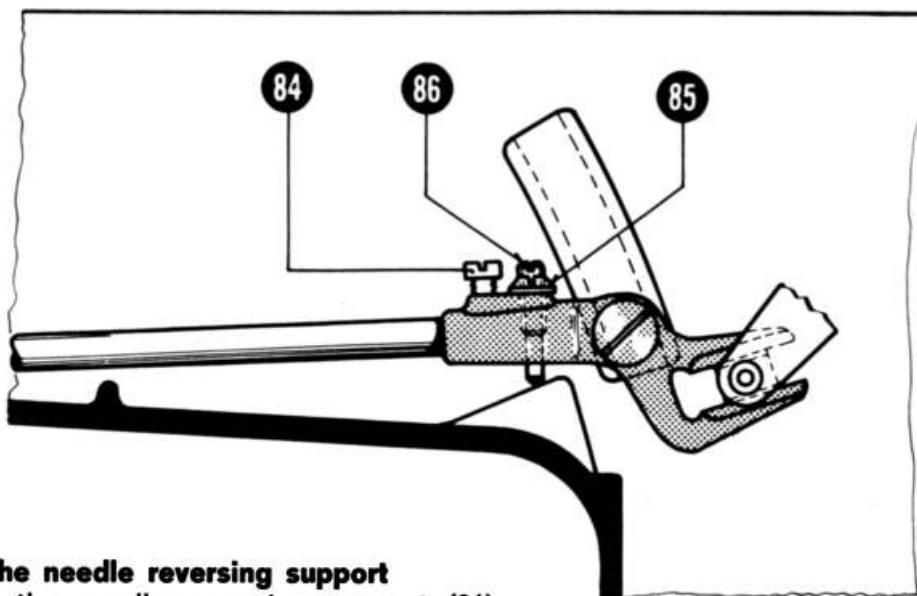


Fig. 23

23. The needle reversing support

Next, the needle reversing support (81) must be adjusted in such a way, that it is perfectly firm. The zigzag remains set at zero. Unscrew the screw with the conical locknut (8) in the guide fork by means of a special spanner (screw driver for slotted nuts), and adjust the stud (86) up and down, until the reversing

support, and with it also the needle, remain perfectly still when the machine is rotated. Retighten the locknut (85).

24. Distribution of stitches for zigzag operation, LH - C - RH stop

Next, the stitch distribution in the needle plate is adjusted by setting the zigzag to 4 and checking whether, with the machine turning, the left hand and right hand stitches are equidistant from the centre stitch.

The slideshaft (122) is developed as a hollow shaft whereon is arranged the oscillating lever (123) with the slide

block. After having unscrewed the bobbin holder, the front end of the slide-shaft becomes visible. Moving tool (124) - N 32 NU 2 - through the hollow of the shaft, the conical tip of the bolt will reach a small hole in the slide block. This will make the slide block oscillate round the centre of the slide shaft in its normal position.

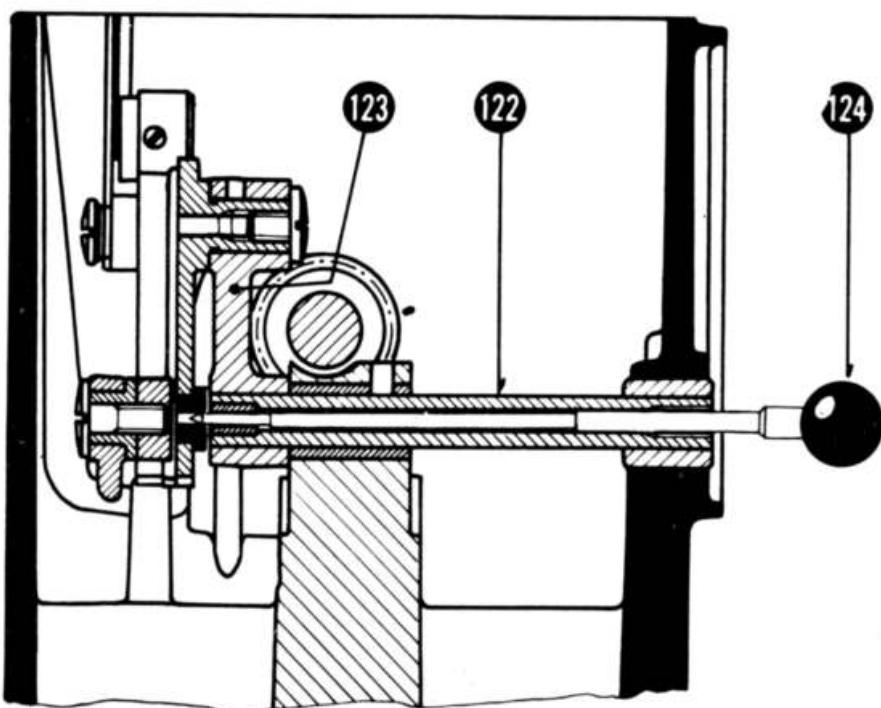


Fig. 23 a

In case A (Figures 24 and 25) adjustment has to be made according to paragraph 2, section 21.

To adjust, loosen the set screw on the reversing lever supporting the zigzag crank, and set needle as indicated in Fig. 23 a. Retighten screw.

To adjust left hand-centre-right hand setting, the graduated bridge piece (92) between the zigzag crank and the stop lever (89), fitted to the inner end of the zigzag adjusting button at zero, has to be brought to its correct length.

If the graduated bridge is too long, the stitches will shift towards the left hand side (Fig. 25 b), if it is too short, towards the right hand side (Fig. 25 c).

The needle is equidistant from the needle hole edge both on the left hand and on the right hand side. (See Fig. 25 a).

To adjust, set stitch position button into the centre loosen bolt (82) with hexagonal head and hexagonal nut (8 mm spanner for bolt, 6 mm for nut) and shift needle into correct position as shown in Fig. 25 a. Retighten bolt (82).

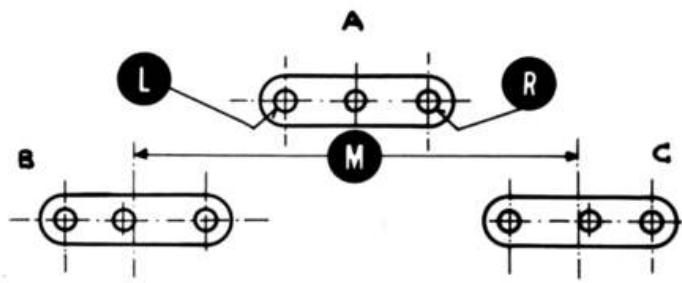


Fig. 24

- (L) = left hand stitch
- (R) = right hand stitch
- (M) = centre stitch
- A = correct
- B = wrong (stitch too far to left)
- C = wrong (stitch too far to right)

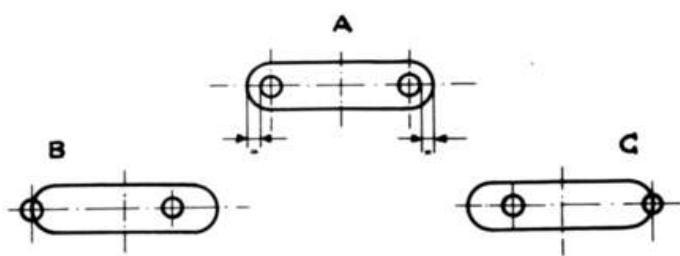


Fig. 25

- A = correct
- B = wrong (connecting bridge too long)
- C = wrong (connecting bridge short)

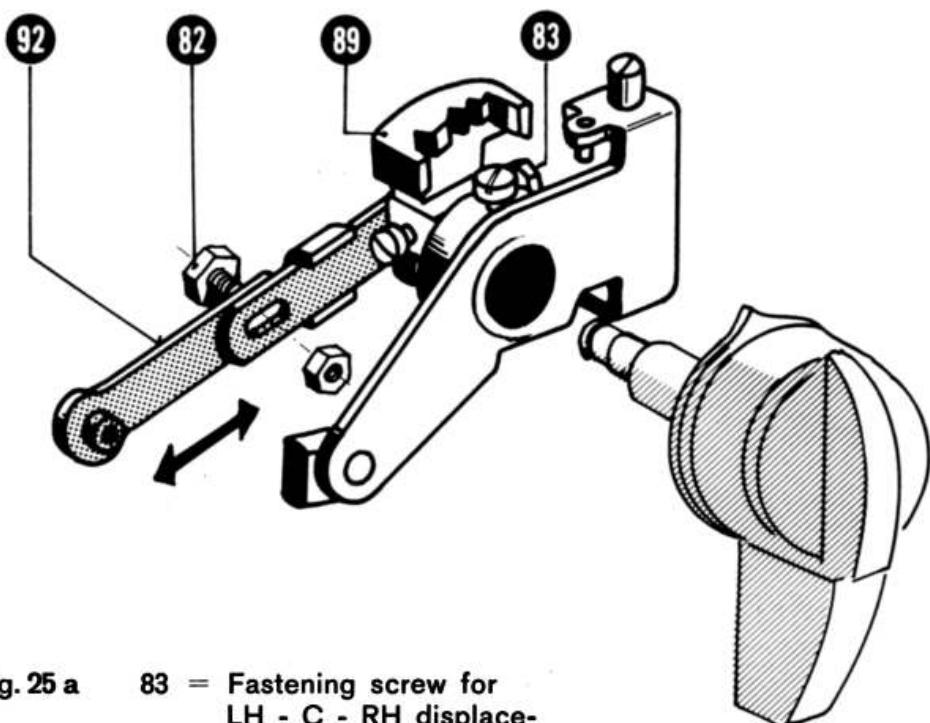


Fig. 25 a 83 = Fastening screw for LH - C - RH displacement lever.

25. Lateral movement of the needle, setting of rack, shuttle driver and pinion

The lateral and the vertical movement of the needle must be exactly synchronized. It must not start before the needle has left the fabric, and must have ceased when the needle begins to pierce it. It is derived from the zigzag eccentric (110) running at half speed (1 : 2). Adjustment is made by means of a worm wheel (87) fitted to the frame shaft (109), which re-

acts upon an adjusting ring. Loosen both screws of the worm wheel, keep same in position pressed to the adjusting ring by means of a screw driver, and turn the handwheel in a clockwise direction. If the handwheel is turned forward, the lateral movement of the needle will shift according to Fig. 27 c, in the opposite case, according to Fig. 27 b.

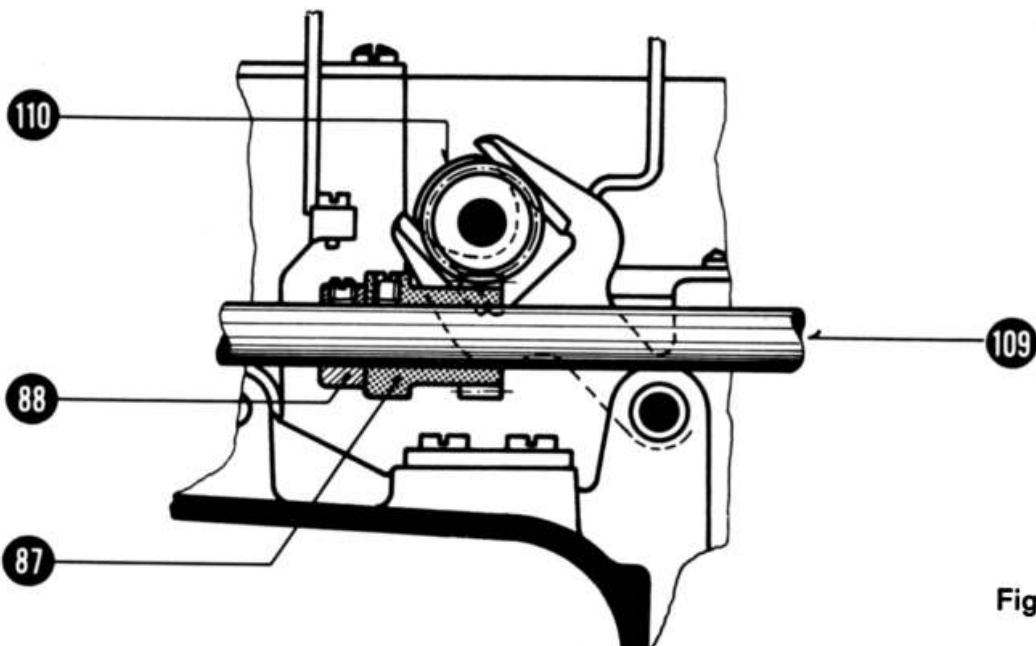


Fig. 26

It is preferable for this lateral movement to begin somewhat earlier, rather than to finish too late. The following illustrations clarify the adjustment.

Prior to commencing the adjustment of

the above mentioned parts, make certain that the rack and the shuttle drive with its pinion are faultlessly assembled. No play must be discernible in either of them.

B = Start of lateral movement

E = End of lateral movement

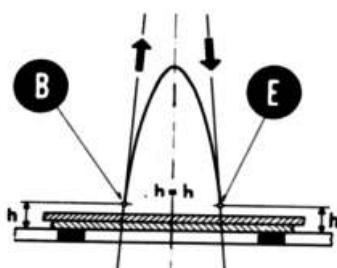
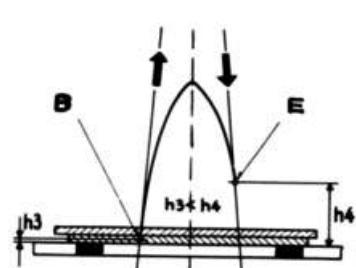
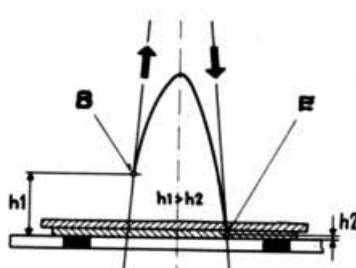


Fig. 27 a) b) c)



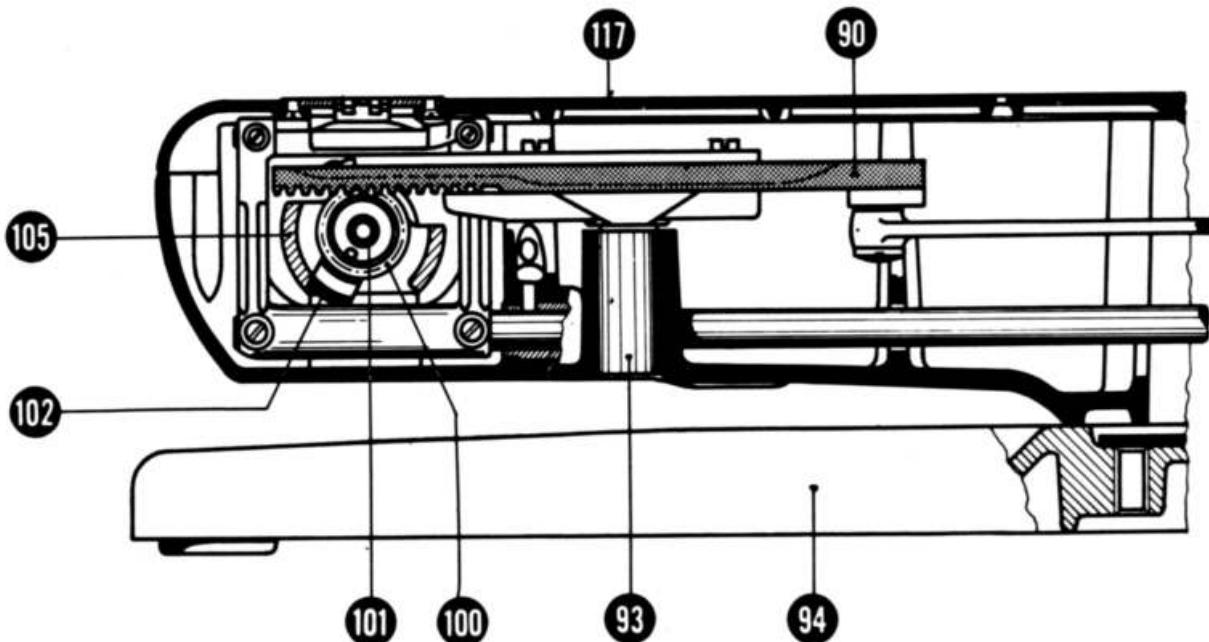


Fig. 28

If the drive jams, the rack (90) must be raised, and if the play in the teeth is excessive, it must be lowered. This is done by loosening the clamp screw (91) with inside hexagon. The bearing pin (93) of the rack is accessible from the bottom of the base (32), after detaching the base plate (94). By moving the bearing pin (93) in one direction or the other, the desired effect can be obtained.

By driving the bearing pin upwards, the rack-play gets bigger and when driving the rack bearing downwards, the play be-

comes smaller. Don't forget to retighten screw (91) Fig. 28.

Now place the rack (90) in front dead centre, with the needle (80) in the lowest position. The adjustment is carried out on the crank plate fitted to the vertical spindle (95) (also called the lift plate, since the lift eccentric (96) is attached to it). Loosen both fixing screws (98, 99) and move rack (90) into front dead centre by turning the crank plate (96) on the vertical spindle (95). The tapering screw (99) serves as a safety screw against the twisting of the lift eccentric. Retighten both screws.

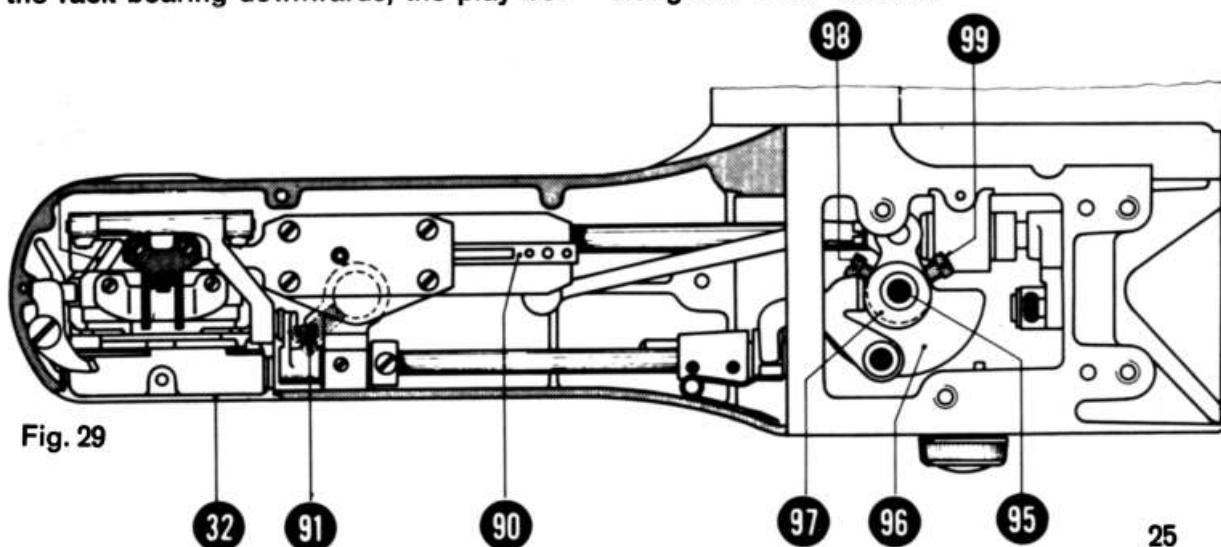


Fig. 29

When adjusting the shuttle driver, 2 points must be taken into account:

- (1) Adjustment with new rack pinion
- (2) Adjustment of shuttle driver where shuttle driver and pinion are machined untrue (as supplied by the factory).

If (1). The rack pinion (100) is still loose on the shuttle driver spindle (101): Test the size of the thread passage, i.e. the play between shuttle-hook (103) and shuttle driver (102). It should be 0,3 mm (0,0119") and should be checked with a feeler gauge N 32 NU 9 (104) / Fig. 31. If it is too large or too small, adjust the lower driver leg (102) by means of ad-

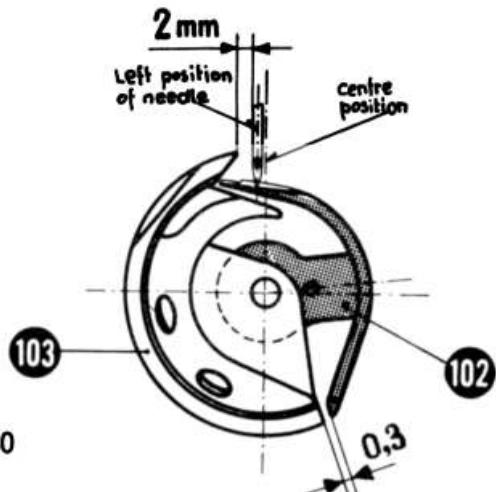


Fig. 30

justing tool N 32 NU 8 (27) - Fig. 31 - inward or outward, until gauge (104) shows the correct play between driver (102) and shuttle (103).

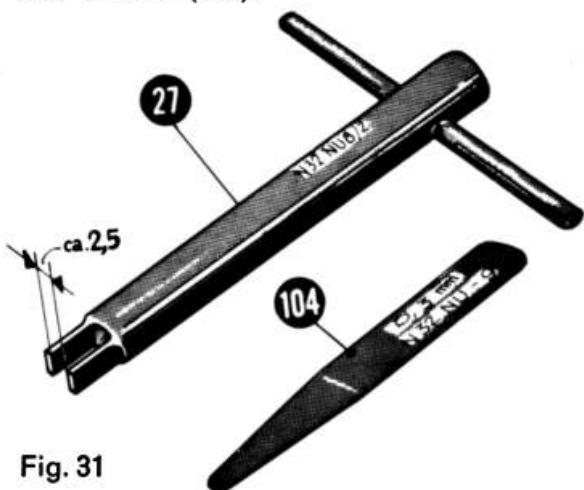


Fig. 31

Now twist driver (102) with the help of tool (27) until the hook tip is at a distance of 2 mm from the needle when stitching to the left. Cancel play between driver and shuttle by replacing gauge (104) - 0,3 mm -. Extract driver (102), drill untrue, pin and then replace.

If (2). In case of machines with untrue pinion and drivers, the dimensions indicated under (1) will be obtained automatically when the shuttle driver (102) and the pinion (100) are engaging in the proper position i.e., when the correct tooth of the pinion engages into the correct slot of the rack (90). If necessary, several positions should be tried.

Next, check the lateral adjustment of the needle in relation to the shuttle (103). The distance should be 0,05–0,1 mm (Fig. 32). The lateral adjustment is carried out by shifting the shuttle race (105) Fig. 33 and 34.

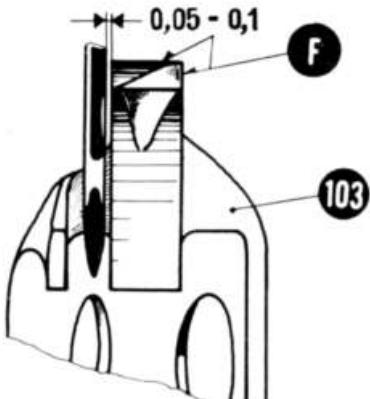


Fig. 32

F = Guide of the shuttle race.

Unscrew the screw (106) fitted to the rear base wall (accessible from the top left-hand side), and move the whole shuttle race forward or back, according to whether the needle distance is too large or too small. After adjustment retighten screw (106) Fig. 33.

When the spacing between needle and driver is too big remove the driver and use gauge N 32 NU 21 (108) for adjust-

ing bushing (107) of shuttle-race (105). The distance between needle and shuttle driver has to be the same as between the hook tip and the needle. Don't allow the driver to protrude from the shuttle race.

The handle of the gauge is pushed through the hole from the back of the

open arm and the pressure plate placed onto the spike. Next, the pressure nut is turned towards the hub of the race until it fits well. Turning the handle clockwise, the bushing (107) slides backwards. In order to reverse, introduce gauge handle from side of the open arm hinged cover (Fig. 34).

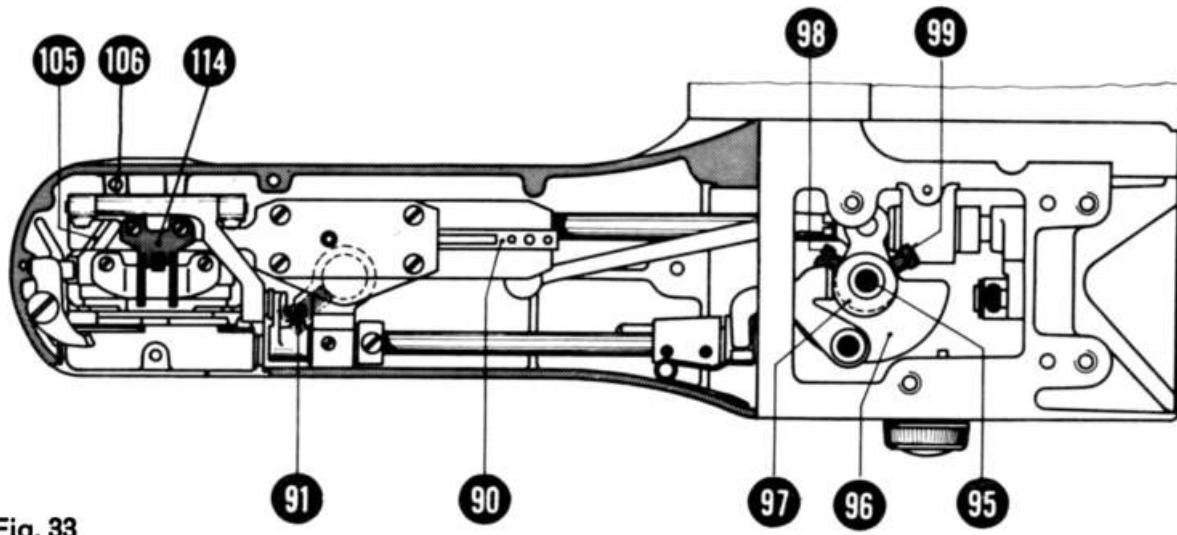


Fig. 33

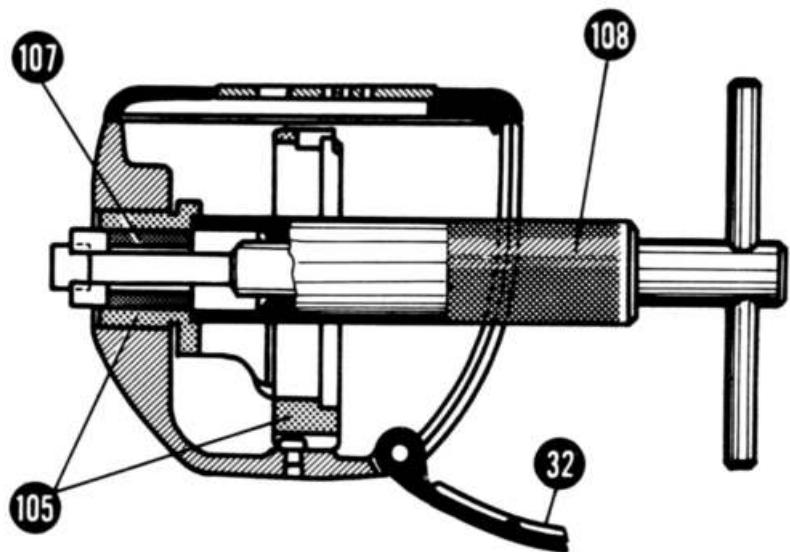


Fig. 34

26. Loop lift 1,8 mm (0,071").

Loop lift is the amount by which the needle lifts from its lowest position. After the termination of this stroke, the point of the shuttle must be behind the needle in order to catch the loop. The points should be on the same level as the front edge of the needle. The relative position of point and eye, i.e. the final vertical position of the needle, is adjusted after the adjustment of the loop lift.

The loop lift is adjusted in the left hand stitch position using the so-called loop lift gauge N 32 NU 6 (111) Fig. 35. Set left hand stitch,

clamp (Fig. 37). Next extract gauge and raise needle bar until clamp touches the support (81).

Now the shuttle (103) is set by turning the crank plate (96) fitted to the vertical spindle (95) until the shuttle point is on the same level as the front edge of the needle (113). Retighten the screw of the crank plate.

When tightening screws (98) and (99) be careful that crank plate (96) is not pushed down so that no axial play of the vertical spindle (95) occurs.

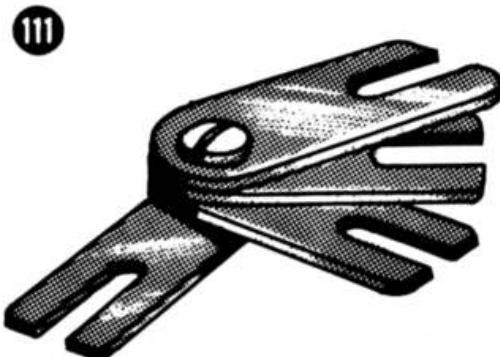


Fig. 35

adjust needle to the lowest position, fit the clamp N 32 NU 7 (112) Fig. 36 to the needle bar (80), place the N 32 NU 6 1,8 gauge to the lower edge of the reversing support (81) and hold in position with the

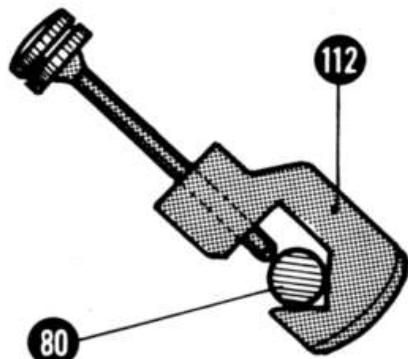


Fig. 36

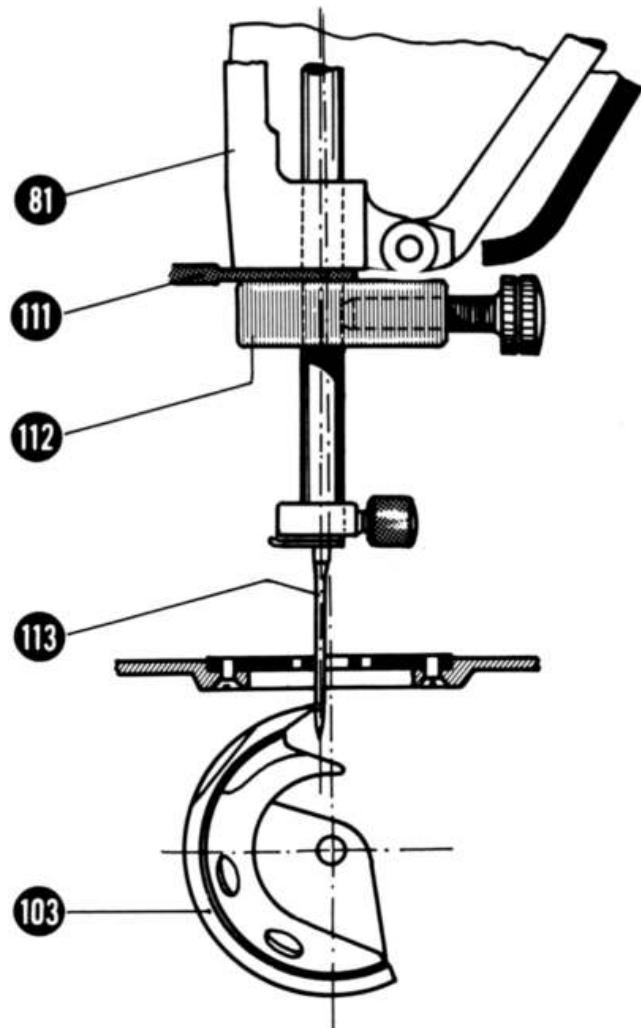


Fig. 37

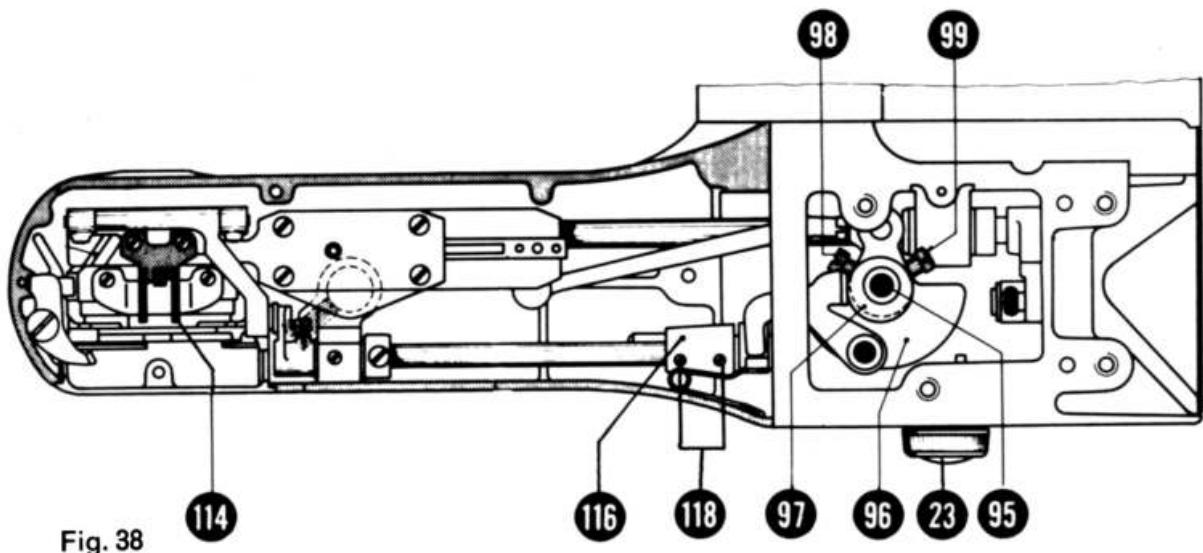


Fig. 38

29. Height of needle

After adjusting the loop lift, the needle height is finally adjusted, using for this purpose the

right hand stitch position

After the loop lift, the bottom edge of the shuttle-tip should be on the same level as the top of the eye of the needle (Fig. 38). Unscrew the set screw of the needle bar carrier, adjust the needle bar in correct position and retighten the set screw.

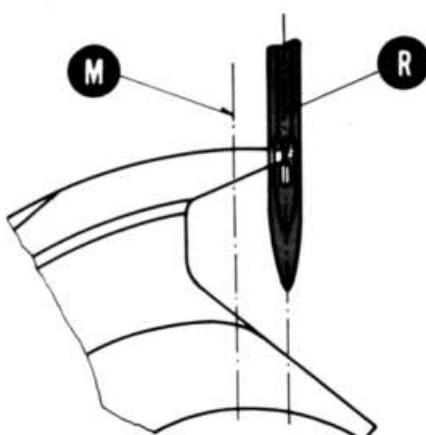


Fig. 39

M = centre needle stitch

R = right hand needle stitch

30. Position of feed dog

Next adjust the height of the feed dog. The teeth of the feed dog (114) should protrude by about 1,0 to 1,1 mm (= 0,040"–0,044") above the top edge of the needle plate (115). Adjustments are carried out by means of the crank (116) of the feed dog lowering device. Set the lowering button (23) until the sewing mark is opposite the zigzag symbol. Take off the base cover plate (117) with needle plate (115). The two fixing screws (118) of the clutch-half (116) both situated on the side facing the frame, are now easily accessible. After loosening these screws move the clutch-half (116) forward or back, thus lifting or lowering the feed dog. After tightening the screw (118) refit the cover plate (117) and check that the feed dog protrudes 1,0 to 1,1 mm above the top of the needle plate (Fig. 40). Check with gauge N 32 NU 11-A.

Place gauge in such a manner on the needle plate that the recess (sparing) of 1,0, respectively 1,1 mm, is over the feed dog racks. Place stitch regulator on

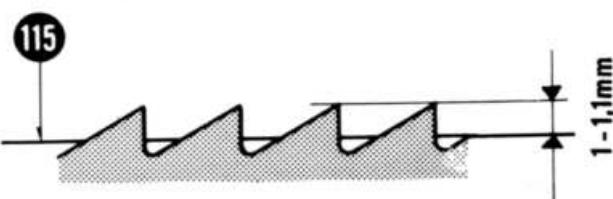


Fig. 40

its longest stitch and rotate hand wheel by hand.

If the gauge is lifted, the feed dog is placed too high, consequently, lower feed dog in the manner described. Is there any play between the gauge and the top-edge of the racks, then the feed dog has to be lifted accordingly.

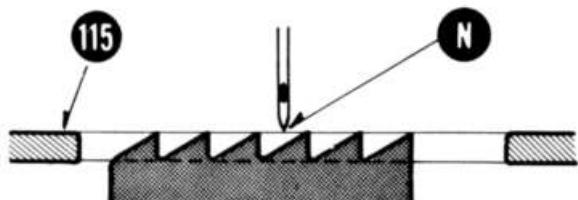


Fig. 41

N = tip of the needle and top-edge of feed dog.

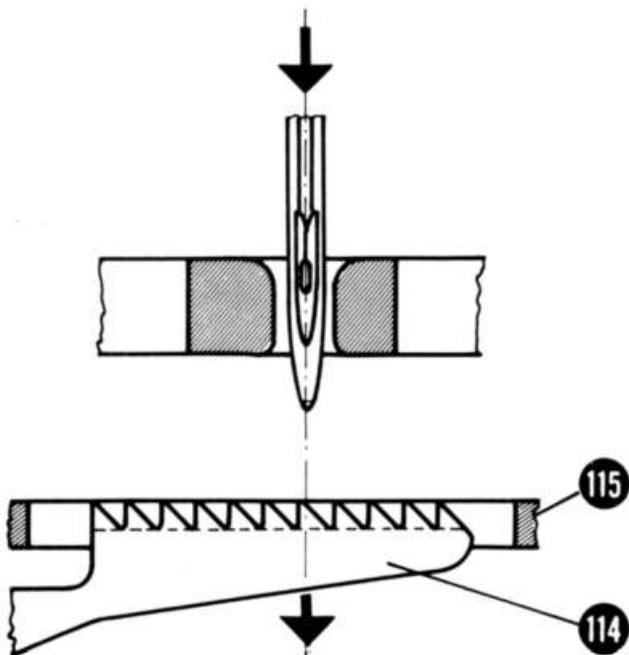


Fig. 42

31. Adjustment of feed dog lift

The lift and descent of the feed dog (114) must be correlated to the movement of the needle so as to take place at the correct time. With the base cover plate (117) in position, turn the machine until the upper edge of the eye of the needle is in line with the upper edge of the needle plate. At that moment the upper edge of the teeth must also be in line with the upper edge of the needle plate, with the feed dog descending (Fig. 42).

Adjustments are made by means of the lift eccentric (97); this is mounted on the crank plate (96) which is fitted to the bottom part of the vertical spindle (95), and accessible from the base cover plate side by means of a long screw driver. Loosen the screw (119), keep the eccentric in position by means of an inserted screw driver, and turn the handwheel (15) forward or back. This shifts the eccentric (97) on the crank plate, thus retarding or advancing the stroke. After completed adjustment retighten the screw (119).

32. Feed dog advance

In the same way as the lift and descent of the feed dog must be timed in accordance with the needle movement, so also must its advance. With the machine set for the longest stitch (stitch lever (22) down), the handwheel should be turned until the thread lever reaches its top position and the feed dog (114) be observed. In this position it should continue to advance by half a tooth.

This requirement is checked in the following manner: at the moment when the thread lever reaches its highest position, a needle is placed at right angles to the feed dog with the point pointing to one tooth. The handwheel is then rotated and the further advance observed. The distance between the needle point and the farthest advance should be half a tooth.

The advance is adjusted by means of the advance eccentric (120) which is mounted on the frame shaft (109). Loosen both screws (121), keep the eccentric (120) in position with a screw driver and turn the handwheel (15) forward or back, according to whether the feed dog should be retarded or advanced. Retighten screws (121).

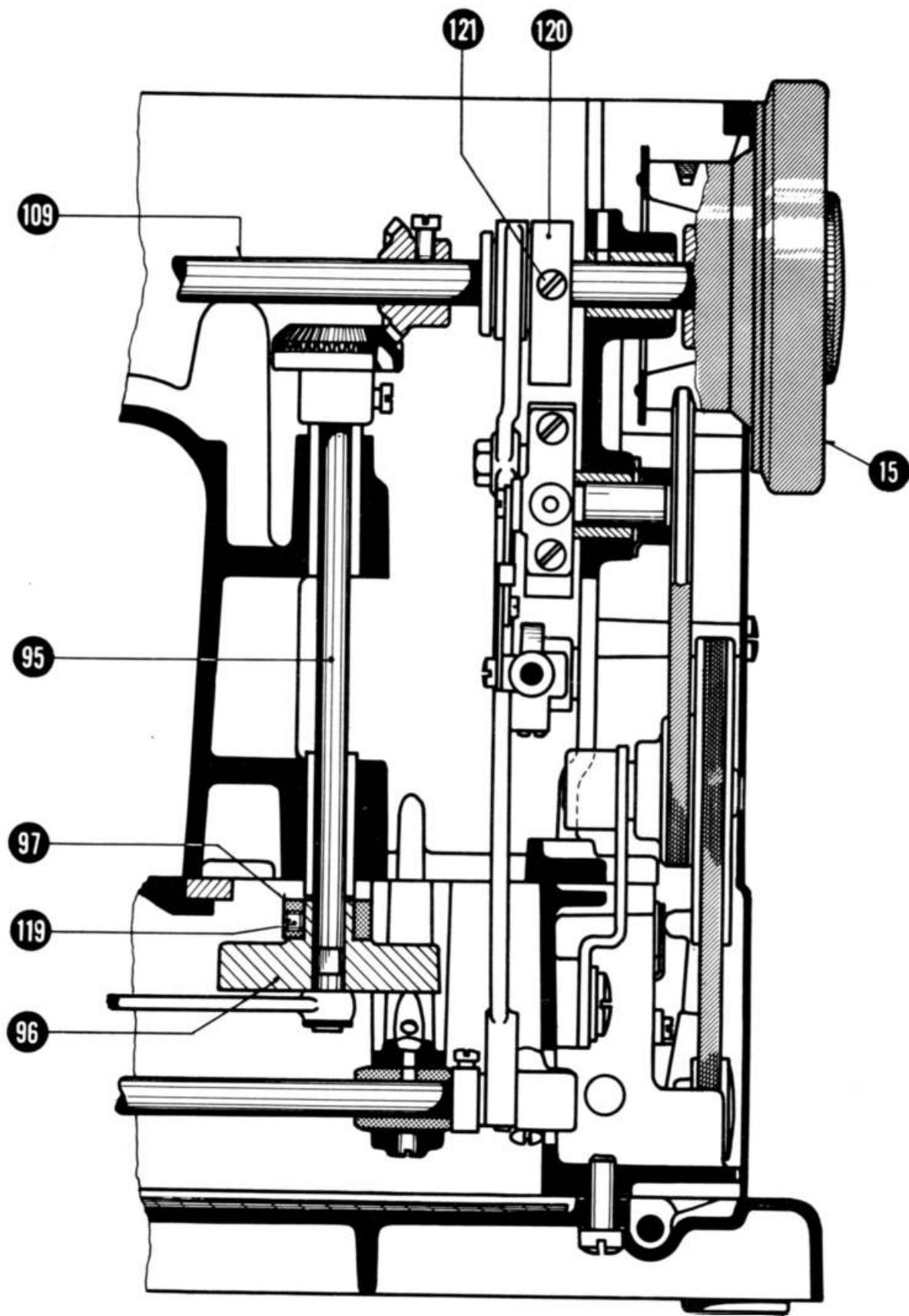


Fig. 48

33. Setting of cloth bar

1. **Setting straight:** The cloth bar is adjusted straight after inserting the hemmer (because of its long edge), then cloth guide screw (126) of the presser bar guide (125) is loosened and the sides arranged parallel to the needle plate slots. Finally retighten screw.

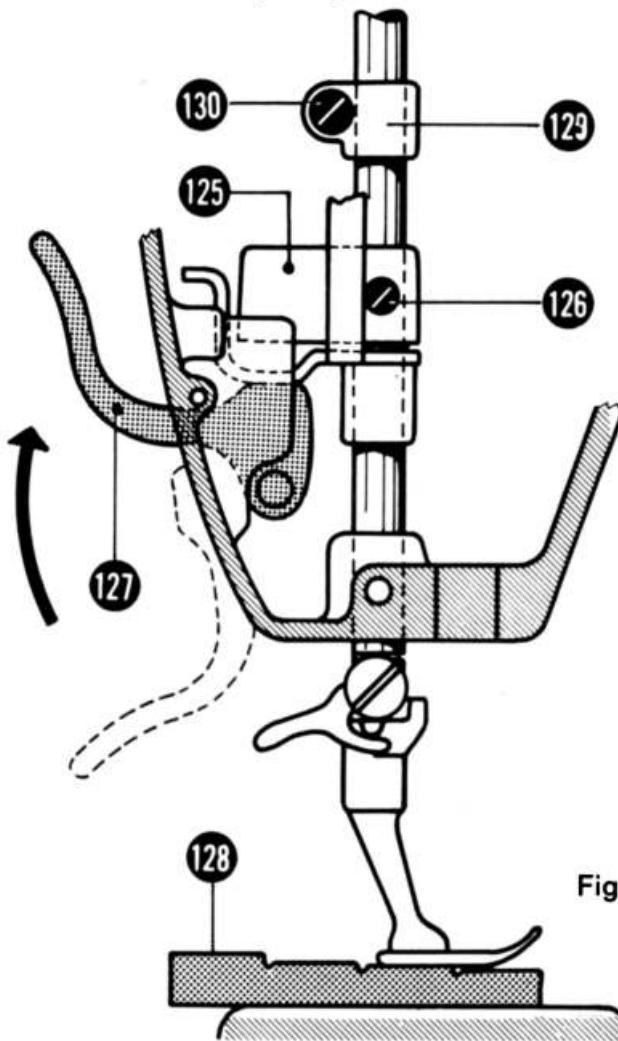


Fig. 44

2. Setting presser foot lift to 7 mm (= 9/32").

After inserting the ordinary working foot and lifting the foot lever (127) a 7 mm plate (128) (N 32 NU 14) is placed on the needle plate, whilst the feed dog is in its lowered position. The cloth bar guide (125) must now rest on the foot lever. Loosen the fixing screw (126) and lower block (125) until it rests, then retighten screw.

34. Jumper adjustment

Replace normal presser foot with darning foot; with feet dog in lowered position place gauge N 32 NU 13 (10 mm) on the needle plate directly below needle bar. Lower the needle bar into its lowest position. Now loosen needle bar carrier (129) positioned above the needle bar guide (125) and lower until it rests on the darning lever. Retighten screw (130) of carrier but avoid twisting it.

Check the correct setting of the darning foot by means of gauge N 32 NU 12 (0,8 mm). The distance between the darning foot base and needle plate has been obtained when setting. Now slide gauge N 32 NU 12 between needle plate and lower edge of foot base and check the needed spacing of 0,8 mm. It is perhaps necessary to align the foot base on the gauge by means of a pair of flat pliers.

35. Self-release spooling device (automatic winder).

On BERNINA Record 730 and classes 731 and 732 the self-release device is placed below the hinged cover. When winding thread, be careful that the reel (37) fills evenly. Thread coming from bobbin (37) has to be threaded below tension disc (133) around the swivel lever (34) and has to glide evenly up and down thread guide (38). Is this not the case, the swivel lever (34) has to be correctly aligned by bending it either up or down. It has to be bent upwards when the thread is winding only on the lower end of the bobbin and bent downwards when winding on the upper end.

Should lever (39) release the filled bobbin too early then, bend lever outwards; does it release too late, bend it towards the bobbin.

36. Setting of ornamental stitch gear with zigzag gear

The set of cams (140) with its 20 cams is driven by a worm (137) fitted to the

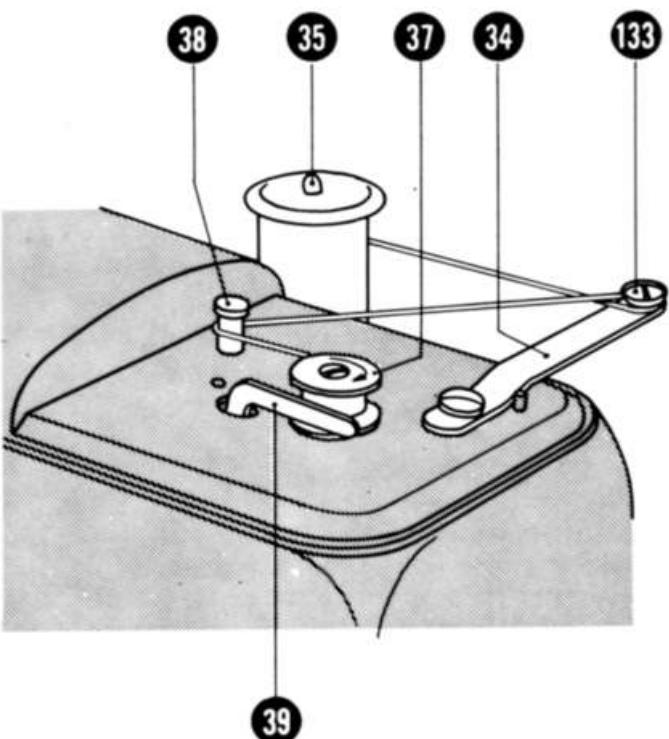
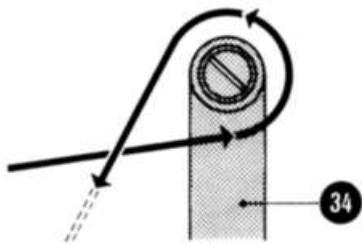


Fig. 45



frame shaft (109) over a worm wheel (157) which is firmly connected with the cams. One cam cycle corresponds to 36 revolutions of the handwheel, i.e. 36 needle stitches produce one ornamental pattern. The ornamental stitch gear must control the same timed movement of the needle as that produced by the properly adjusted zigzag gear.

First the lateral movement of the needle is adjusted. For this purpose cam No. 8 is used, by switching the scanner (141) to the cam without regard to its setting and pushing the engaging lever (13) towards the back. The setting must be identical to that obtained by the zigzag eccentric. The lateral movement of the needle must not start before it has left the fabric, and must cease when it begins to penetrate into it. (See Fig. 27).

Adjustments are carried out by turning the worm (137) fitted on the frame shaft (109). Loosen both screws (138), securing the worm, hold same in position pressed against the adjusting ring (139) and turn the handwheel forward or back. In the former case the lateral movement of the needle will be retarded, in the latter case it will be advanced. Retighten screws on worm. This adjustment is very important, as misadjustments will result in distorted ornamental stitches.

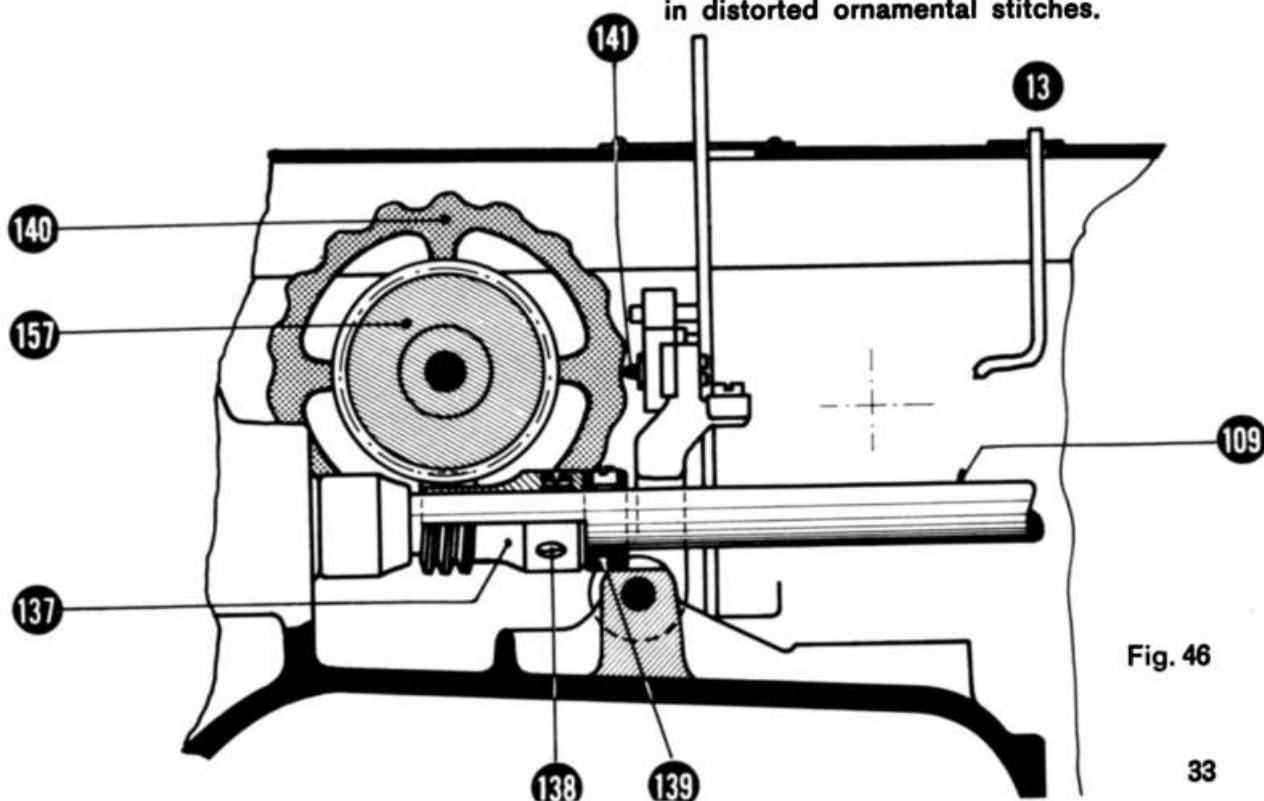


Fig. 46

37. Adjustment of scanner

The scanner (141) takes its impulses for the lateral movement of the needle from the cam (140). Its own axial setting affects the distribution of stitches in the needle hole.

The scanner can be shifted towards the front or back in the direction of the frame shaft. Care must be taken to ensure that the rounded part scanning the cams is always in full contact with the entire width of the cam.

If it is necessary to shift the scanner forward, loosen screw (142) below bobbin holder. Unscrew bobbin holder. When turning screw (143) clockwise the scanner goes forward, if the scanner is to be moved back the opposite procedure should be followed, then retighten screw (142). See Fig. 47 and 50.

Check stitch with several cams but at least with the eighth and last cams,

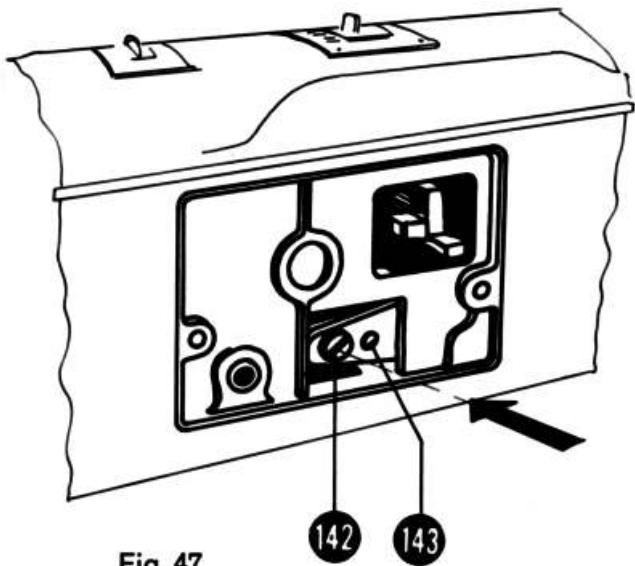


Fig. 47

especially with regard to the maximum amplitude of the needle. The stitching of the needle during ornamental stitching must be identical to that occurring during zigzag stitching (see stitching diagramm Fig. 27).

Next examine the change from zigzag gearing to ornamental stitch gearing,

and whether the two lever slots of the zigzag eccentric fork and the angle lever show parallel oscillation. If the slot of the angle lever swings forward and the zigzag eccentric fork rearwards, turn the zigzag eccentric by 180°. This adjustment is made by turning the worm (87) fitted to the frame shaft (see description under 25). (Lateral movement of the needle).

38. Adjustment of notched carrier

When an individual ornamental design is selected, the design selector lever (12) is moved from one cam to another. This movement is carried out in two periods:

1. Lifting of the scanner
2. Lateral movement of the scanner.

The notched carrier (144) restricts the lateral movement of the needle in such a way, that after lifting the scanner (141) (pulling the selector lever towards the handwheel) the needle still meets the needle hole.

The notched carrier is adjusted by loosening the 3 screws (145, 146, 147) and setting it to the described distance. Then retighten the screws.

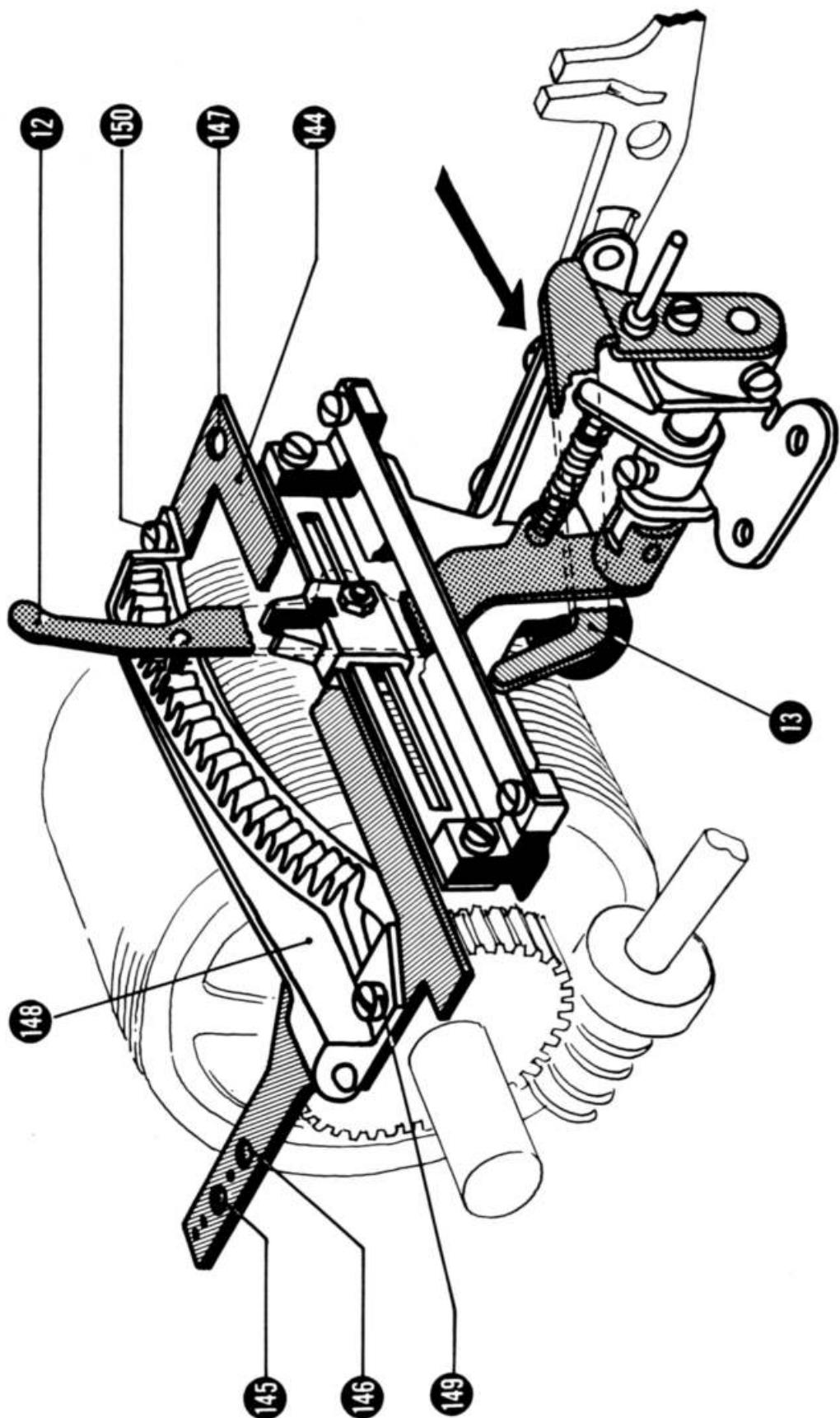
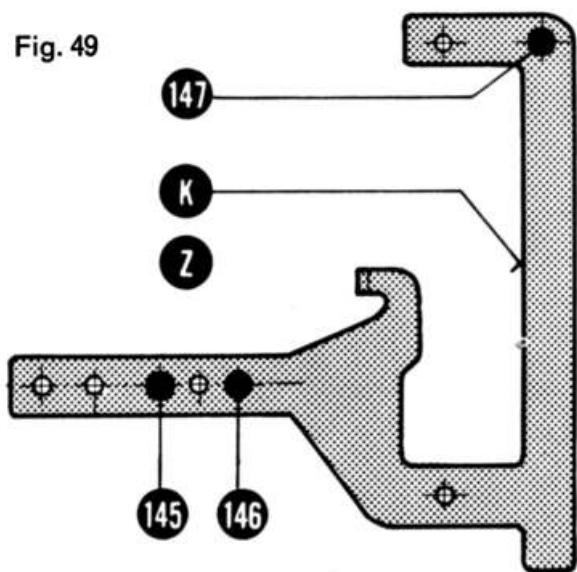


Fig. 48

Fig. 49



- Ⓐ = edge parallel to cam package shaft (lift off scanner evenly on each cam). Set edge to distance so that needle always meets the needle hole when scanner is lifted.
- Ⓑ = support of scanner when zigzag-sewing.

39. Setting the notched segment (148)

The notched segment has the task of keeping the ornamental stitch selector lever in the selected position. The lateral arrangement of the notches must be such that they coincide on the one hand with the cams and the scanner, and on the other hand with the black mark on the selector lever and the scale on the frame cover.

In order to achieve this setting, the notched segment must be moved laterally towards front or back, according to the difference found. To adjust, loosen the two fixing screws (149, 150), shift the segment slightly in the desired direction and retighten screws.

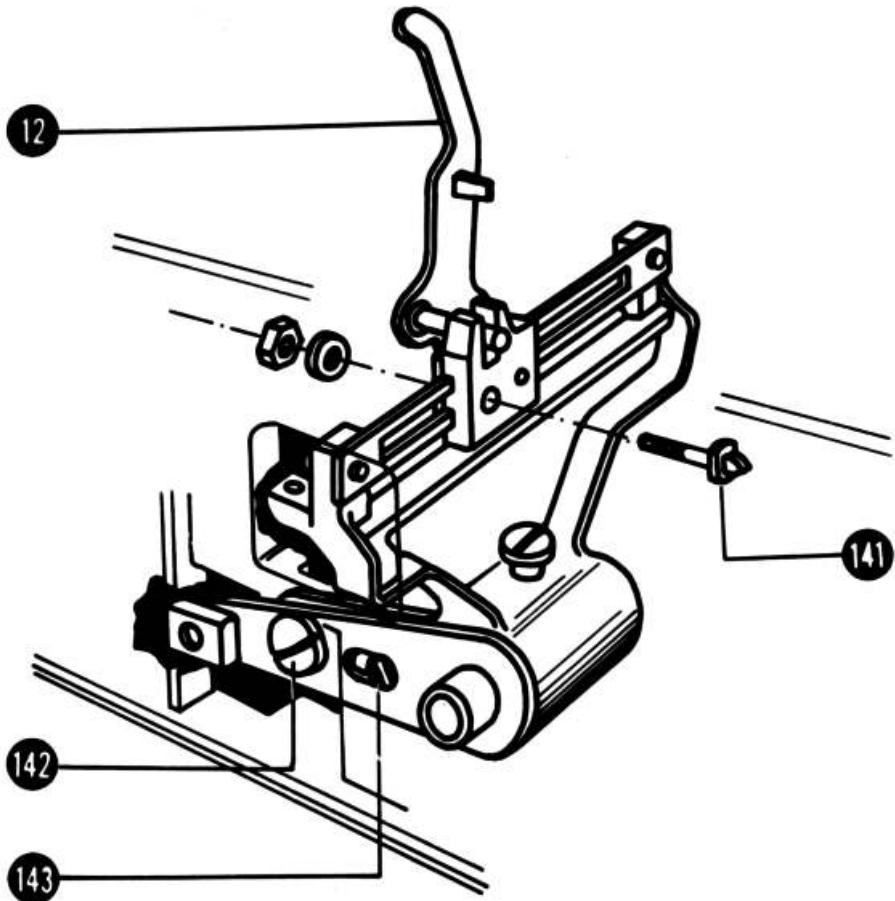


Fig. 50

40. Setting of the ornamental stitch pattern indicator

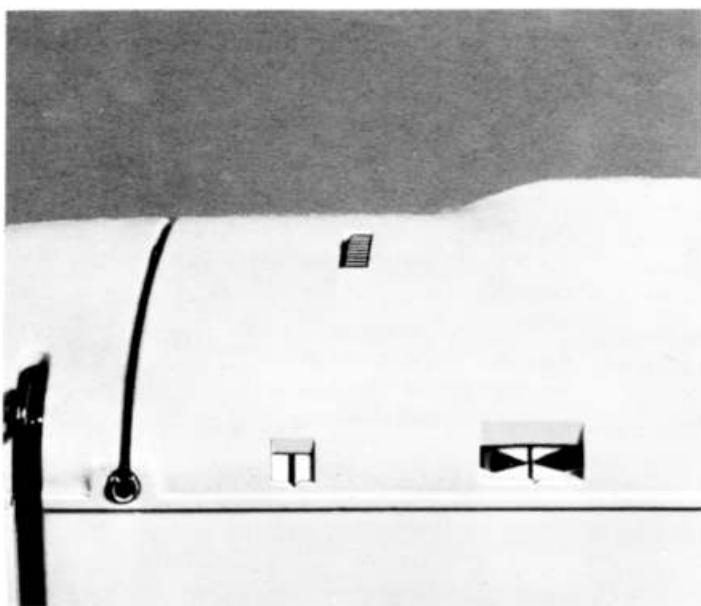


Fig. 51

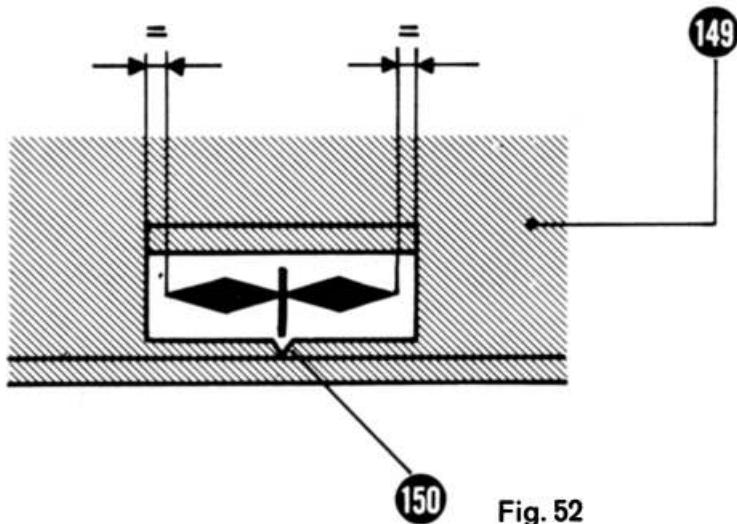


Fig. 52

The BERNINA models 730 Record and 731 are provided with an ornamental stitch pattern indicator. This device makes it possible to check whether a pattern has been finished sewing, or not. The patterns are sewn by means of single cams and all sewing is started on the same spot. In the sight hole appears the symbol of the pattern to be sewn and moves to and fro when sewing; this symbol is synchronized with the v-mark (150). The setting of the indicator is as fo-

lows: First set indicator scale (151). Run the machine and check whether scale symbol has same distance from both sight hole edges. (See Fig. 52). Is this not the case, loosen screw (152) and shift scale to and fro until you can set it to the position required. Scale should be pressed slightly into the direction of the cams in order to avoid touching the arm cover. Retighten screw (152). Now switch-on the ornamental stitch device - switch lever (13) to the rear - place

selector lever on cam 12 and start running the machine. Pattern cam 12 has been especially selected because the needle jumps only once the whole width. Please check when the side movement of the needle takes place. The instant the needle moves from the right to the left, the marked line (153) of the scale (151) has to be exactly above the fixed v-mark (150) on sight hole. First check whether the centre mark (153) of scale (151) arrives too early or too late above the fixed-v-mark. If it does arrive too early, loosen screw (154) of cam shaft. Now turn pinion (155) clockwise until both marks are above one another, then retighten screw (154).

If these marks meet too late then turn pinion in reverse. This time you don't need to loosen the pinion screw. As this pinion is also an axial limitation for the worm wheel shaft (158), be careful when tightening the screw (154) that the shaft has no play.

On model 731, which has only 4 cams, the setting of the indicator has to be made with cam No. 3. With the help of a sheet of paper determine the last needle stitch by placing the stitch length lever on number 1. Following the last stitch, both marks (153 and 150) have to be opposite each other. Is this not

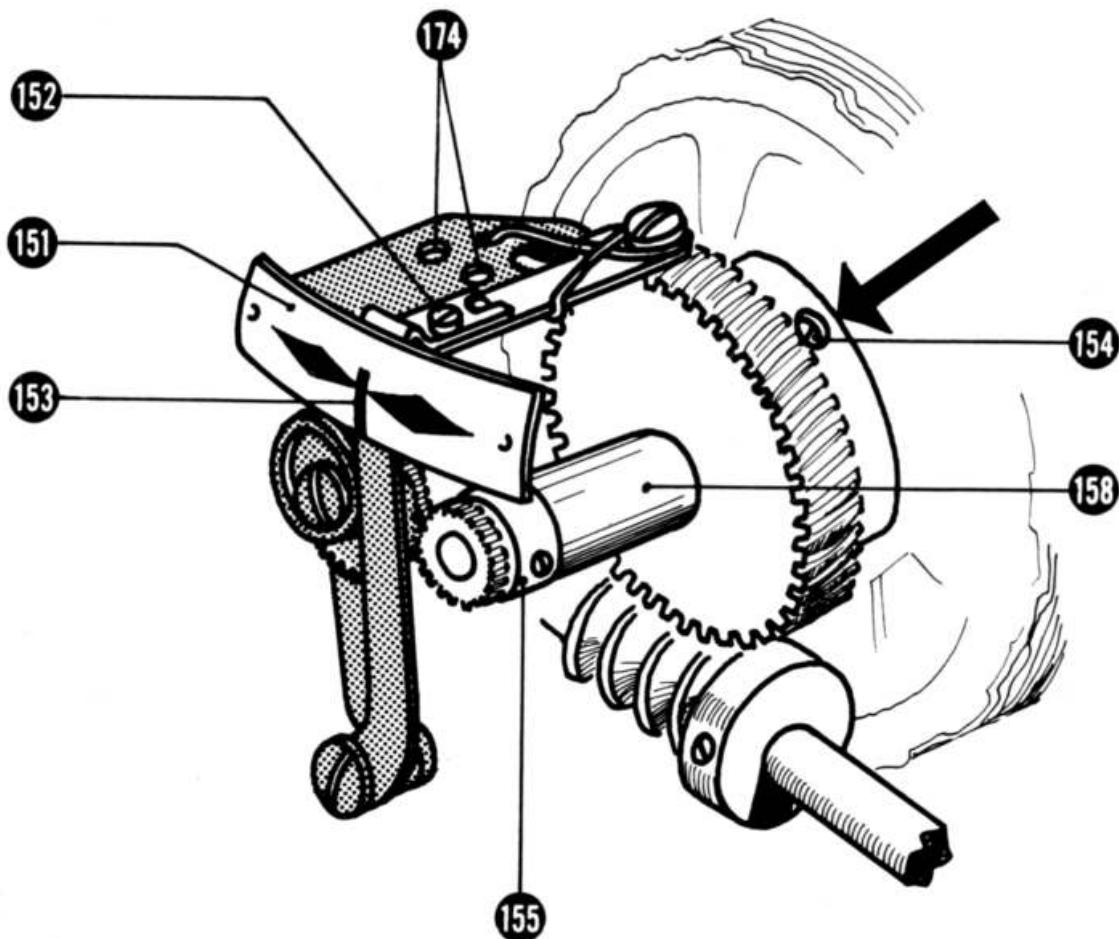


Fig. 53

the case, correction has to be made in the same manner as described before.

In case you need to dismantle the machine completely, you'll notice on the upper arm three T-marks (Fig. 54). By means of these marks, the indicator can be set as described before, but opening and closing the upper arm cover is no longer necessary. The eccentric wheel (173) together with holding plate (172) can be taken out of the arm by pushing the bent part of tool (171) N 32 NU 24 through both holes in the plate and eccentric. Before replacing indicator, set scanner on cam no. 12. Whilst the needle tip almost touches the needle plate, the centre mark on the edge of the frame which is identical with the v-mark on the sight hole has to be opposite of the scale mark. After loosening pinion (155) replace indicator into machine and retighten with both screws (174).

The eccentric wheel meshes with the pinion soon. Rethighten pinion screw. Should both scale lines not coincide, then reset scale. For this, unfasten screw (152) and scale in correct position, then retighten screw. Then retrieve tool (171). Be careful that no lateral play develops when tightening pinion.

41. Adjusting the automatic buttonhole device (Fig. 56)

Set shift lever (22) with its white lateral mark (161) somewhat below the zero of the stitch length scale. Be careful that

screw (162) isn't screwed in too far as otherwise the knob can't be moved. Now push lever (19) - marked with a button-hole symbol - to the top and engage. The stitch-width setting knob (18) is now drawn by means of grip (163) downward and then swivelled to the right as described in instruction book.

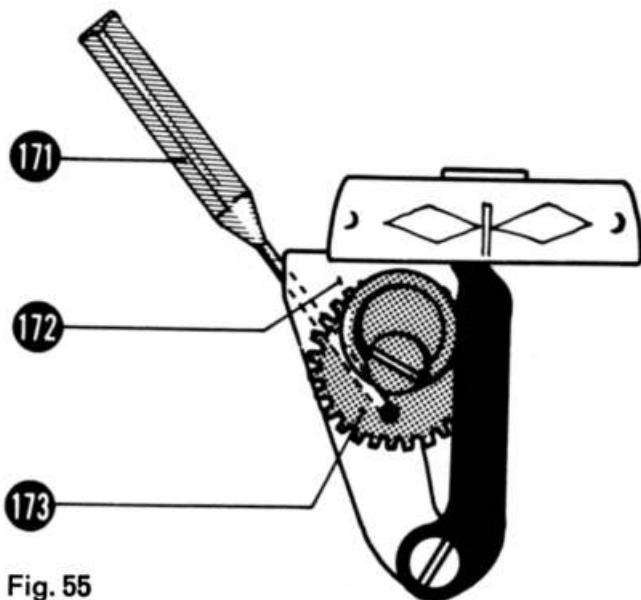


Fig. 55

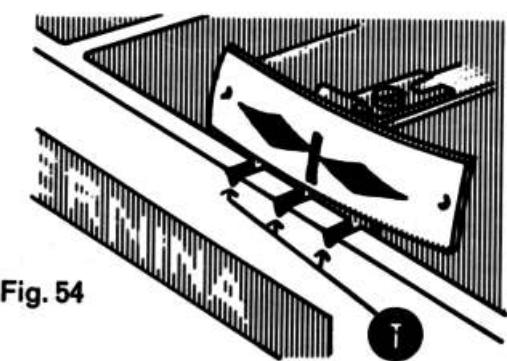


Fig. 54

Button LH - C. - RH. (17) is turned in such a manner that the white mark on button (18) is opposite the white mark on regulating knob (17). Now shift lever (22) upwards as far it will go. Then start with buttonhole sewing. Thread machine with sewing yarn no. 100 (left twist) or no. 50 (right twist) and insert needle no. 80. When sewing buttonholes on sewing material of middle thickness, be careful that regulating knob (21) with number 1 to 5 is set on number 1 and then determine closeness of stitches.

For doing this, set screw (164) in such a manner that the correct feed advance can be determined. Turn screw (164) clockwise and the stitchlength is shortened when sewing in reverse. Turn it counterclockwise then the density (closeness) of stitches becomes bigger. Now start sewing the first edge and the first bar. Then adjust density, e. i. feed advance for the second edge which has to

be sewn ahead. For this, adjust screw (165) on stitch width lever. Turn screw clockwise, then the feed advance becomes bigger; turn it anti-clockwise and feed advance becomes smaller. Be careful that both edges are sewn in the same stitch length. If the setting has been done correctly then it can be used for other fabrics too, but for this, you have to regulate the knob according to the thickness or strength of the fabric; e. i. for sheer fabric set on 1, for thicker fabrics set on 3, 4 or 5 or its intermediate positions as required.

42. Adjusting the satin stitch control

It is proper to the BERNINA sewing-machines that its classes 730 Record, 731 and 732 are fitted with the satin stitch control with which a certain stitch-density can be set with one single grip irrelevant of the once choosen fabric or yarn. From the right hand side of the sewing-machine housing protrudes stop lever (20). Unscrew the cover plate on the drive side for setting.

Now set knob (21) on number 2 and engage lever (20) by lifting it. Sew a seam with thread no. 30 (right twist) or no. 60 (left-twist) and check whether seam is

sewn tight enough. When sewing, each thread should lie close together. Is the seam sewn too tight then the eccentric (156) (Fig. 54) should be turned anti-clockwise. Loosen screw but don't unscrew it fully.

Screw is accessible from the handwheel side by means of screw driver (175) N 32 NU 25 - opening 1,5 mm - is the seam not sewn tight enough then turn eccentric (156) clockwise, e. i. move it downward. The set stitch density should agree with the setting used for buttonhole sewing when the same thread and the same sewing material is used. When adjusting satin stitch control eccentric, observe

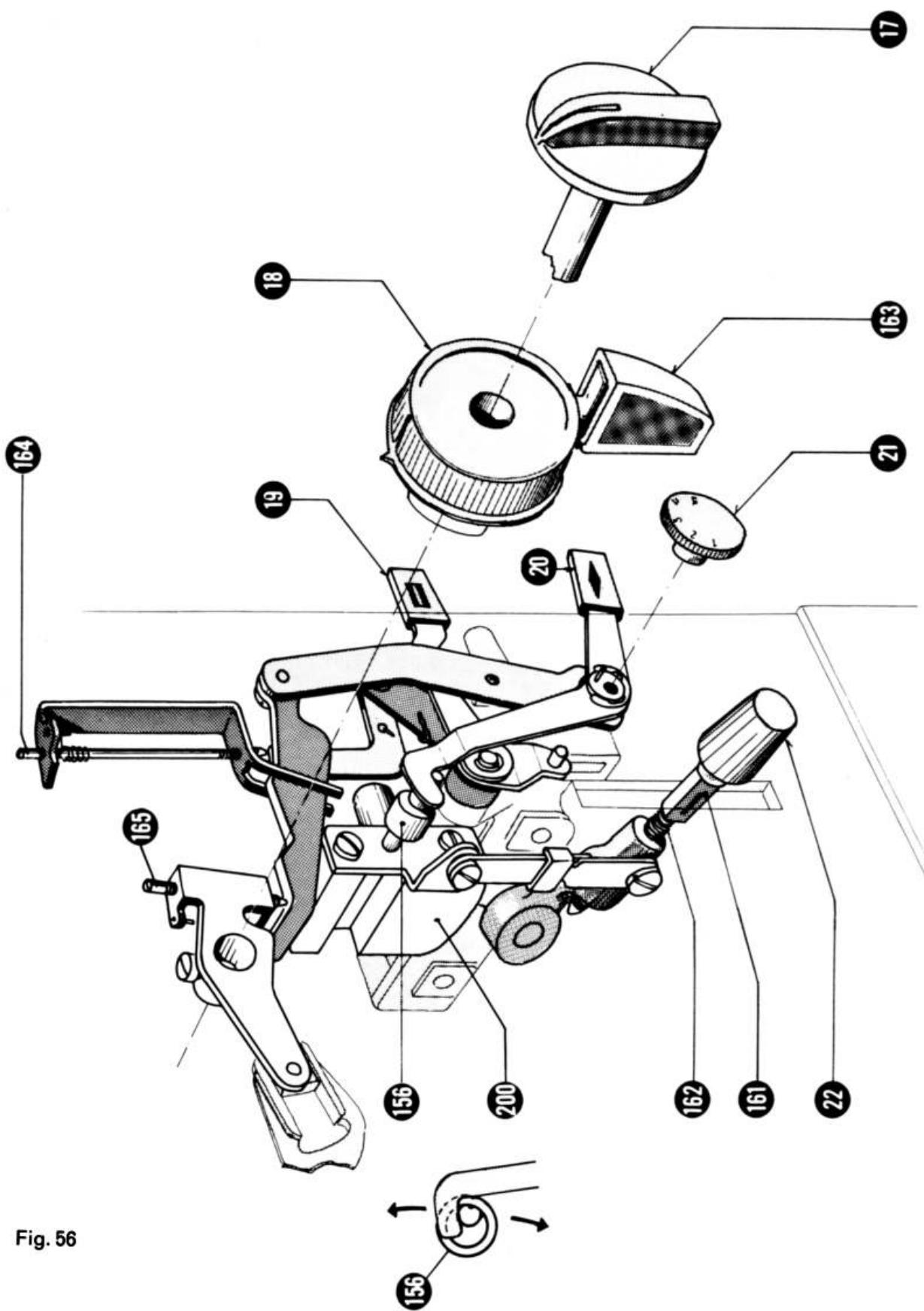


Fig. 56

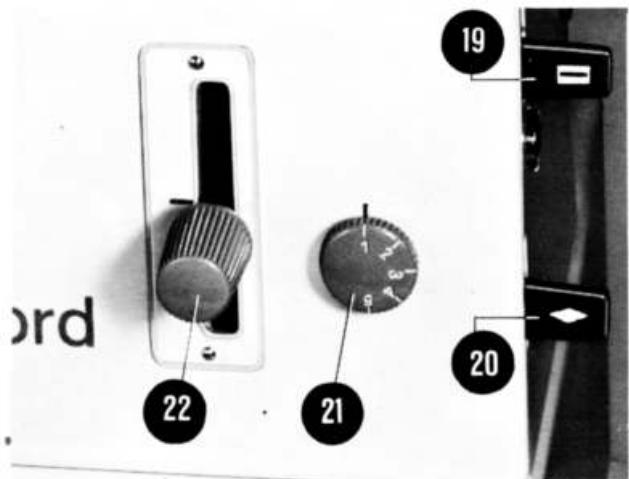


Fig. 57

that lock ring lies always close enough. This can be done by pushing lightly with box spanner (socket wrench) in the direction of crank lock ring. After adjustment, retighten screw.

When changing for buttonhole sewing and switching-on lever (19), the satin stitch control will disengage itself automatically.

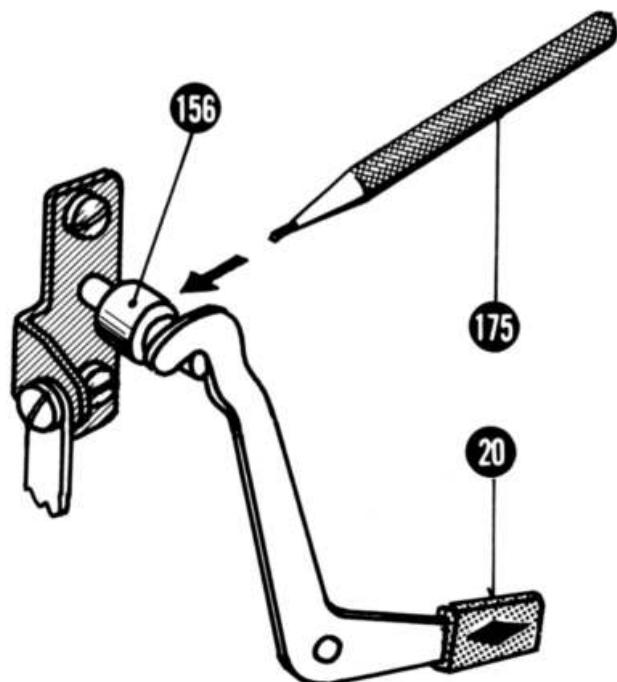


Fig. 58

IV. Subassembly of the machine

1. Drive

1.1. Setting of the V-belts

The motor drives the frame shaft by means of two V-belts. They are situated below the cover plate which is fastened to the housing side with two screws (166). After a certain time, the belts may slip due to stretching. Unscrew the belt cover and check tension. Press the two sides towards each other by about 5 to

6 mm ($\frac{13}{64}$ " to $\frac{15}{16}$ "). If found too loose, the belts have to be adjusted. This is done by loosening screws (167 and 168) of intermediary gear (169) and shifting step pulley toward the resulting X. Observe that the top belt tension has to be stronger than the lower. After correct adjusting, retighten screws (167 and 168).

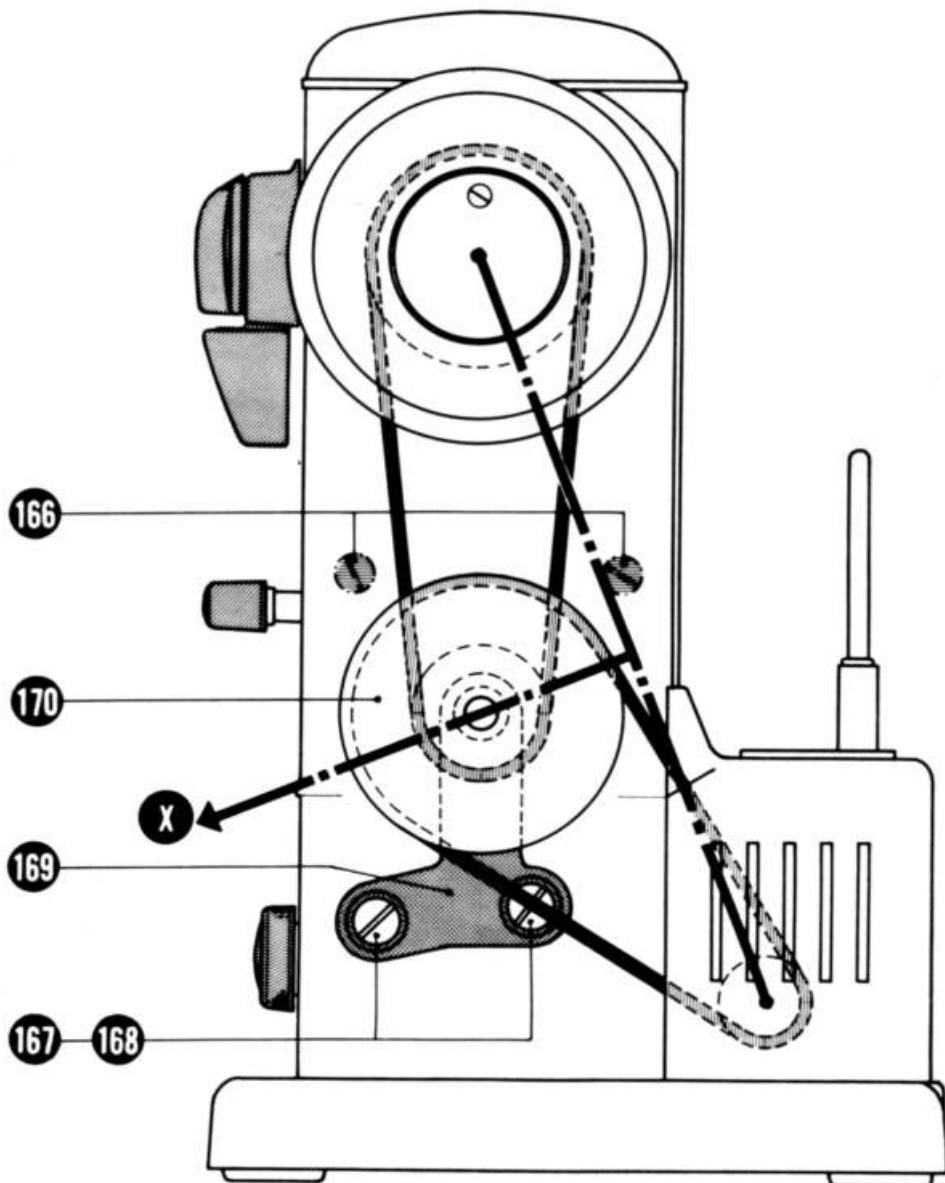
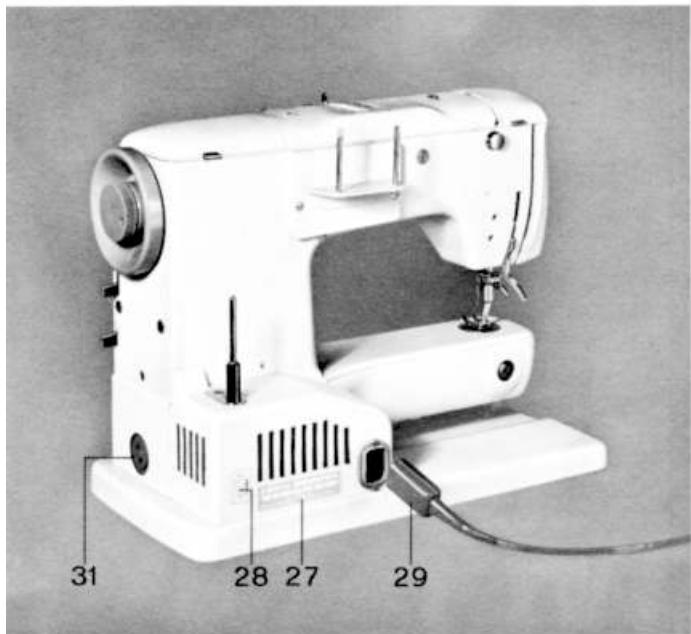


Fig. 59

2. Electrical installation



- 27 = rating plate
- 28 = change-over switch (slow-fast)
- 29 = mains cord
- 31 = plug-in socket for foot control starter

Fig. 60

2.1. Servicing the motor

BERNINA sewing-machines classes 730 Record, 731 and 732 are driven by a rear-mounted universal motor. By knee lever machines, motor and starter are united. Foot-starter models are not unitized and have their motors below a protective housing.

The complete installation is rated according to insulation schedule II. Such apparatuses are not allowed to have 3-core cables. Lubrication of motor is not necessary. Slide bearings are automatically lubricated, so that they need no service at all. From time to time, the length of the carbon brushes should be checked. To this intent, first the motor housing must be removed (take out mains plug)! Now the top carbon brush holder becomes visible. The lower is reached through the bed plate. With the help of a screwdriver remove the caps and carbon brushes fixed to springs become visible. If these carbon brushes are not renewed in good time - with a mini-

mum. length of 3 mm ($1/8''$) - they will damage the collector. When re-inserting the carbon brushes, please take care that the semi-circular brush ends match with the rounding of the collector.

2.2. Replacing the motor

The motor is fastened by two screws to the base (bed) plate. When replacing, first remove light cord. On foot-starter motor, unclamp connecting cord between foot-starter socket and motor. Light cords are fastened on top of mains socket. Foot starter cords are fastened to a transparent, varnish-coated metal bar on the motor. Now remove both black screws which can be reached from below base plate. Motor comes off easily. When reassembling, take care that motor is properly realigned with V-belts.

V. How to avoid machine trouble

First we should like to give you some hints how machine troubles might be avoided, what may be their cause, and how to remedy them.

1.1. On principle...

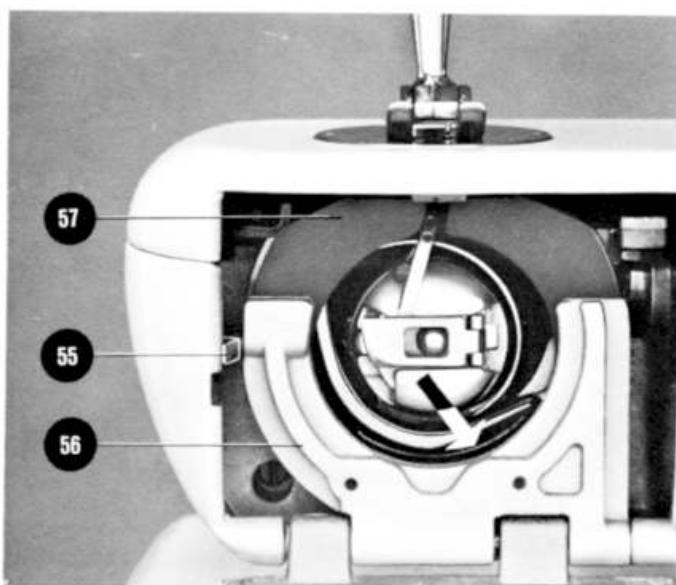
In most cases trouble is resulting from faulty manipulation of the machine. However, should other causes be presumed, the machine has to be examined, whether:

- a) the needle is correctly set. The long groove should always be in front and the needle threaded from front to back;
- b) the needle is the correct size for the thread; for darning of fine fabrics use needle size no. 70, for other sewing work needle size no. 80 or no. 90. Re sizes of needles and threads see page 13;
- c) the machine is properly cleaned. Remove free arm cover plate and clean all lint. Cleanse feed dog with brush;
- d) shuttle race is properly cleaned. This cleansing is made in the following way:
For proper care and thorough cleansing of the machine the shuttle should be removed from time to time from its race.
Raise needle bar to its uppermost position and with the thumb of left hand press down spring lever part 55 to the left of shuttle race, thus enabling the locking bridge 56 to swivel down together with shuttle race cover 57. After having withdrawn bobbin case with shuttle, it will be easy to clean the shuttle race from jammed thread ends and lint, using the brush to do so. Never use hard in-

struments, such as screwdrivers a.s.o. to perform this, as otherwise the shuttle race might get damaged. After this cleaning has been done, replace first shuttle, then close locking bridge 56 with shuttle race cover 57, and finally insert bobbin case. Make sure that the locking bridge has engaged correctly;

- e) the shuttle race has been oiled correctly with a few drops of oil (see fig. 61);
- f) no thread ends are stuck between the thread tension discs;
- g) no thread ends are jammed under the bobbin case tension spring;
- h) the machine can easily be started with handwheel.

Fig. 61



2. The causes of upper thread breaking
may be the following:

- a) The use of badly polished needles of inferior quality. Needles should always be purchased at a BERNINA shop;
- b) Needle incorrectly set. Long groove must always be in front;
- c) Needle is bent or blunt;
- d) The relation between size of thread and needle is not correct (see table on page 10);
- e) Upper tension thread is too tight;
- f) Thread of bad quality, full of knots. Thread dried out by too long storage. Thread should never be stored in heated rooms.
- g) Stitch plate hole has been damaged by the needle and requires re-polishing;
- h) Shuttle point is damaged.

3. Cause of lower thread breaking
can be:

- a) Lower thread tension too tight;
- b) Lower thread badly wound on bobbin;
- c) Bobbin is deformed and jamming in the case;
- d) Stitch plate hole has been damaged by the needle and requires re-polishing.

4. Missing stitches

may be caused by:

- a) using unsuitable needles of other make. Always use needles of system 705;
- b) needle is bent;
- c) needle not correctly set; long groove must always be exactly in front; when inserting needle push it up as far as it will go;
- d) needle of inferior quality or badly polished;

e) size of needle and size of thread are not in good relation.

5. Needle breaking

may have the following causes:

- a) needle holder screw not securely tightened;
- b) upper thread tension too tight;
- c) the material has been pulled from under the presser foot towards the front, after having finished with the sewing work. Thus the needle got bent. Always remove the material from the machine by pulling it back from under the presser foot base;
- d) size of needle and size of thread are not in correct relation together. Often the needle is too thin for too thick a yarn, whereby the needle becomes bent;
- e) use of thread of inferior quality, unevenly twisted, or having knots;
- f) during sewing do not pull the material too strongly towards the back.

6. Faulty seams

a) A faulty, uneven seam is formed:

1. if there are thread ends between the thread tension discs;
2. if there are thread ends under the bobbin case tension spring;
3. if the bobbin is deformed and jamming in the bobbin case;
4. if the thread is not evenly manufactured;
5. if the shuttle is not oiled;

b) when sewing tricot or other knit goods, make sure of the following.

1. tricot should always be basted with darning thread, never with basting thread;
2. use perfect needles of size no. 70 or 80;

3. the thin area of the material should be placed to the left under the presser foot;
4. sizes of needles and thread should be in perfect relation;
5. if the zigzag stitch seams are not elastic enough, adjust for a larger width and a shorter stitch length in order to enlarge the elasticity of the seam;

c) puckered seams:

In most cases the cause of puckering is too tight a tension on upper and under thread. When sewing tricot and other knit goods, the material must never be pulled to the back with the hands; otherwise the seam gets puckered. Care has to be taken that when sewing this kind of material the feed towards the presser foot be always sufficient, by means of lightly pushing the tricot on both sides of said presser foot.

7. The machine operates too slowly

The motor does not work correctly:

- a) tension of drive belt may be too tight or too loose;
- b) the sewing machine has been idle for a long time in a moist room. In such a case it must be placed in a room with normal temperature for some time and subsequently the machine should be oiled;
- c) if oil of doubtful quality has been employed, the machine may become gummed and eventually jam. If lubrication of the sewing machine with petrol does not improve the running, dismantle and cleanse.

General notice

To prevent any damage to the presser foot, place a piece of material under it. If machine will be idle for some time you may do alike.

In order to avoid thread jamming, make sure that after every sewing operation

the thread take-up lever is raised to its uppermost position. This precaution will greatly help to avoid troubles.

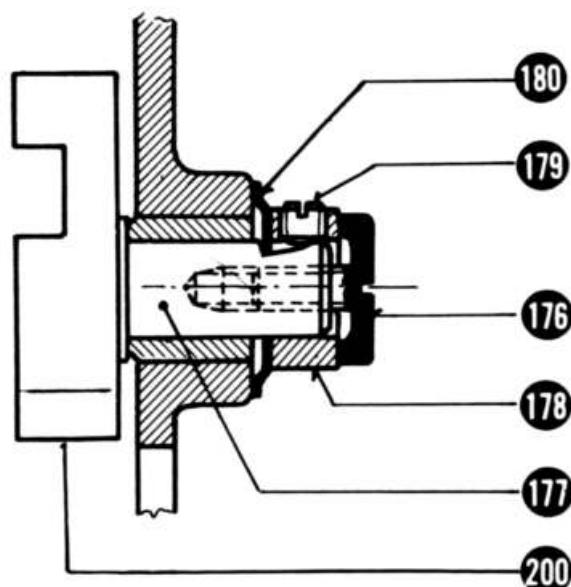


Fig. 62

8. When stitch regulator becomes loose

If shifting of the stitch regulator becomes too easy, adjustment is recommended.

The stitch-regulator crank (200) (see figures 56 and 62) has a threaded journal and is limited by a lockring (178). Drive screw N 32 NU 18 (176) into journal (177) until it lies on the lockring. After loosening lockring-screws tighten screw (176) until stitch regulator lever (22) moves harder. After doing this, retighten lockring-screws (179). Tension ring (180) below lockring (178) is to be tightened lightly in the same manner.