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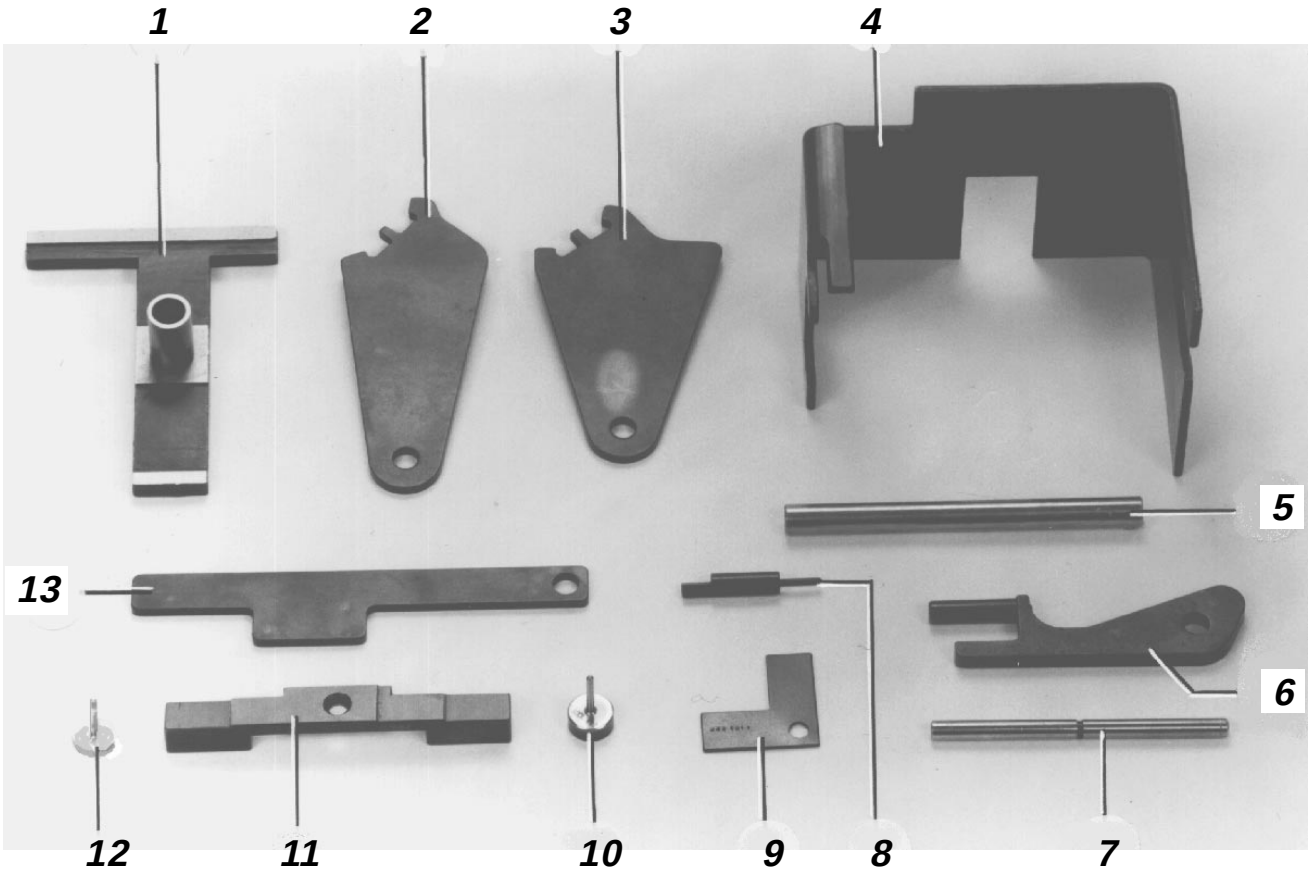
Service manual N291

1. Set of gauges and handwheel positions

1.1 Parts of the set of gauges

The pin 7 of the 13-part set of gauges (parts no. 491 79991) is also incorporated in the accessories of every machine. It is thus possible to lock the handwheel in the positions A, B, C, D, E and F, even without the set of gauges.

Gauge	Parts no.	Adjustment
Gauge 1	244 1001	– Height of the hook shaft
Gauge 2	491 79995	– Timing of the sewing foot stroke motion
Gauge 3	491 79994	– Timing of the sewing foot feed travel
Gauge 4 with Pin 5	491 80001 742 52082	– 0-position of the "bottom" stitch regulator
Gauge 6	491 79997	– 0-position of the "top" stitch regulator
Pin 7	791 8110	– Locking the handwheel in the desired positions
		– Equalizing the foot strokes
		– Position of the adjustment disk and further elements
Gauge 8	244 1014	– Distance between the hook and needle
Gauge 9	241 1011	– Distance between the thread catcher and thread trimmer
Pin 10	244 1009	– Needle bar height for needle system 2134-35 DU KK
Measuring bridge 11	212 4942	– Needle bar height
		– Feed dog height
Pin 12	244 1008	– Needle bar height for needle system 134 KK
Gauge 13	491 79996	– Foot stroke adjustment range

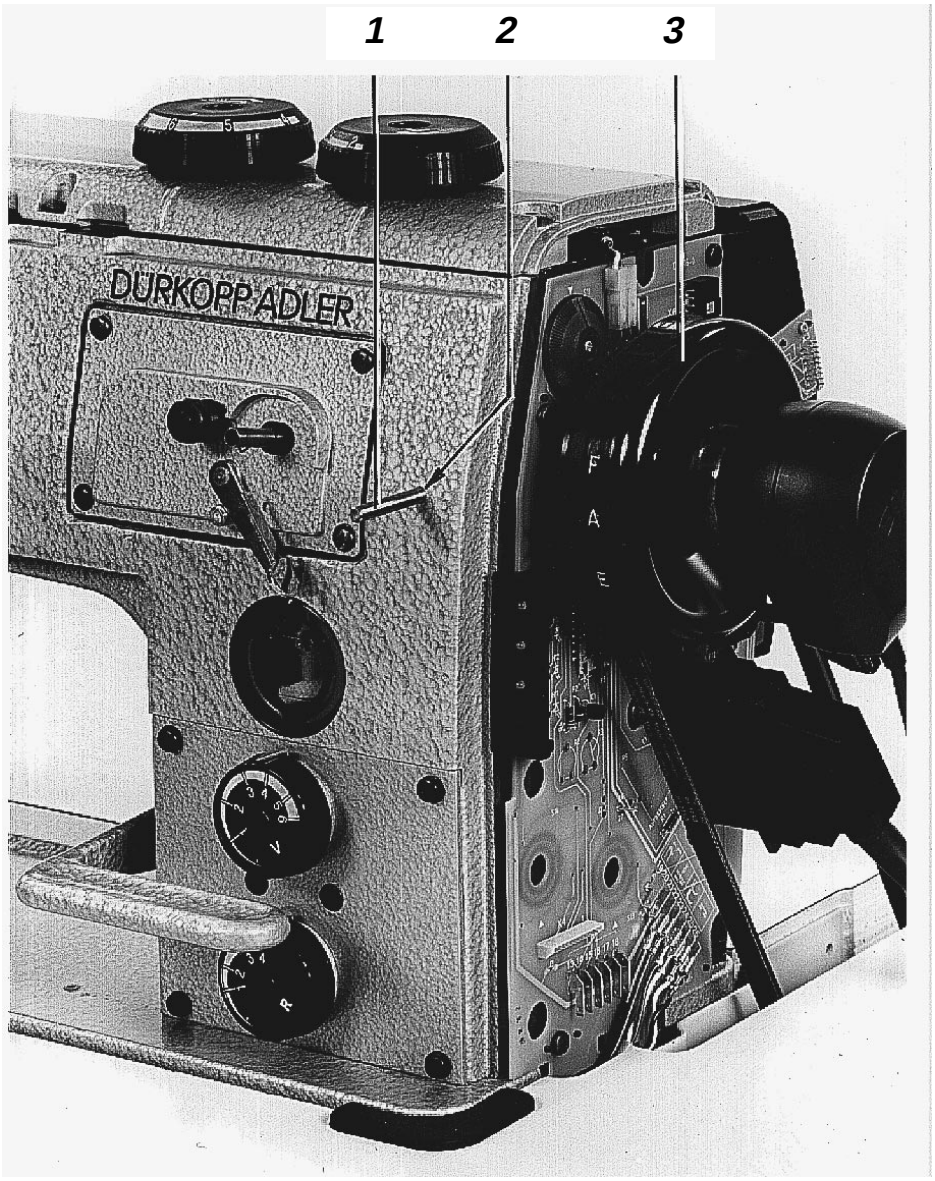


1.2 Adjustments in the different handwheel positions

For some adjustments the needle bar or take-up lever must be in a defined position.
This position is marked by letters on the handwheel 3 and can be locked as follows:

– Turn the handwheel into the position defined for the adjustment.
– Slide the timing pin 1 into the hole 2 of the housing.
– Turn the handwheel slightly forward and backward until the timing pin can be slid all the way into the respective slot of the adjustment disk 4.
  Only with position F the pin must rest against the respective side of the cutout.

Slot	Position	Adjustment
A	Needle bar 2 mm behind the lower dead point	– Position of the adjustment disk on the arm shaft – Loop stroke – Needle bar height (without gauge) – Distance between the hook and needle
B	Needle bar nearing its upper dead point	– Timing of the feeding foot feed travel (with gauge)
C	Take-up lever nearing its upper dead point	– Position of the thread trimmer cam
D	Take-up lever nearing its lower dead point	– Timing of the feeding foot stroke motion – Setting the reference position of the synchronizer
E	Needle bar at the lower dead point	– Distance between the feeding foot bar and sewing foot bar – Checking the timing of the feeding foot feed travel – Needle bar height (with gauge) – Timing of the feed dog feed travel
F	Shortly behind the loop stroke	– Synchronizer (1st position)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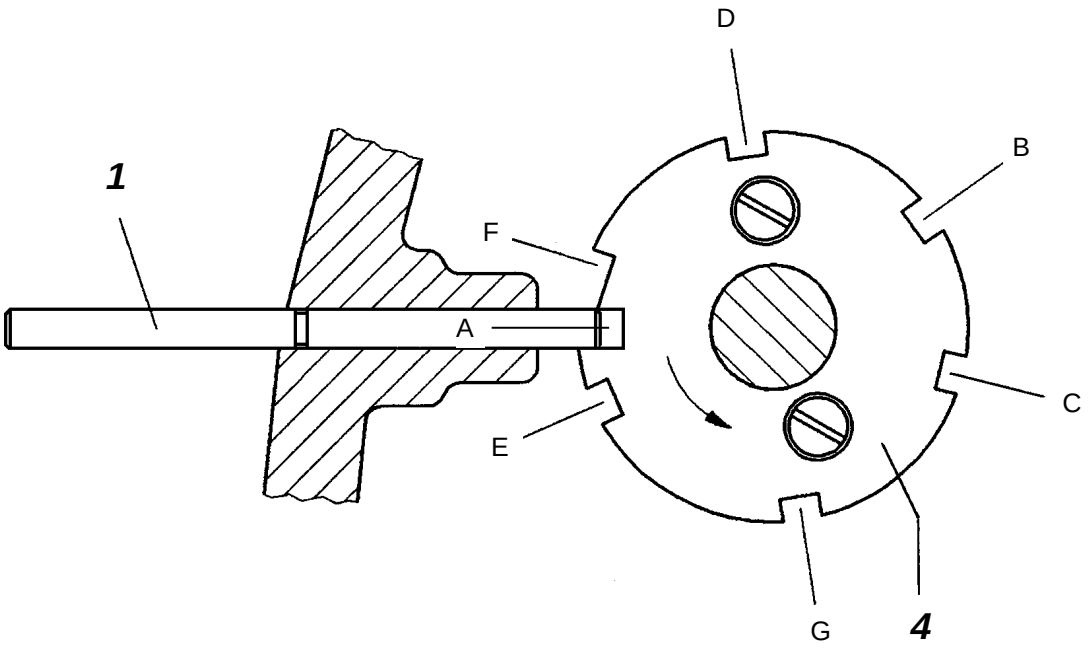
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2. Sewing machine

Turn off main switch!
Otherwise there is danger of injury!

2.1 Adjustment disk

Explanation:

The positions locked with the timing pin 1 are only correct, when the adjustment disk 4 has been adjusted according to the rule.

Rule:

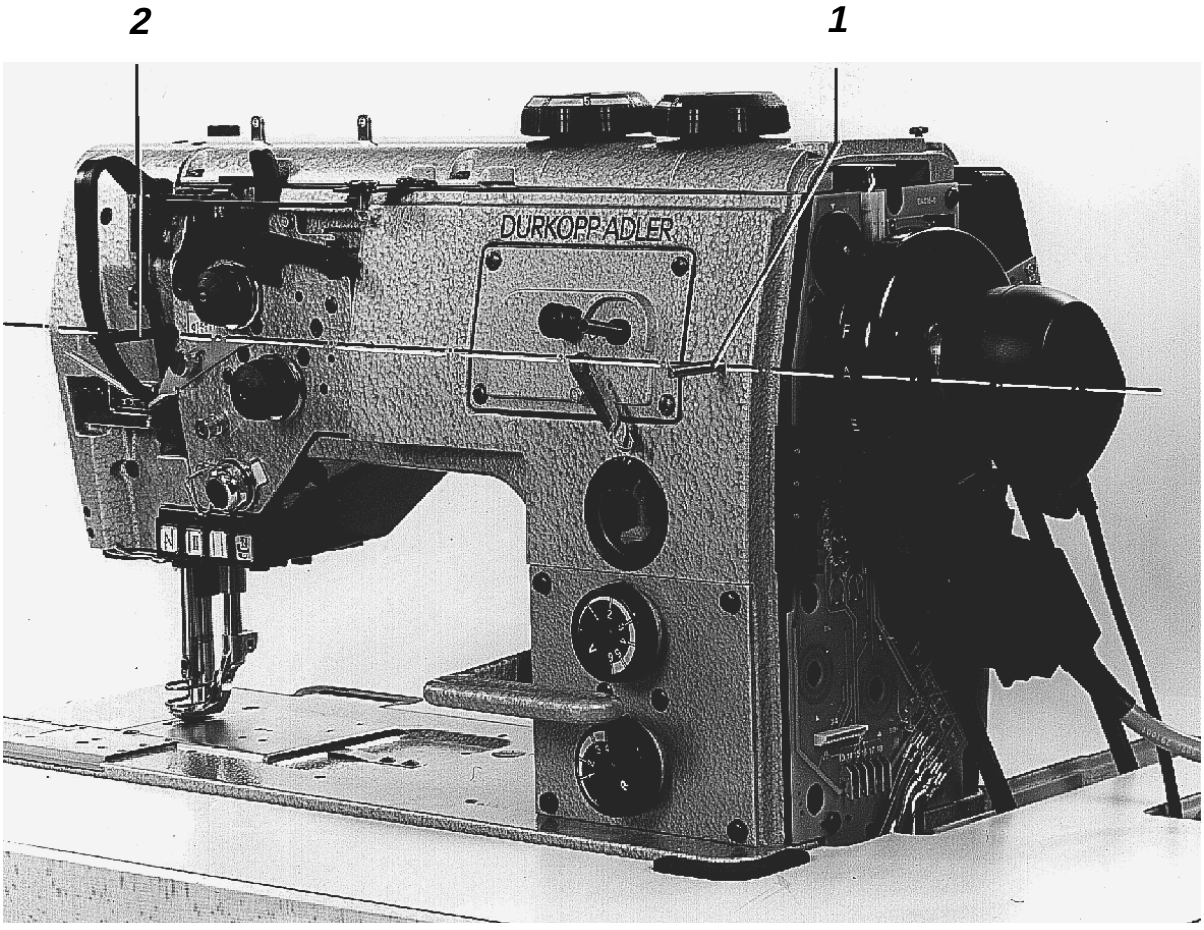
The groove in the arm shaft crank 3 and the lowest slot in the adjustment disk 4 must be aligned.

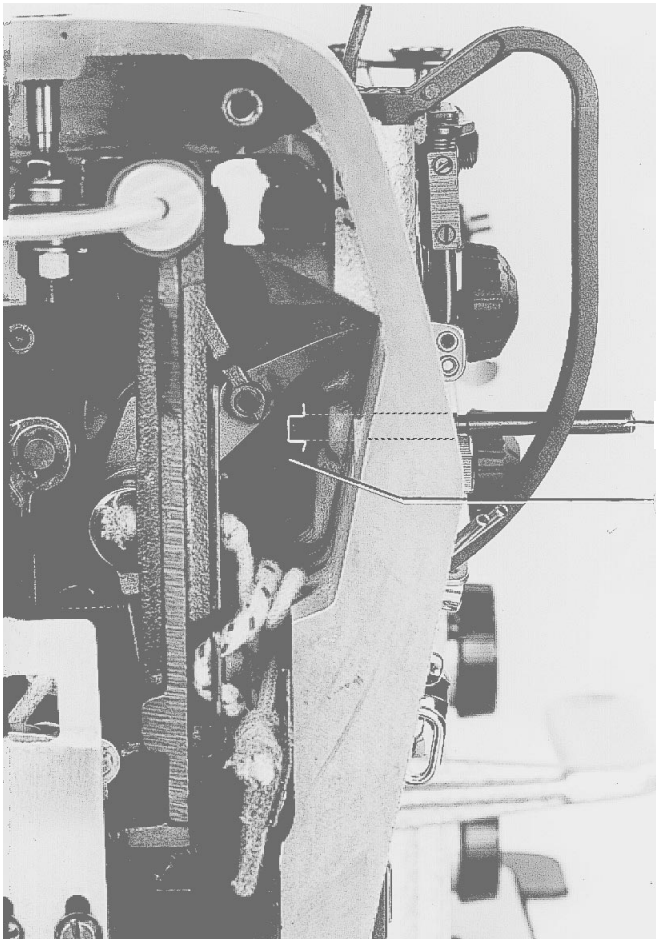
Check:

– Slide the pin 2 (5 mm Ø) of the set of gauges through the hole of the housing all the way into the groove of the arm shaft crank 3.
– Push the timing pin 1 through the hole of the housing right against the adjustment disk. When the pin is located in the deepest slot of the adjustment disk, the adjustment disk is positioned correctly. In this case, the ring groove in the timing pin is no longer visible.

Correction:

– Move the timing belt 5 on the upper timing pulley 6 to the left until its 2 screws are accessible.
To do this, use a round pin and turn the handwheel.
– Loosen the two screws at the timing pulley 6.
– Slide the pin 2 (5 mm Ø) through the hole all the way into the groove of the arm shaft crank 3.
– Slide the timing pin 1 through the hole in the housing.
– Turn the timing pulley until the timing pin 1 can be slid into the deepest slot of the adjustment disk 4.
– Tighten both screws at the timing pulley.
At the same time shift the timing pulley to the right against the timing pin 1.
– Remove both pins.
– Turn the handwheel until the timing belt is again centred on the timing pulley.

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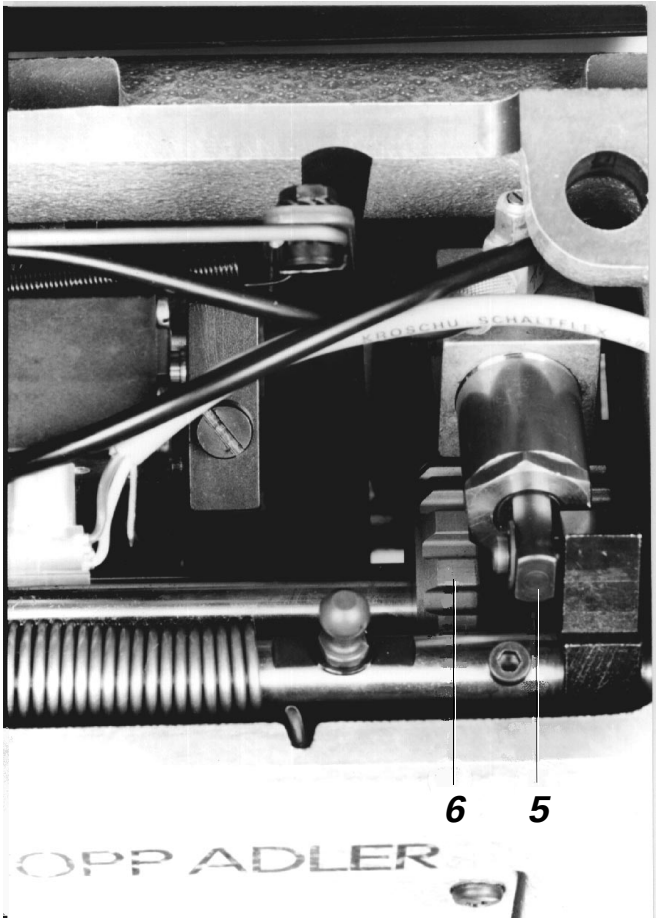
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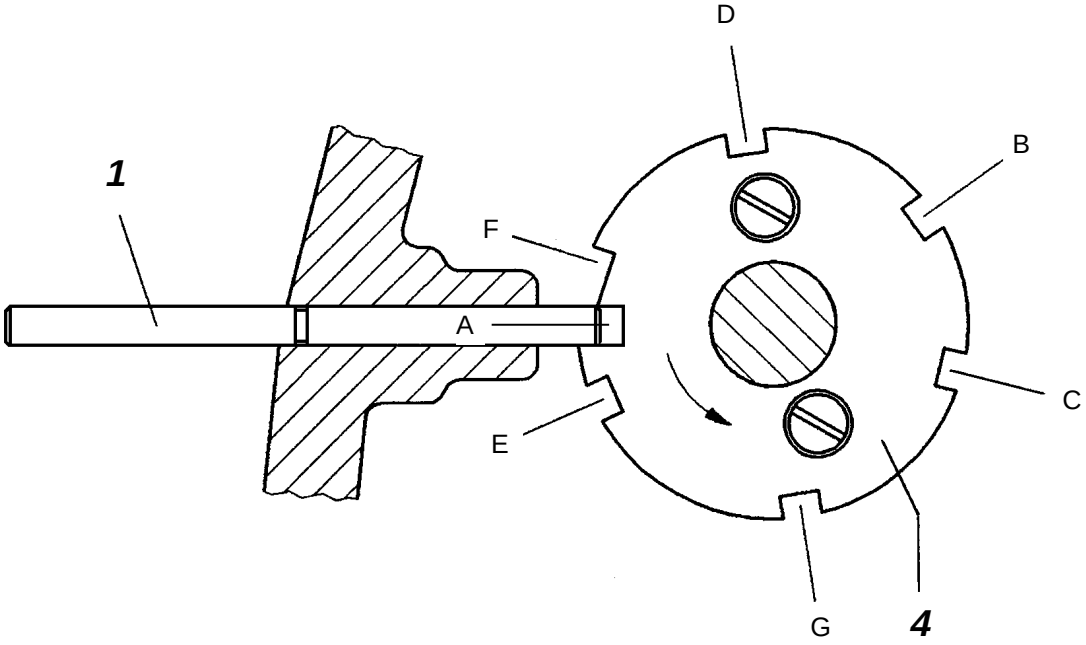
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2.2 Stitch regulator

Turn off main switch!
Otherwise there is danger of injury!

2.2.1 Stitch regulator 0-position for the bottom feed

Rule:

The feed dog should perform the minimum possible feed travel, when the respective dial has been set at the stitch length "0".

Check:

– Set the stitch length "0".
– Lock the sewing feet in their lifted position.
– Turn the handwheel.

Pre-adjustment with gauge:

– Slide the gauge 1 onto the coulisse shaft 2 and axle 4.
– Insert the pin of the gauge 3 (8 mm) into the hole of the coulisse shaft 2.
– Loosen the screw 5 at the block 6.
– Turn the coulisse shaft until the pin of the gauge rests against the edge of the gauge.
– Tighten the screw 5.
– Check the adjustment, and if necessary correct.

Correction:

– Loosen the screw 5.
– Insert a pin into the hole of the coulisse shaft 2.
– Turn the coulisse shaft accordingly using the pin.

2.2.2 Stitch regulator 0-position of the top feed

Rule:

The needle and the feeding foot should perform the minimum possible feed travel, when the respective dial has been set at the stitch length "0".

Check:

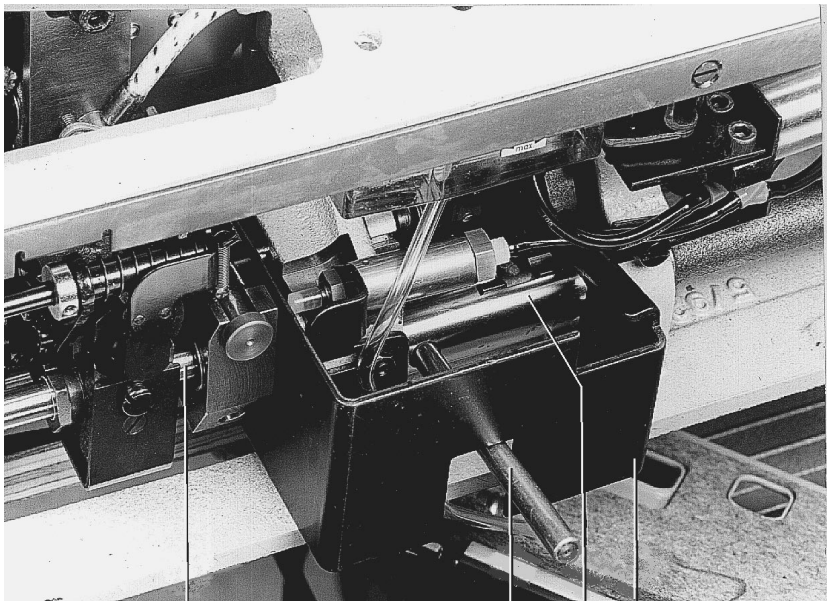
– Set the stitch length "0".
– Turn the handwheel.

Pre-adjustment with gauge:

– Loosen the screw 9.
– Insert the gauge 8 into the hole of the coulisse shaft 7 and push it against the flat at the arm.
– Tighten the screw 9.

Correction:

– Loosen the screw 9.
– Insert the pin into the hole of the coulisse shaft 7.
– To increase the feed travel:
turn the coulisse shaft 7 towards (+).
– To decrease the feed travel:
turn the coulisse shaft 7 towards (–).
– Tighten the screw.



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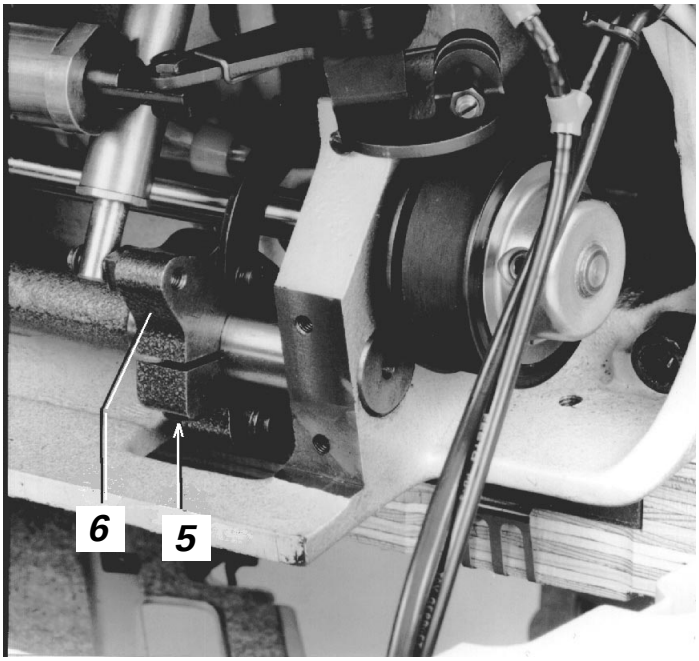
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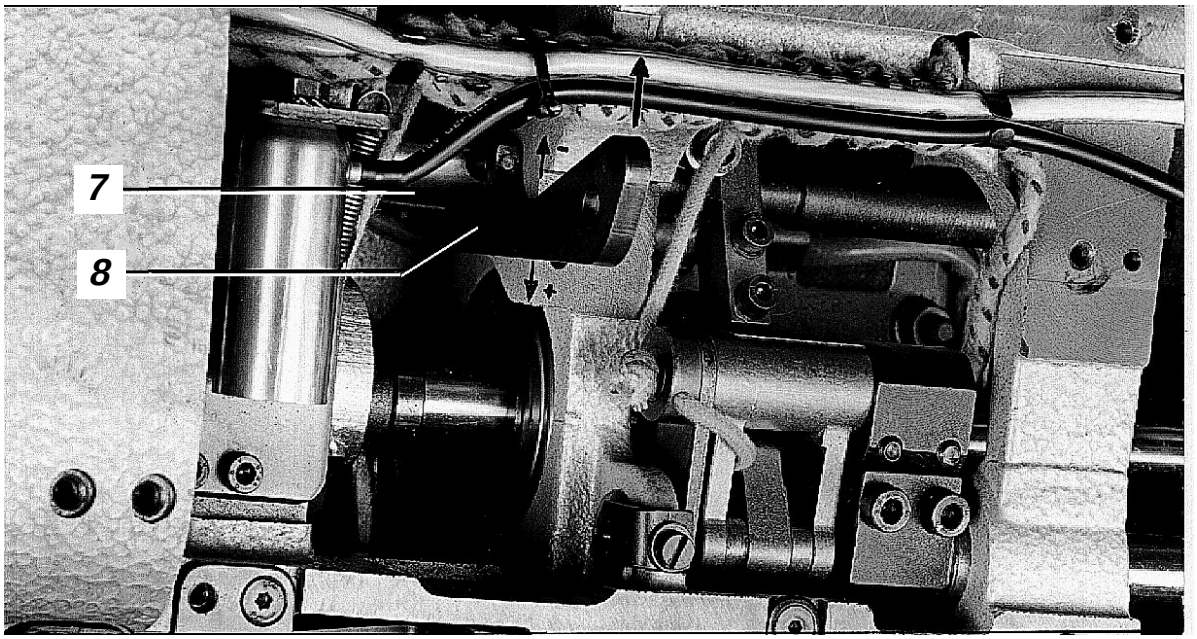
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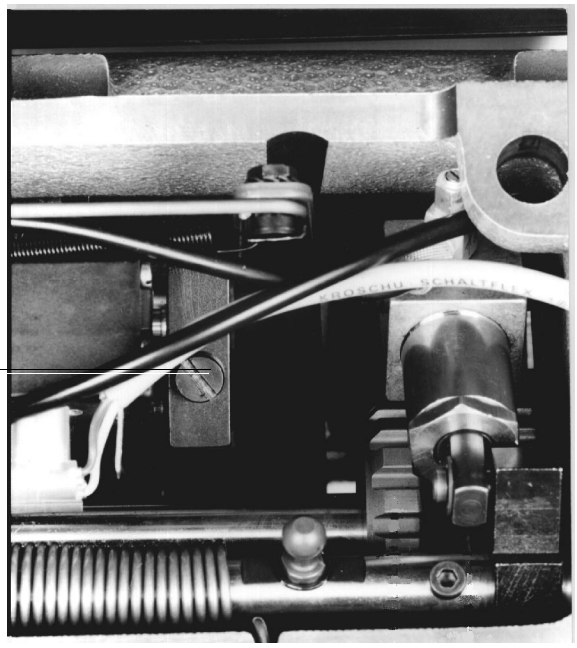
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2.3 Feed dog

Turn off main switch!
Otherwise there is danger of injury!

2.3.1 Feed dog position in the throat plate cutout

Prerequisite:

Correct distance between the feeding foot bar and cloth presser bar. (See 2.4.2).

Rule:

– In line of feed motion:
The feed dog should be aligned such that in line of feed motion the needle enters at the centre of the needle hole.
– Across the line of feed motion:
The feed dog should be centred in the throat plate cutout.

Correction in line of feed motion:

Loosen the screw at the feed lever 4 and change the position of the feed dog holder 2 accordingly.

Correction across the line of feed motion:

– In the case of small deviations:
Change the position of the feed dog on its holder 2 accordingly.
– In the case of greater deviations:
Loosen the screws at the stroke lever 1 and feed lever 4.
Change the position of the feed dog holder 2 accordingly.

2.3.2 Feed dog height

Rule:

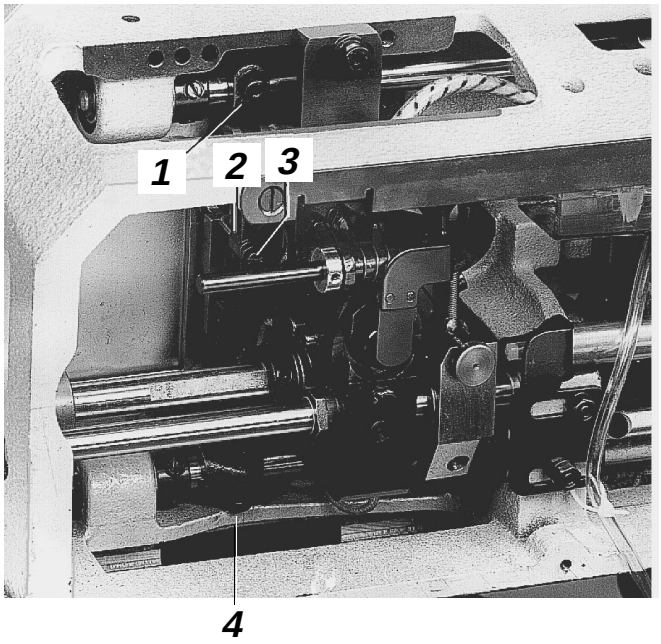
At its highest point of travel the feed dog should extend above the throat plate by 0.5 mm. In this position the feed dog should also be parallel to the throat plate.

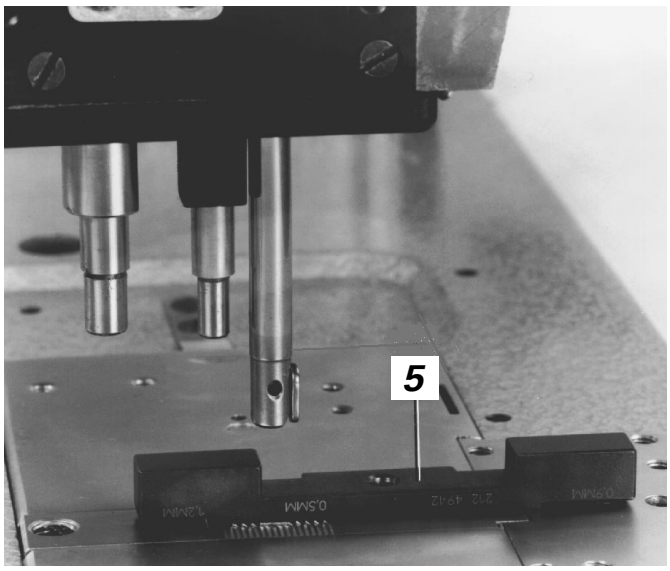
Check:

– Lock the sewing feet in their lifted position.
– Turn the handwheel until the feed dog has reached its highest point of travel.
– Check whether the height is correct using the gauge 5 or a feeler gauge.

Correction:

– Loosen the screw at the stroke lever 1 and change the height of the feed dog holder 2 accordingly.
– Slightly loosen the screws at the feed dog and turn the supporting screw 3 accordingly.





Turn off main switch!
Otherwise there is danger of injury!

2.3.3 Timing of the feed dog feed travel

Rule:

When the stitch regulator lever is actuated, the needle bar must not move under the following conditions:

– Maximum stitch length has been set.
– Handwheel locked in position E (needle at the bottom of its stroke)

Adjustment with gauge:

– Loosen the screws at the eccentric 2.
– Slide the gauge 1 onto the coulisse shaft and axle.
– Lock the handwheel in position E.
– Turn the eccentric until the gauge can submerge in its groove.
– Slide the eccentric to the right against the bearing.
– Tighten the screws at the eccentric.

Correction:

– Loosen the screws at the eccentric 2 and turn the eccentric accordingly.
  The eccentric is positioned correctly, when not only the rule is fulfilled, but also the slot of the eccentric points downward. If this is not the case, turn the eccentric by 180°.
– Move the eccentric to the right against the bearing.
– Tighten the screws at the eccentric.

2.3.4 Timing of the feed dog stroke motion

Rule:

When the needle is at the bottom of its stroke the feed dog should have reached its highest point of travel.

Check:

– Lock the sewing feet in their lifted position.
– Set the stitch length "0".
– Turn the handwheel.

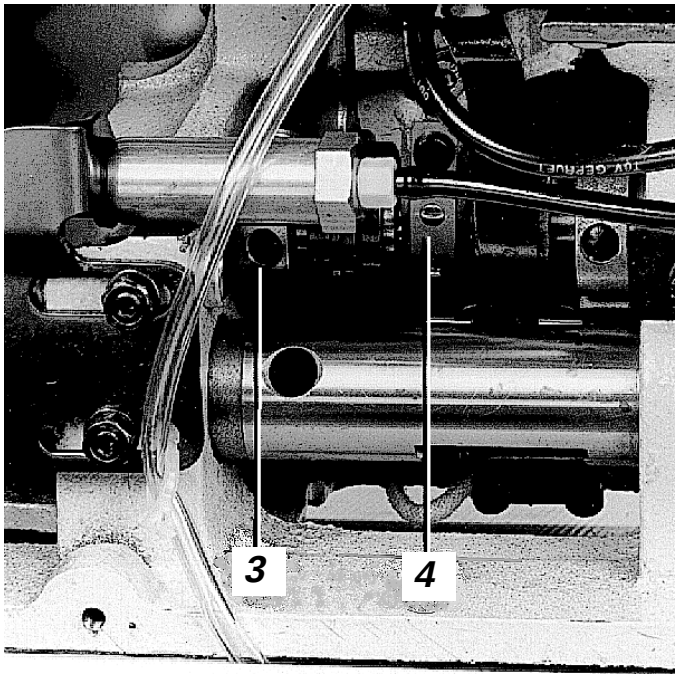
Pre-adjustment:

When the feed eccentric 2 is adjusted correctly, proceed as follows for the pre-adjustment:

– Loosen the screws at the stroke eccentric 3 and turn it on the shaft until the 1st screw (seen in direction of rotation) of the stroke eccentric is aligned with the 2nd screw of the feed eccentric.
– Move the stroke eccentric to the right until it touches the oil leather strip 4.
– Tighten the screws.

Correction:

Loosen the screws and turn the stroke eccentric 3 on the shaft accordingly.



2.4 Needle bar frame

Turn off main switch!
Otherwise there is danger of injury!

2.4.1 General information

– The stop screw 5 that is sealed with yellow paint and is secured with glue to prevent it from turning must rest against the inside of the arm casting.
– The left guide bolt 3 (within the frame) and the right guide bolt 7 (within the arm) were adjusted at the factory such that the needle bar frame moves smoothly and without clearance. Therefore, the position of the two guide bolts must not be changed.
– Using the nuts 4 the frame holder 6 must be adjusted such that it is parallel with the bottom edge of the arm head.

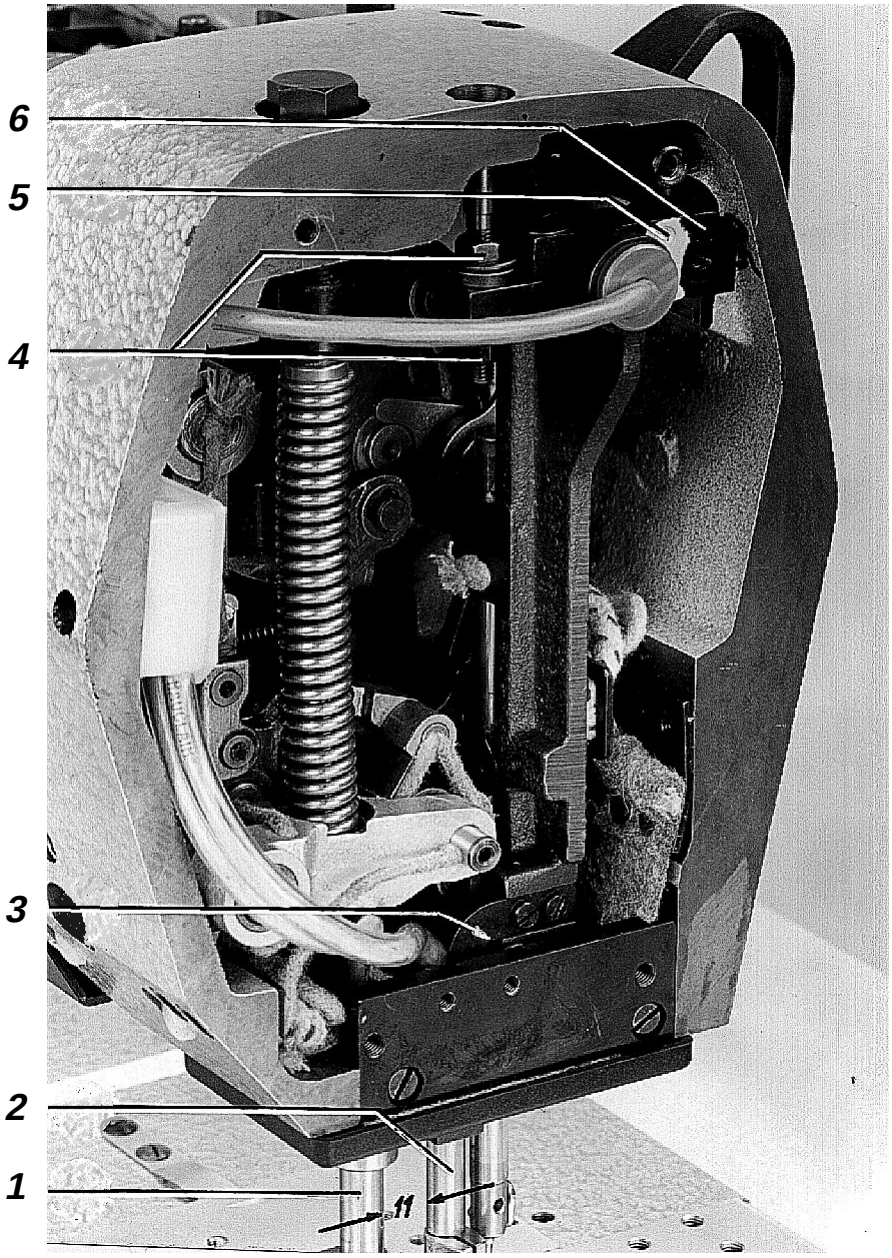
2.4.2 Distance between the feeding foot bar and cloth presser bar

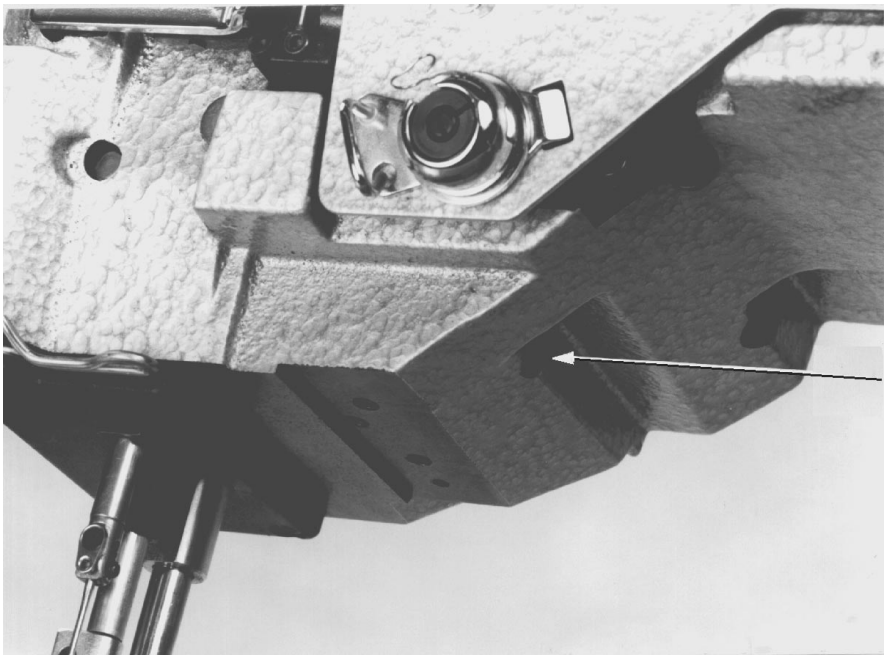
Rule:

The distance between the bars 1 and 2 should be 11 mm, when the handwheel is locked in position E (needle at the bottom of its stroke).

Correction:

– Lock the handwheel in position E.
– Remove the plug 9 and loosen the screws behind.
– Turn the eccentric 8 accordingly.

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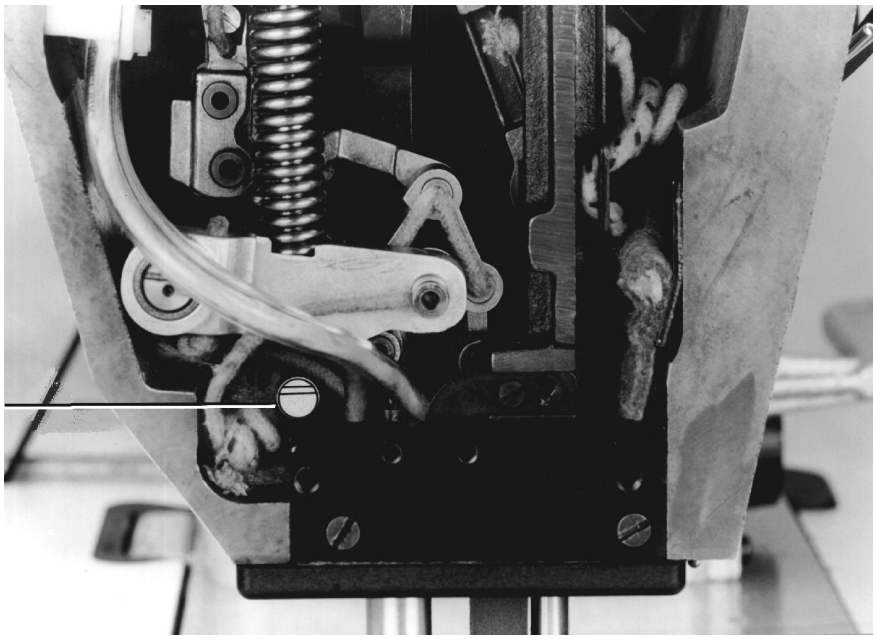
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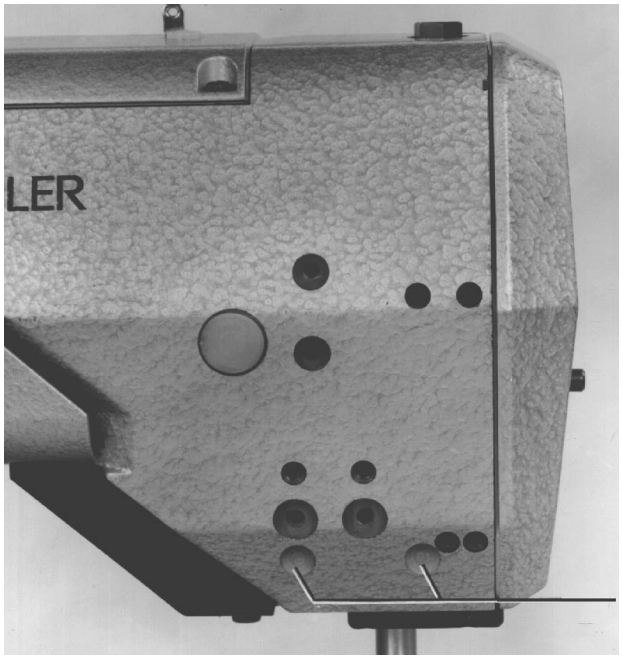
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2.5 Hook, needle bar, needle guard and thread sluice

Turn off main switch!
Otherwise there is danger of injury!

2.5.1 Hook shaft height

Rule:

The distance between the hook shaft 1 and the throat plate rest should be 17.7 mm, which can be checked using the gauge 2.

Check:

– Remove the hook. (See 5.1)
– Align the gauge 2 on the throat plate rest such that the hook shaft 1 is located in the sleeve of the gauge 2.
The hook shaft height is correct, when the gauge rests on the throat plate rest as well as on the hook shaft.

Correction:

– Remove the plug 18 from the hook holder.
– Loosen the screws 3 at the worm 4.
– Loosen the screw at the adjusting ring 19 and push the actuation lever 17 of the bobbin brake to the right until the parts 8, 9, and 10 are accessible.
– Loosen the screw 7 and remove the circlip 11.
– Remove the ring 10, pressure sleeve 9 with pin 8 and the springs 6.
– To bring the hook shaft to a lower position:
Push the hook shaft all the way down.
Set the top ball bearing 12 until it is dead against the circlip 13.
To do this, carefully slide the inner ring of the bottom ball bearing 5 upward using a pin.
– Push the hook shaft all the way up until it rests against the sleeve of gauge 2.
To do this use a pin.
– Tighten the screws 3 at the worm 4.
– Re-attach all previously removed parts.

Please note:

After a correction adjust the loop stroke and re-adjust the actuation lever of the bobbin brake.

2.5.2 Distance between the hook and needle

Explanation:

The distance set at our factory using a gauge is suited for needles up to Nm 140. In the case of larger-sized needles the distance must also be greater.

Rule:

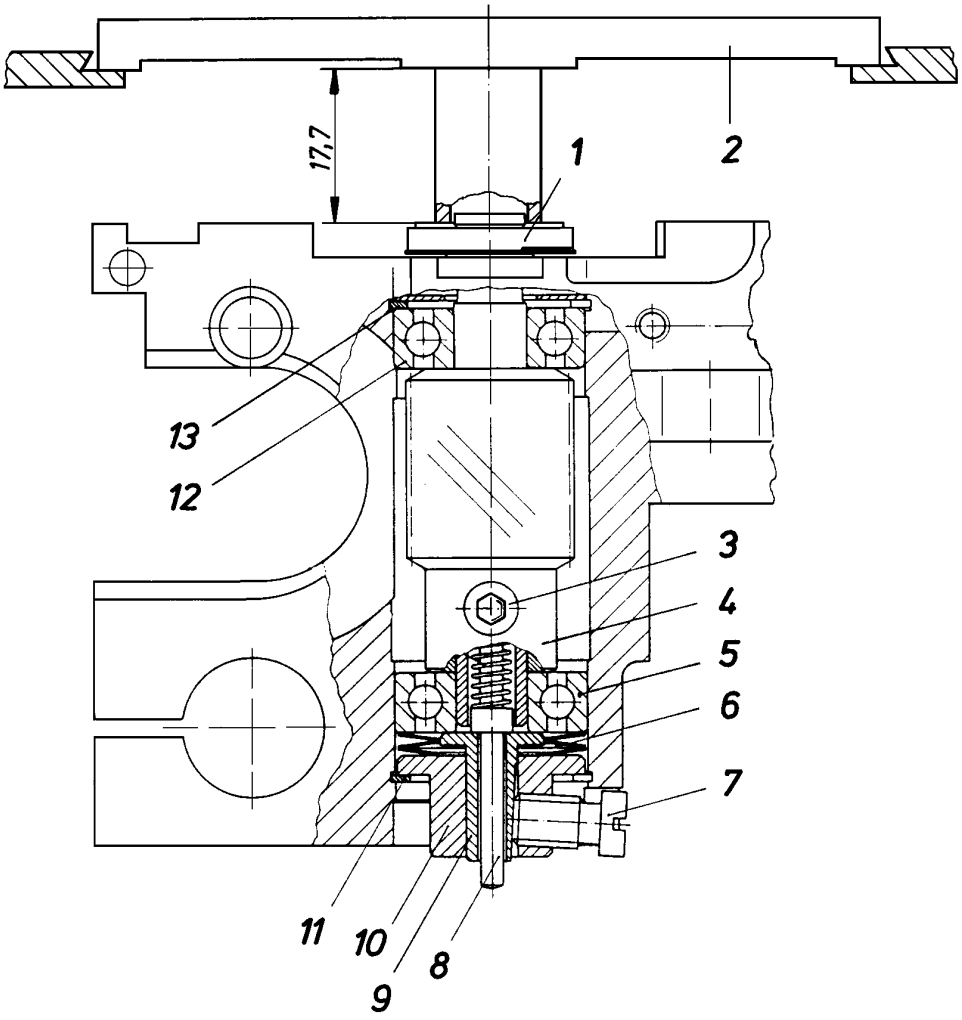
In position A of the handwheel (loop stroke position) the distance between the hook point and the scarf of the needle that is slightly deflected by the needle guard should be 0.1 mm.

Check:

Lock the handwheel in position A and check the distance.
To do this, a white piece of paper may be laid behind the hook.

Correction:

– Move the needle guard 22 to the rear until the needle is no longer deflected in the loop stroke position.
– Insert the adjusting pin 21 or a Nm-120-needle into the needle bar.
The rest surface of the adjusting pin must be parallel with the line of feed motion of the material.
– Unscrew the angle 16.
– Loosen the screws 15 and 20 and shift the hook drive housing laterally such that the hook point rests against the adjusting pin or in the needle scarf.
– Adjust the needle guard such that it slightly deflects the needle in the loop stroke position. See subject 2.5.6.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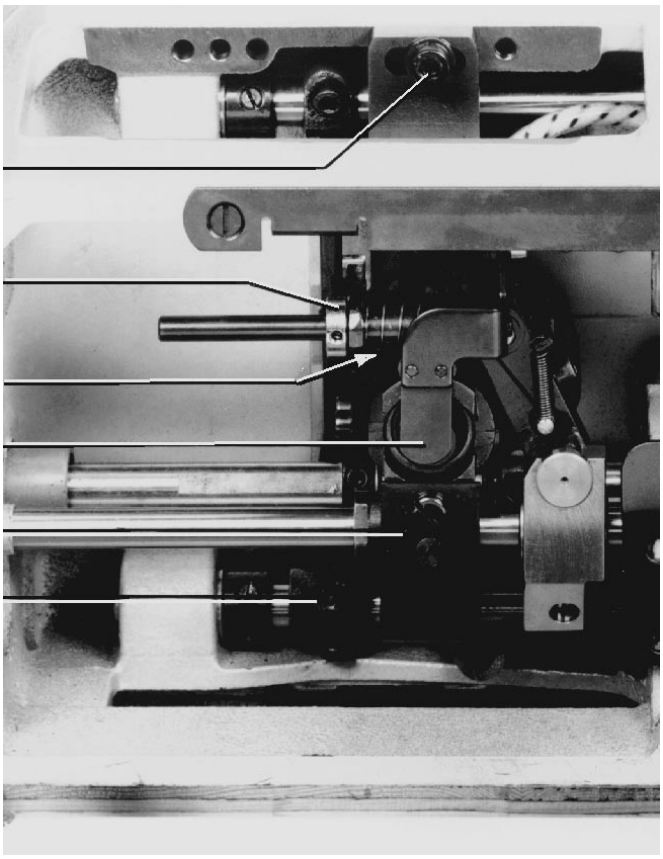
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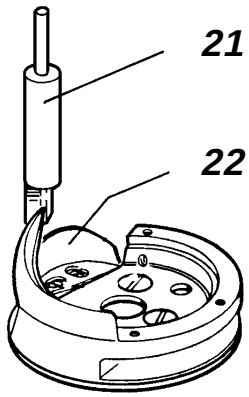
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Turn off main switch!
Otherwise there is danger of injury!

2.5.3 Clearance between the worm and worm gear

Explanation:

This clearance must be checked or, if necessary corrected each time that the hook drive housing has been shifted laterally.

Rule:

The clearance between the worm 4 (page 15) and the worm gear 5 of the hook drive should be as small as possible.

Check:

Lock the handwheel in any position and then turn the hook back and forth.

Correction:

– Unscrew the angle 3.
– Loosen the clamping screw 2 for the eccentric bushing 1.
– To axially align the worm gear with the worm proceed as follows:
  Loosen the two screws at the worm gear 5.
  To "centre" the worm gear, turn the eccentric bushing until the teeth have no more clearance.
  Tighten the screws at the worm gear 5. Make sure the 1st screw - seen in direction of rotation - sits on the flat of the shaft 4.
– To adjust the clearance between the teeth turn the eccentric bushing 1 accordingly.
  The further the bushing is turned upward, the greater the clearance between the teeth.

Please note:

After the clearance has been corrected, check the loop stroke and, if necessary correct.

2.5.4 Loop stroke

Explanation:

The loop stroke is the path that the needle bar travels from its lower dead point up to the point where the hook point is at the centre of the needle.

Rule:

The loop stroke should be 2 mm, when the following forward stitch length has been set:
On machines up to 6-mm-stitch length: 0 mm
On machines up to 10-mm-stitch length: 2 mm.

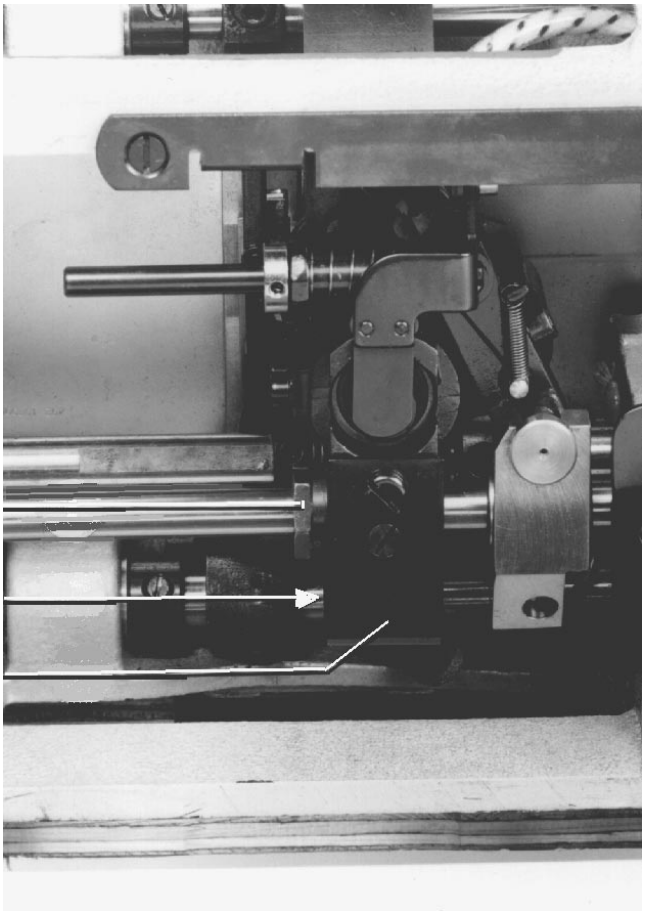
Check:

– Set the forward stitch length 0 or 2 mm.
– Remove the jumping foot, feeding foot and throat plate.
– Lock the handwheel in position A.
– Check, whether the hook point is at the centre of the needle.

Correction:

When the check is completed as described above, proceed as follows to correct the loop stroke:

– Remove the timing pin.
– Remove the plug 6 from the hole in the hook housing.
– Loosen both screws at the worm 4 (page 15).
– Lock the arm shaft in position A using the timing pin.
– Turn the hook accordingly.
– Tighten the accessible screw.
– Remove the timing pin.
– Turn the handwheel until the 2nd screw is accessible and then tighten the screw.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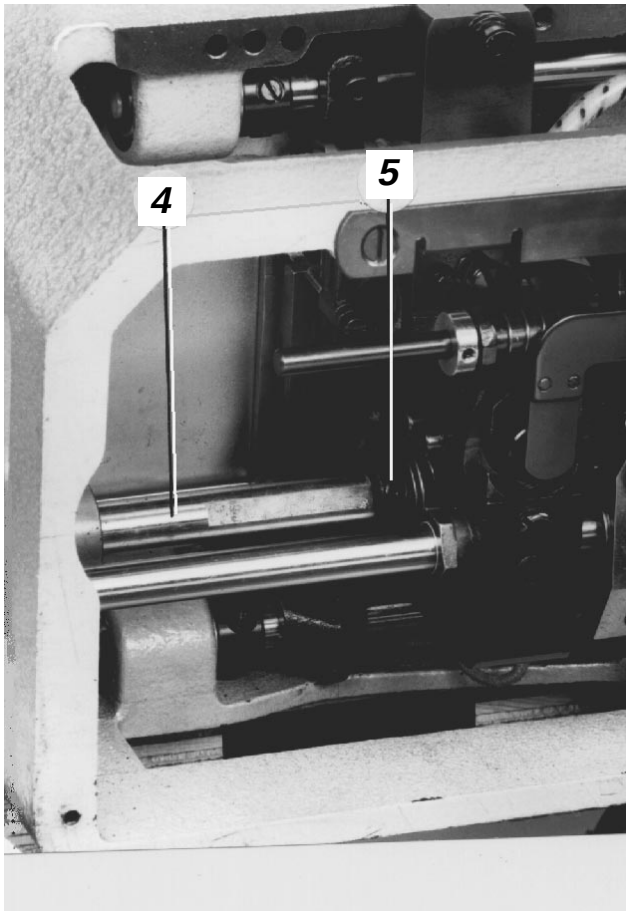
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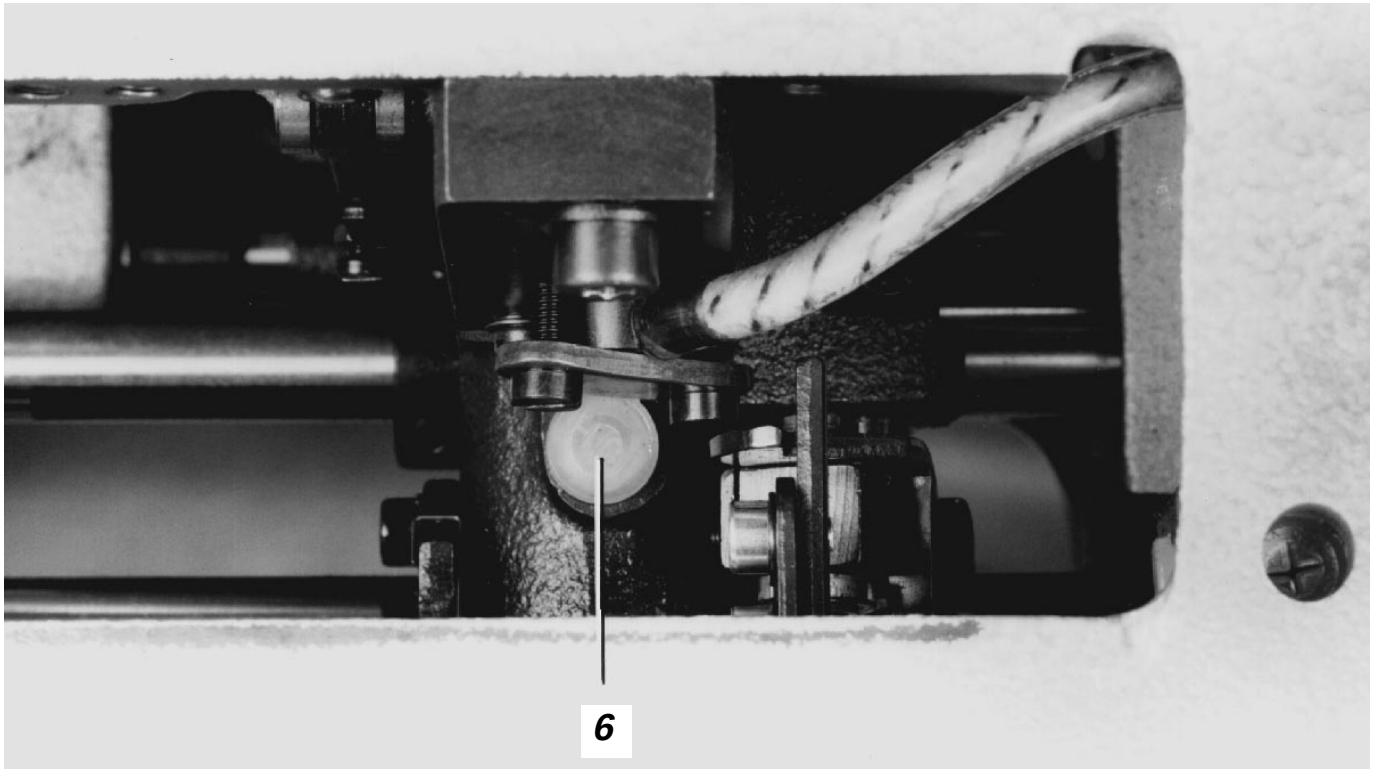
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Turn off main switch!
Otherwise there is danger of injury!

2.5.5 Needle bar height

Rule:

The height of the needle bar should be adjusted such that under the following conditions the needle is positioned to the hook point as shown in the figure:

– Handwheel locked in position A (loop stroke position).
– Stitch length dial set at 0.

Adjustment with gauge:

– Remove the plug 2 from the hole.
– Turn the handwheel until the clamping screw at the needle bar is accessible.
– Slide a screwdriver through the hole and loosen the clamping screw for the needle bar.
– Install the measuring bridge 4 with the pin 3 referred to in subject 1.1 in the machine bed cutout.
– Lock the handwheel in position E (needle at the bottom of its stroke) using the timing pin.
– Pull the needle bar all the way down onto the pin 3 in the measuring bridge.
– Tighten the clamping screw.

Correction:

– Remove the plug 2 from the hole.
– Turn the handwheel until the clamping screw at the needle bar is accessible.
– Loosen the clamping screw and change the height of the needle bar accordingly.

Please note:

After a correction, check the position of the needle guard. (See 2.5.6)

2.5.6 Position of the needle guard

Explanation:

– The needle guard 1 is to prevent that the needle touches the hook point.
– At the factory, the needle guard is set for the needle size 120. Therefore, the needle guard position must be changed only, when needles from size 150 up are used.
– Check the needle guard position after:
a correction of the needle bar height and
a correction of the loop stroke.

Rule:

In loop stroke position the needle should be slightly deflected by the needle guard 1.

Correction:

Loosen the screw 5 and change the position of the needle guard accordingly using the eccentric 6.

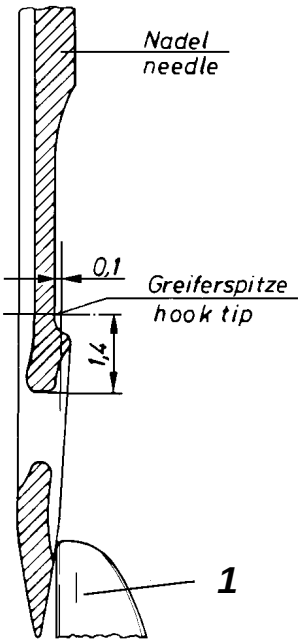
2.5.7 Thread sluice

Rule:

– The height of the holding wire 9 must be adjusted to the bobbin case cap 8.
– The distance between the holding nose of the bobbin case cap 8 and the recess in the throat plate 10 should be 1 mm, when the bobbin case cap rests against the holding wire 9.

Correction:

Change the height or lateral position of the holder 7 accordingly.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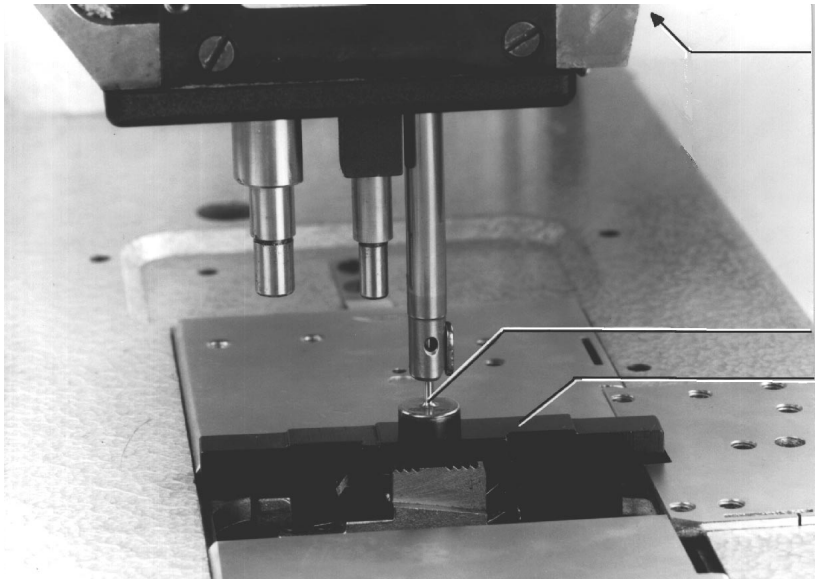
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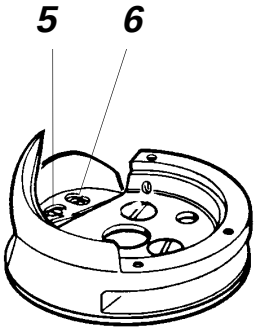
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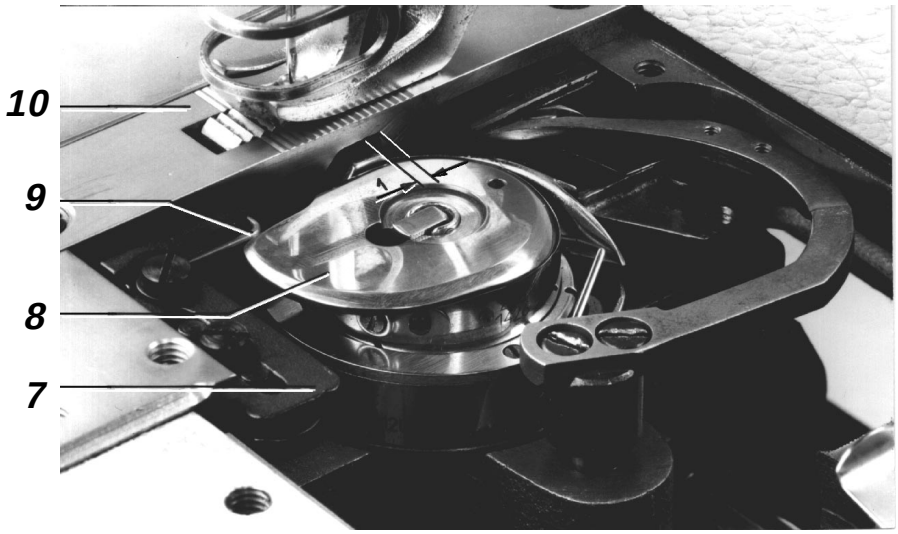

10
9
8
7

2.6 Dials

Turn off main switch!
Otherwise there is danger of injury!

2.6.1 Adjustment range for the stitch length dials

Explanation:

The adjustment range of the two dials 3 and 4 is limited on the one side (min. value) by a cam on the worm 5. The cam in the locking piece 1, against which the lobe washer 2 is turned by the dial, limits the other side of the adjustment range (max. value).

Rule:

– When the two dials are turned completely to the right, their mark (before the "1") must be located below the pointer.
– When the two dials are turned completely to the left, they must be at positions "4", "6", "8" or "10", depending on their respective scale.
If, however, a sewing equipment is installed that does not allow for this stitch length, the stitch length must be restricted to a smaller value.

Adjustment:

– Unscrew the plate with the two dials.
– Turn the dials completely to the right and make sure that the position of the worm 5 is not changed during the entire adjustment process.
– Unscrew the dials.
– Lay the lobe washers 2 into the locking pieces 1.
– Depending on the scale value, align the side a or b of the lobe washer 2 with respect to the following mark in the locking piece 1:

Maximum scale value	Cam side	Locking piece mark
10	a	5
8	b	3
6	a	4
4	a	2

– Screw on the dial such that its mark (before the "1") is located below the pointer.
Make sure not to change the position of the pointer.
– Check the adjustment range, and if necessary correct.

2.6.2 Adjustment range of the dial 7 for the smaller sewing foot stroke

Explanation:

– The arrows indicate the position that both dials 6 and 7 should have, when the top cover plate is to be removed or replaced.
– The dial 7 can be turned to the right or left only until the lobe washer 12 rests against the respective cam side of the locking piece 14. As the turning range of the dial 6 is smaller, the lobe of the respective lobe washer 12 is accordingly wider.

Rule:

When the dial 7 has been turned completely to the right, the following conditions should be met:

– The smallest value is displayed.
– Slight clearance of the dial.

Adjustment:

– Remove the top cover plate.
– Unscrew the dial.
– Align the straight edge of the worm 8 with respect to the mark 9 of the sticker.
– Align the lobe washer 12 such that it rests with its left side 15 against the cam 13 of the locking piece 14.
– Screw on the dial such that the maximum value is indicated.

2.6.3 Adjustment range of the dial 6 for the greater sewing foot stroke

Prerequisite:

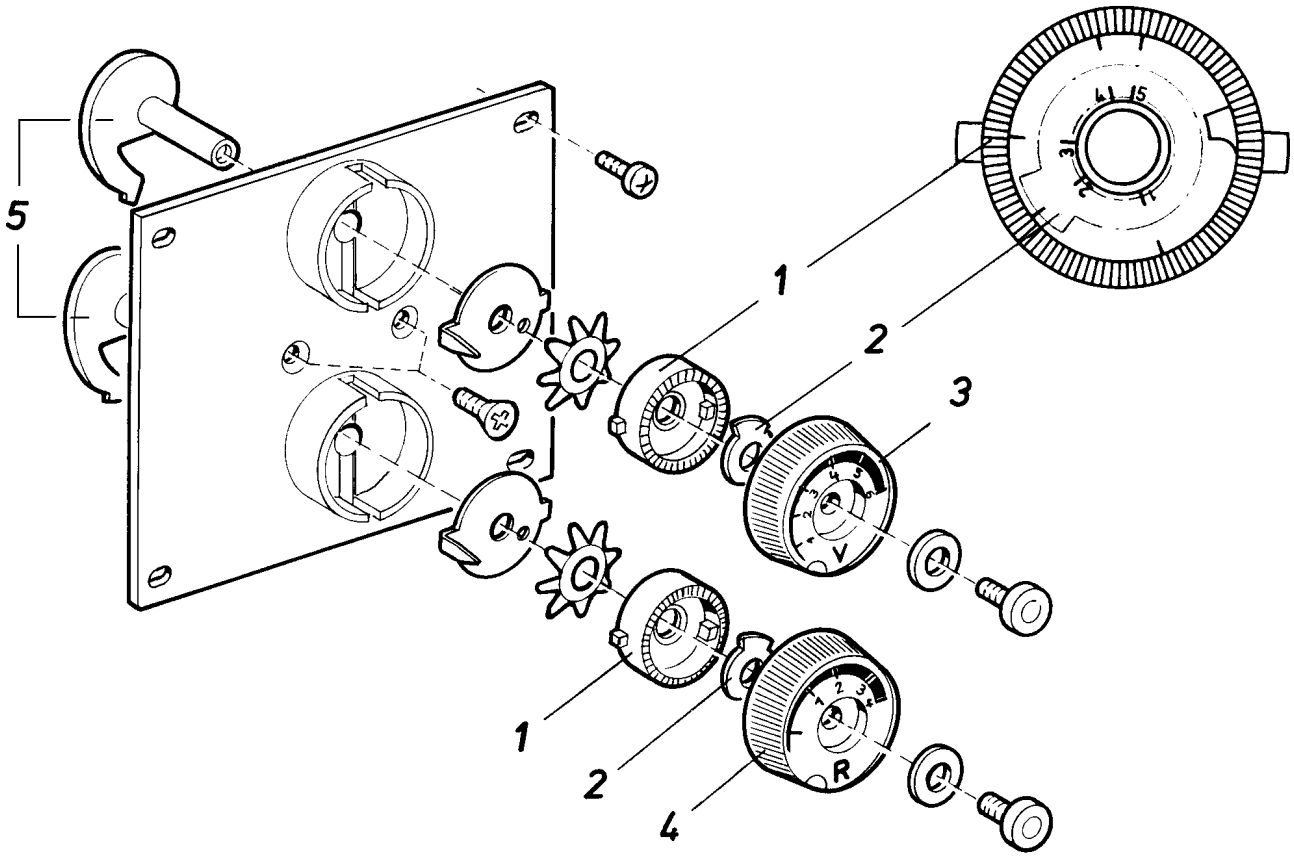
Correct adjustment range of the dial 7 for the smaller foot stroke.

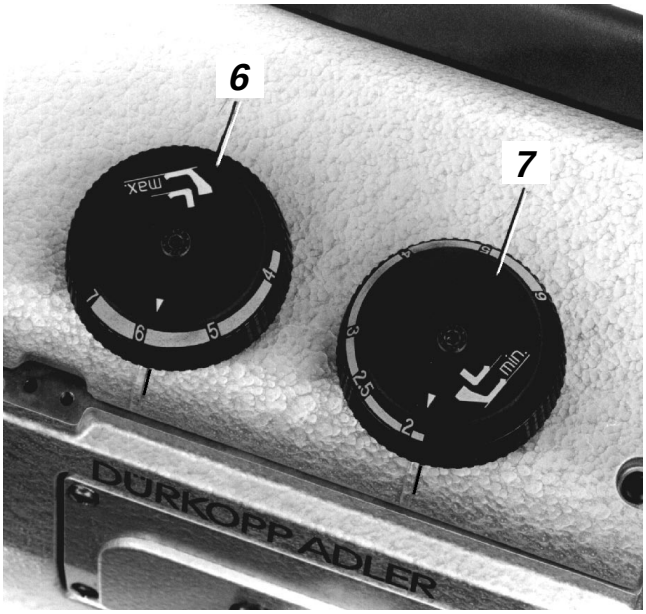
Rule:

When the dial for the smaller foot stroke is set at "4", the other dial 6 must indicate the value "4 + 1 locking position", when it is completely turned to the left.

Adjustment:

Proceed as described in subject 2.6.2.


5
1
2
3
1
2
4
R
V


6
7
max
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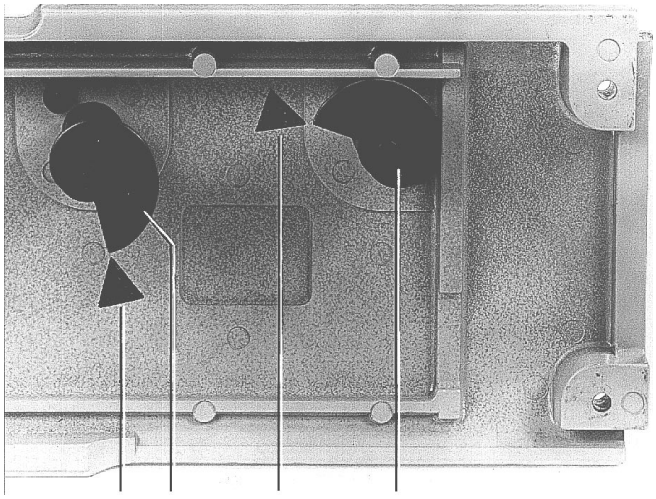
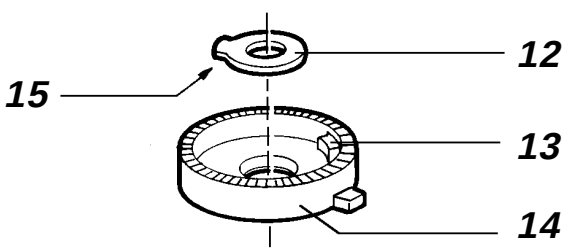

11
10
9
8


15
12
13
14

2.7 Sewing feet

Turn off main switch!
Otherwise there is danger of injury!

2.7.1 Foot stroke adjustment range, foot stroke timing and equalization of foot strokes

Explanation:

These 3 adjustments are dealt with in one chapter, as the correction of one adjustment does also affect the two other adjustments. Therefore, the adjustments are to be repeated until the rule is fulfilled. The use of gauges substantially simplifies these adjustments.

Rule:

- In position "2" of the dial, both feet should perform the following stroke motions on a 1-mm-thick plate that rests on the throat plate:
  sewing foot: 2 mm
  jumping foot: 1.8 mm
- In position D of the handwheel both feet should rest on a 1-mm-thick plate.

Adjustment with gauge:

Foot stroke adjustment range:

- Loosen the screws 4 at the block 3.
- Lay the gauge 6 onto the two walls of the arm casting.
- Swing the block 3 until the bolt of the stroke rocker 5 rests against the gauge.
- To axially secure the shaft, push the block against the bushing.
- Re-tighten the screws.
- Remove the gauge.

Foot stroke timing:

- Bring the linkage mechanism to the position for the highest foot stroke, and to lock the linkage mechanism slide the pin 10 into the hole of the extended piston rod.
- Loosen the screws at the stroke eccentric 13.
- Lock the handwheel in position D.
- Insert the gauge 12 into the 3-mm-slot of the stroke eccentric 13 and then press it against the coulisse shaft 11.
- Tighten the accessible screw at the stroke eccentric.
- Remove the gauge and loosen the handwheel lock.
- Tighten the 2nd screw at the stroke eccentric.

Foot stroke equalization:

- Lock the handwheel in position D.
- Slide the pin 7 (5 mm) incorporated in the set of gauges into the hole of the casting.
- Loosen the screw 1 at the block 2:
  The lifted foot is lowered.
- Swing the stroke lever 8 to the left until the sliding block rests against the pin 7.
- Re-tighten the screw at the block.

Balancing:

- Check whether in handwheel position D both feet rest on a 1-mm-thick plate.
  If this is not the case:
  Change the position of the stroke eccentric 13 on the shaft accordingly.

Adjustment without gauge:

Foot stroke adjustment range:

- Loosen the screws 4 and change the position of the block 3 on the shaft such that the distance between the bolt of the stroke rocker 5 and the upper edges of both casting walls is 10.8 mm.
- Re-tighten the screws.

Foot stroke timing:

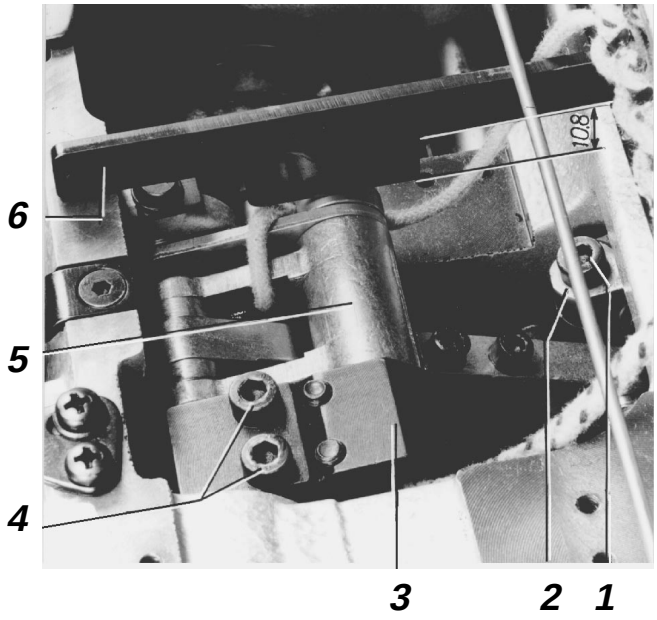
- Loosen the screws at the stroke eccentric 13.
- Lock the handwheel in position D.
- Change the position of the stroke eccentric 13 such that the following condition is fulfilled:
  The stroke lever 8 must not move, when the stroke rocker 5 is moved up and down.
- Tighten the accessible screw at the stroke eccentric.
- Remove the timing pin.
- Tighten the 2nd screw at the stroke eccentric.

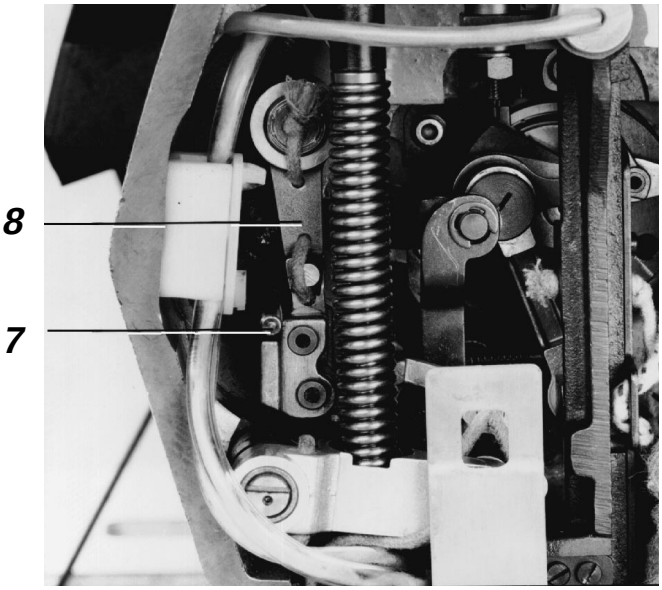
Foot stroke equalization:

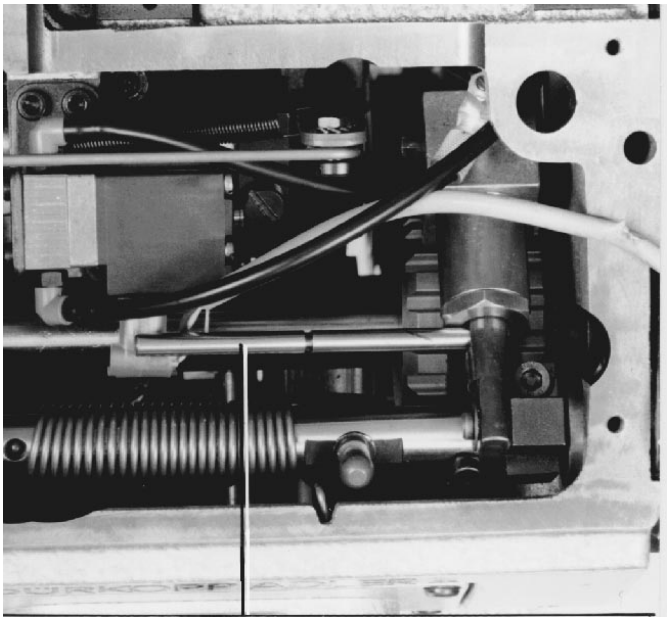
– Lay a 1-mm-thick plate onto the throat plate.
– Lock the handwheel in position D.
– Bring the linkage mechanism to the position for the highest foot stroke, and to lock the linkage mechanism slide the pin 10 into the hole of the extended piston rod.
– Insert the pin 7 (5 mm) incorporated in the set of gauges into the hole of the casting.
– Loosen the screw 1 at the block 2:
The lifted foot is lowered.
– Swing the stroke lever 8 to the left until the sliding block rests against the pin 7.

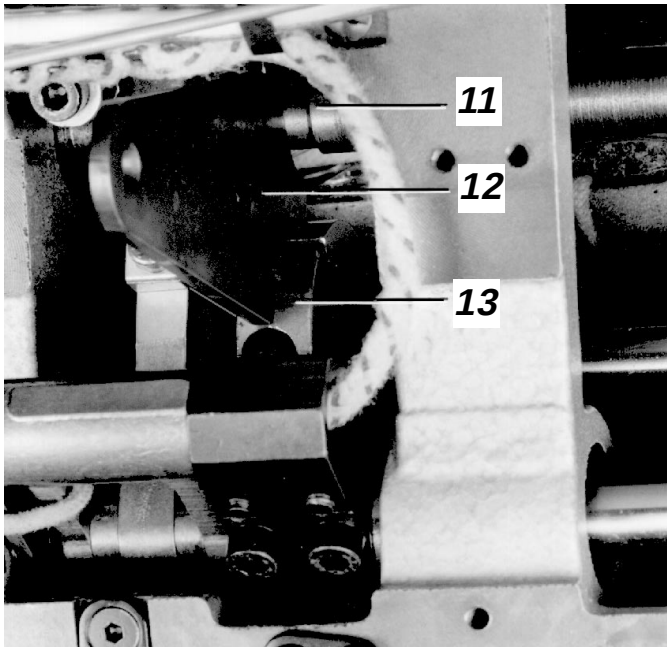
Balancing:

– Check whether both feet rest on the 1-mm-thick plate.
If this is not the case:
Change the position of the stroke eccentric 13 on the shaft accordingly.









Turn off main switch!
Otherwise there is danger of injury!

2.7.2 Timing of the feeding foot feed travel

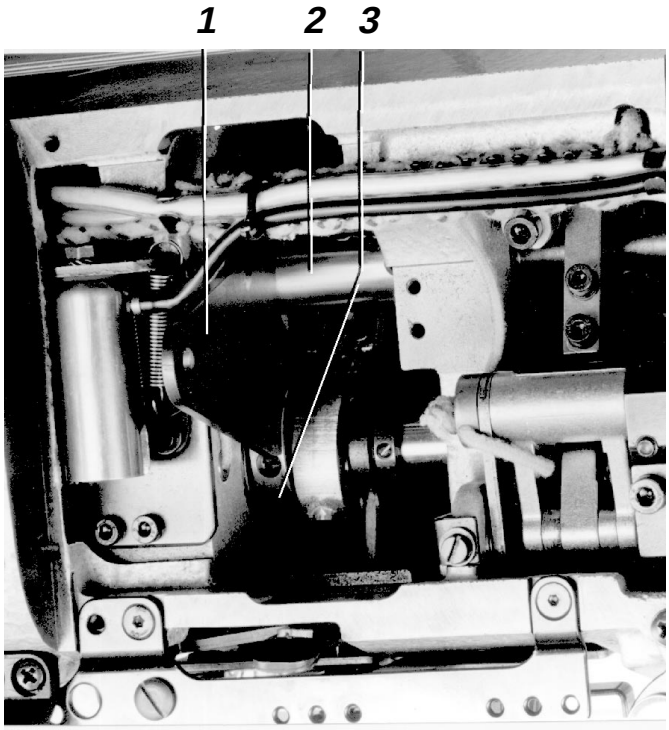
Rule:

The sewing foot must not move when the stitch regulator lever is actuated under the following conditions:

– Maximum stitch length set.
– Handwheel locked in position E (needle at the bottom of its stroke).

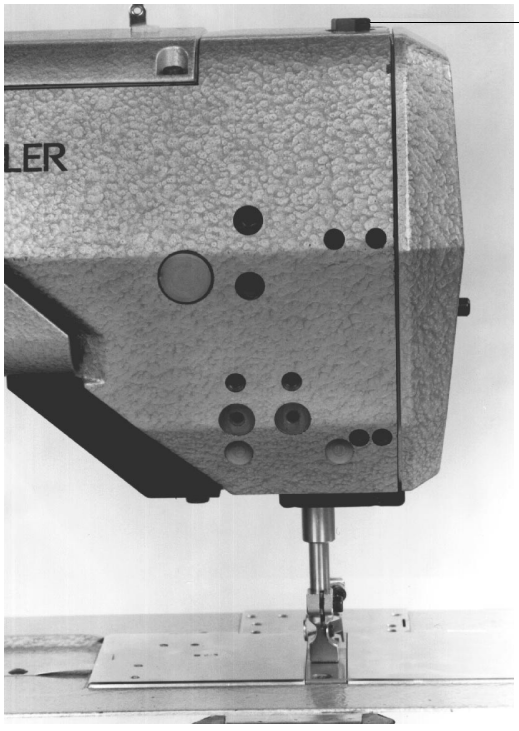
Pre-adjustment with gauge:

– Loosen the screws at the eccentric 3.
– Lock the handwheel in position B.
– Insert the gauge 1 into the slot of the eccentric 3 and then press it against the stitch regulator shaft 2.
– To axially fix the shaft push the eccentric 3 all the way to the left against the arm shaft bearing.
– Tighten the screws.



Adjustment without gauge:

– Loosen the screws at the eccentric 3.
– Lock the handwheel in position E.
– Turn the eccentric on the shaft until the "rule" is fulfilled.
– Push the eccentric to the left against the bearing and tighten the screws.
– Check whether in handwheel position C the slot in the eccentric points upward.
If this is not the case:
Turn the eccentric on the shaft by 180°.



2.7.3 Sewing foot pressure

Rule:

The screw 4 must be turned all the way in to assure that the maximum pressure is effective.

2.8 Sewing foot lift and thread tension release

Turn off main switch!
Otherwise there is danger of injury!

2.8.1 Height of the lifted sewing feet or limitation of the lifting motion

Explanation:

The sewing feet can be lifted by heeling the pedal or by actuating the knee lever. When the feet are completely lifted either by knee lever or "pneumatically" by pedal, the "under-foot-clearance" should be equal.

Rule:

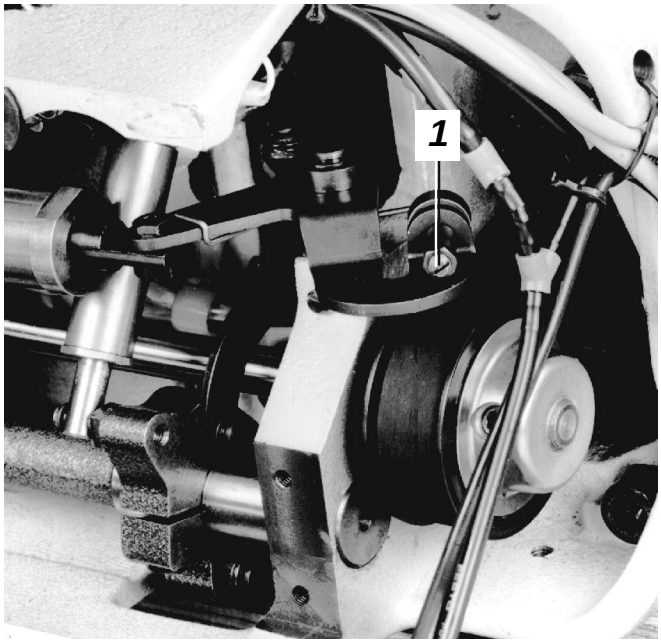
– After thread trimming the "clearance" between the lifted sewing feet and the throat plate should be as follows:
In the case of needle system 2134-35 DU KK: when "needle at the top of its stroke" has been entered
(see 4.3): 17 mm, otherwise 14 mm
In the case of needle system 797 KK : 11 mm
– In the case of very thick sewing feet, eg for welting operations, the "under-foot-clearance" must be reduced so as to prevent collision with the needle bar.

Correction:

– To increase the under-foot-clearance:
Turn back the set screw 4 (page 27) for the tension release.
– Turn the stop screw 1 accordingly.

Please note:

After a height correction, check the thread tension release and, if necessary adjust.



2.8.2 Safety stop

Explanation:

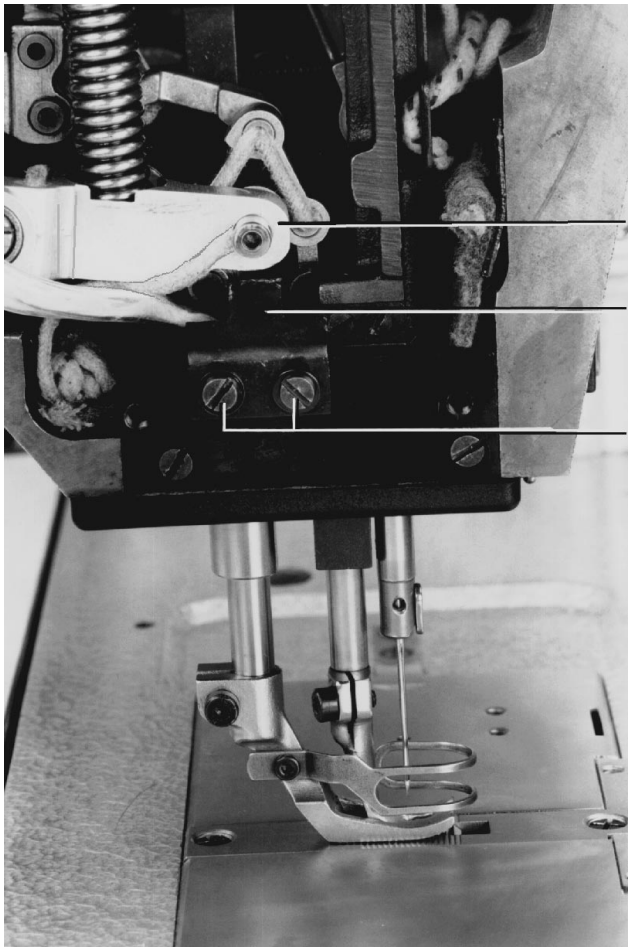
When both sewing feet have been removed, the safety stop 3 is to prevent that the sewing foot bar and cloth presser bar lower too much, thus blocking the drive mechanism.

Rule:

The distance between the lever 2 and the safety stop 3 should be 1 mm, when at least one of the sewing feet rests on the throat plate or the feed dog.

Correction:

Loosen the screws 4 and change the position of the safety stop 3 accordingly.



Turn off main switch!
Otherwise there is danger of injury!

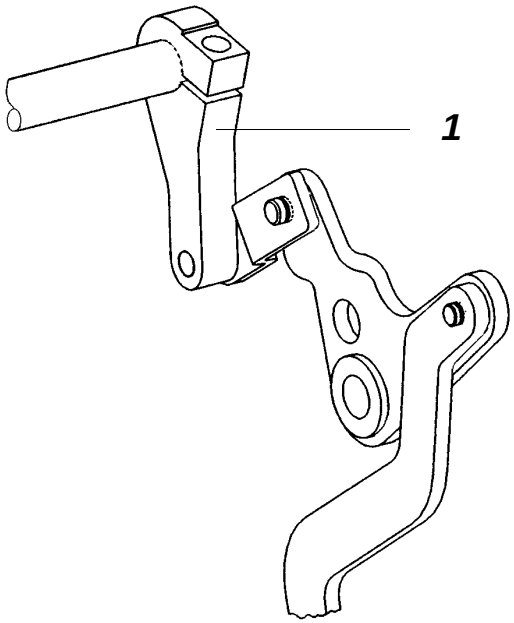
2.8.3 Clearance in the lifting mechanism

Rule:

The clearance in the lifting mechanism should be 1 mm, when at least one of the two sewing feet rests on the throat plate or the feed dog.

Correction:

– Loosen the screw and change the position of the clamping block 1 on the shaft accordingly.
– To axially fix the shaft, press the clamping block 1 to the left.
– Tighten the screw.



2.8.4 Height of the sewing feet locked in their lifted position

Explanation:

The sewing feet can be locked in their lifted position using the button at the face plate, eg to change the sewing feet or to operate the sewing machine without material or to wind the bobbin thread.

Rule:

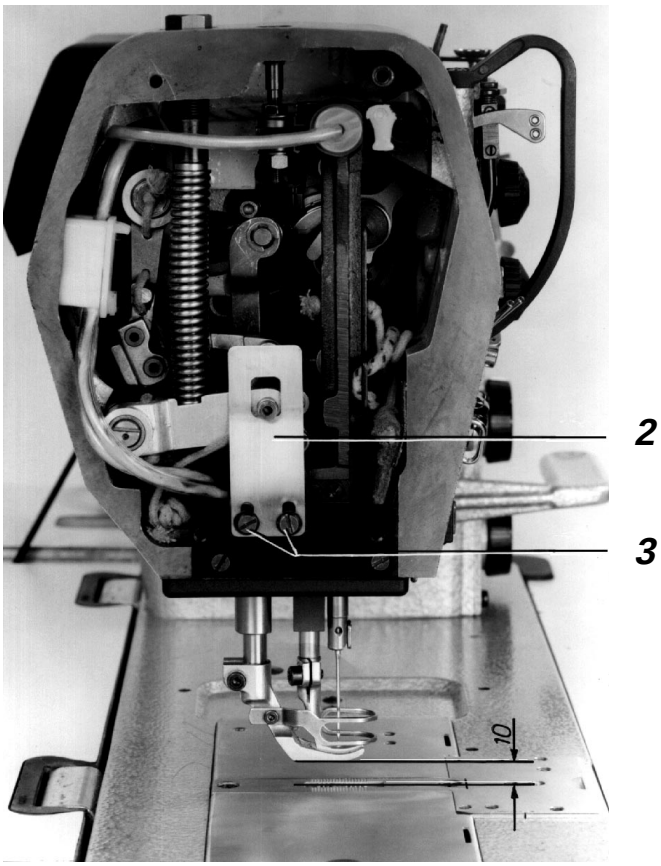
The distance between the sewing feet locked in their lifted position and the throat plate should be 10 mm.

Check:

– Lock the handwheel in position C.
– Lock the sewing feet in their lifted position using the button at the face plate.

Correction:

Loosen the screw 3 and change the position of the support plate 2 accordingly.



Turn off main switch!
Otherwise there is danger of injury!

2.8.5 Thread tension release

Explanation:

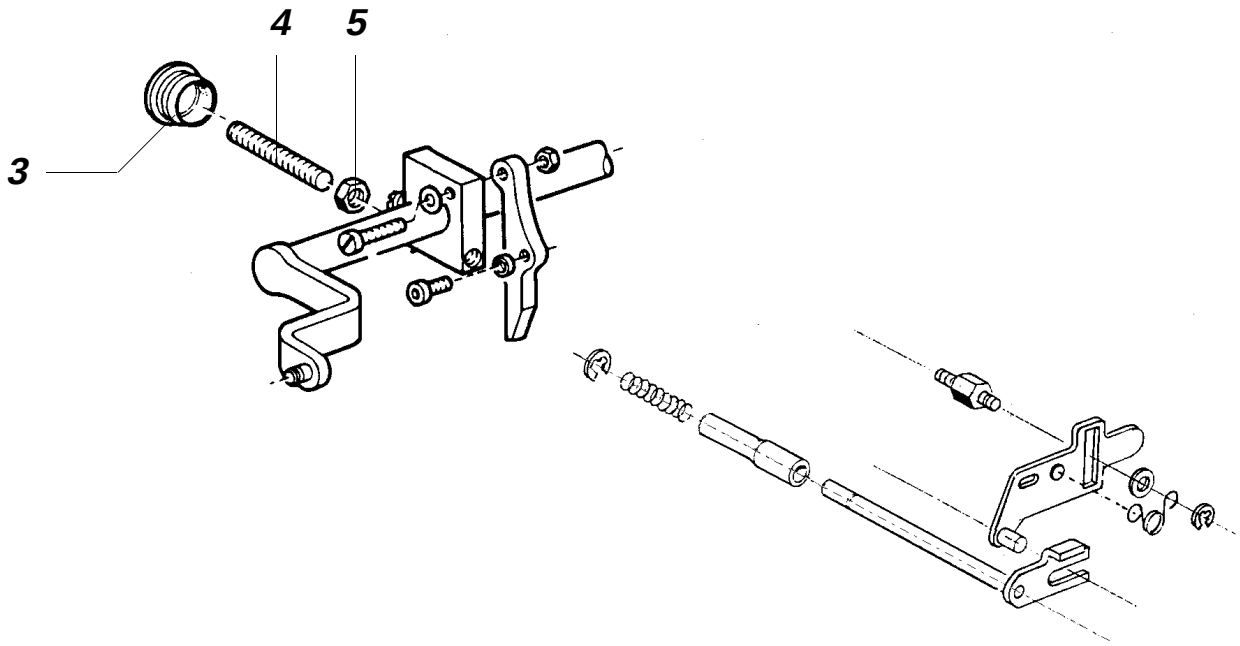
The thread tension is only released with lifted sewing feet, when the lever 2 is in its lower position.

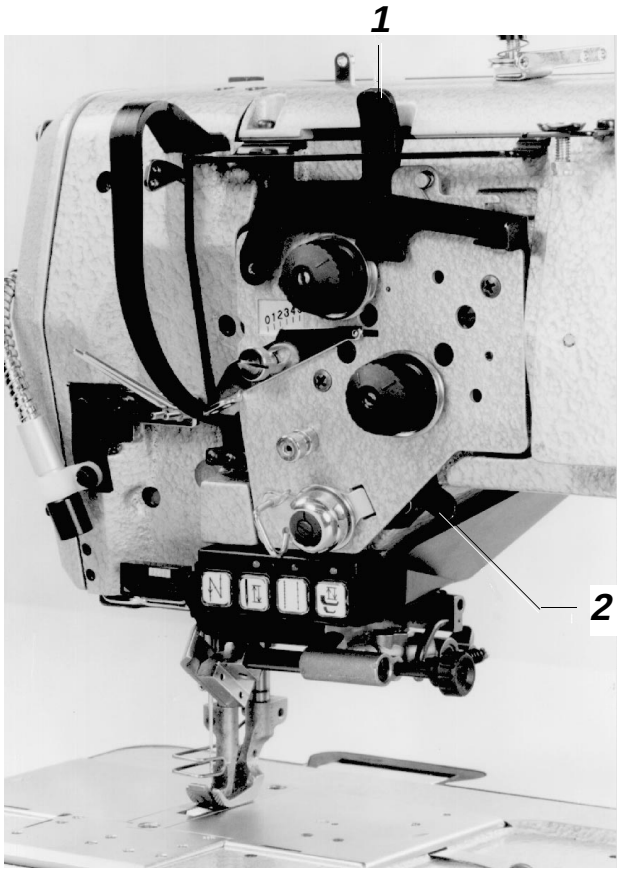
Rule:

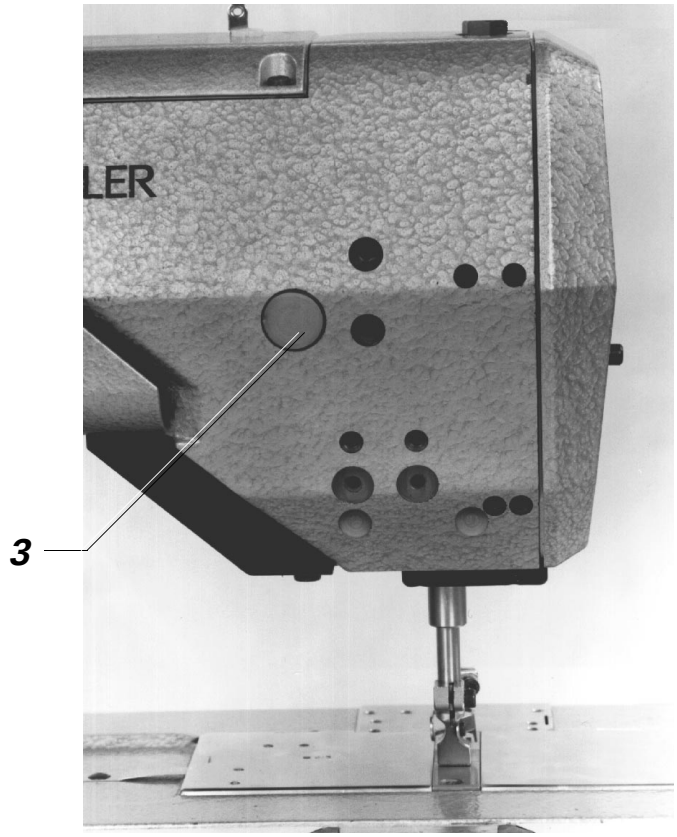
The thread tension must be released enough that threads with a size of 11/3 pull easily through the tension discs.
This condition is fulfilled, when the hand lever 1 can be moved slightly at the same time.

Correction:

– Remove the plug 3.
– Loosen the lock nut 5 and turn the set screw 4 accordingly.







Turn off main switch!
Otherwise there is danger of injury!

2.9 Thread regulator

Explanation:

With the thread regulator 1 the desired seam pattern can be obtained with minimum thread tension.

Rule:

The position of the thread regulator 1 must be adjusted to the material thickness, sewing threads and stitch length such that the needle thread is guided "controllably" around the hook and the bobbin case cap.

Correction:

Loosen the screw 2 and change the position of the thread regulator accordingly.
In position 0 the greatest amount of thread is released, as is needed for very great stitch lengths and very thick material.

2.10 Check spring

Rule:

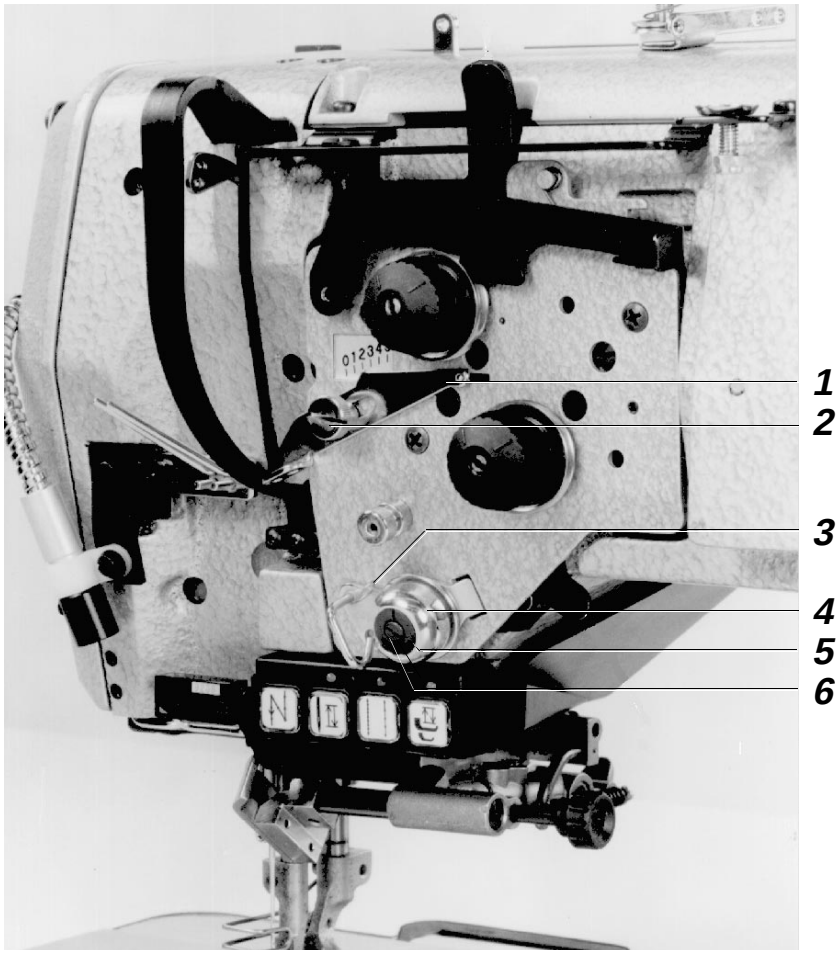
– The tension of the spring 3 should be such that the tension on the needle thread is low all the way from the take-up lever top position until the needle's eye submerges in the material.
– The spring tension should be lower than the needle thread tension.
– The path of the spring should be so large that the spring only rests against the stopper, when the needle has penetrated the material up to its eye.

Correction of the path:

Loosen the screw 6 and turn the stopper 4 accordingly.
Be sure not to change the position of the clamping sleeve 5.

Correction of the tension:

Loosen the screw 6 and turn the clamping sleeve 5 accordingly without changing the position of the stopper 4.



2.11 Lubrication

Turn off main switch!
Otherwise there is danger of injury!

2.11.1 Checking the oil level in the arm reservoir, and if necessary refilling oil

Rule:

The oil level in the reservoir 1 must be between the marks "MIN" and "MAX".

Refilling:

When the oil level has dropped below "MIN": Pour "ESSO SP NK 10" oil into one of the holes of the reservoir up to the mark "MAX".

2.11.2 Checking the oil level in the machine bed reservoir, and if necessary refilling oil

Rule:

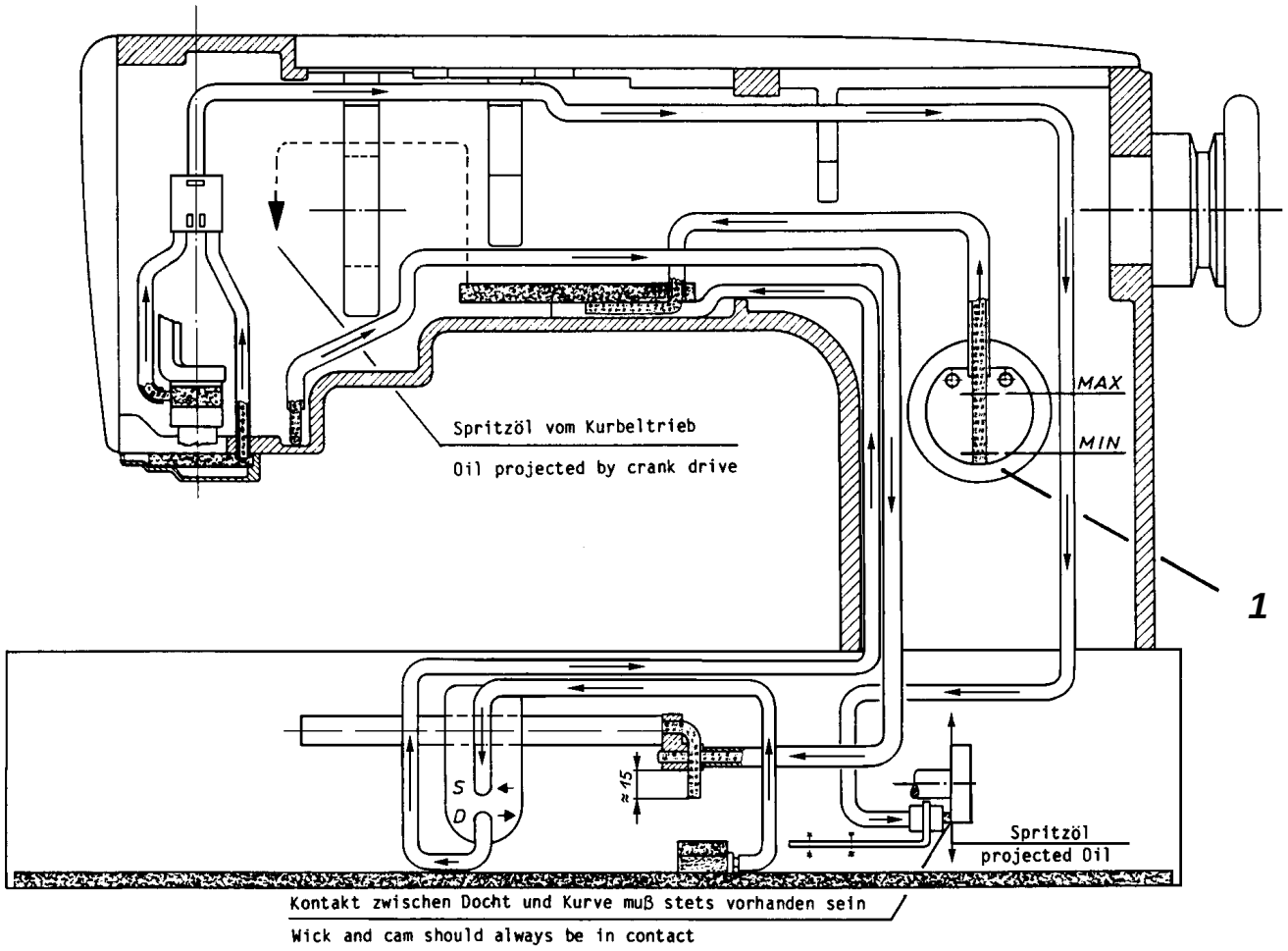
- The reservoir 3 (page 30) must never be empty.
- With the machine head tilted backwards the oil level must not exceed the mark "MAX".

Check:

- Tilt the machine head backwards.
- Determine the oil quantity.

Refilling:

Introduce the oil can through the hole 2 (page 30) into the red nipple of the reservoir and fill in the "ESSO SP NK 10" oil.



Turn off main switch!
Otherwise there is danger of injury!

2.11.3 Regulating the hook lubrication

Rule:

The hook should be lubricated sufficiently with a minimum of oil.

Check:

– Operate the sewing machine approx. 1/2 minute.
– Hold a piece of paper beside the hook and operate the sewing machine.
Keep clear of moving elements.
Otherwise there is danger of injury.
The adjustment is correct, when a sufficient amount of oil is splashed on the paper.

Pre-adjustment:

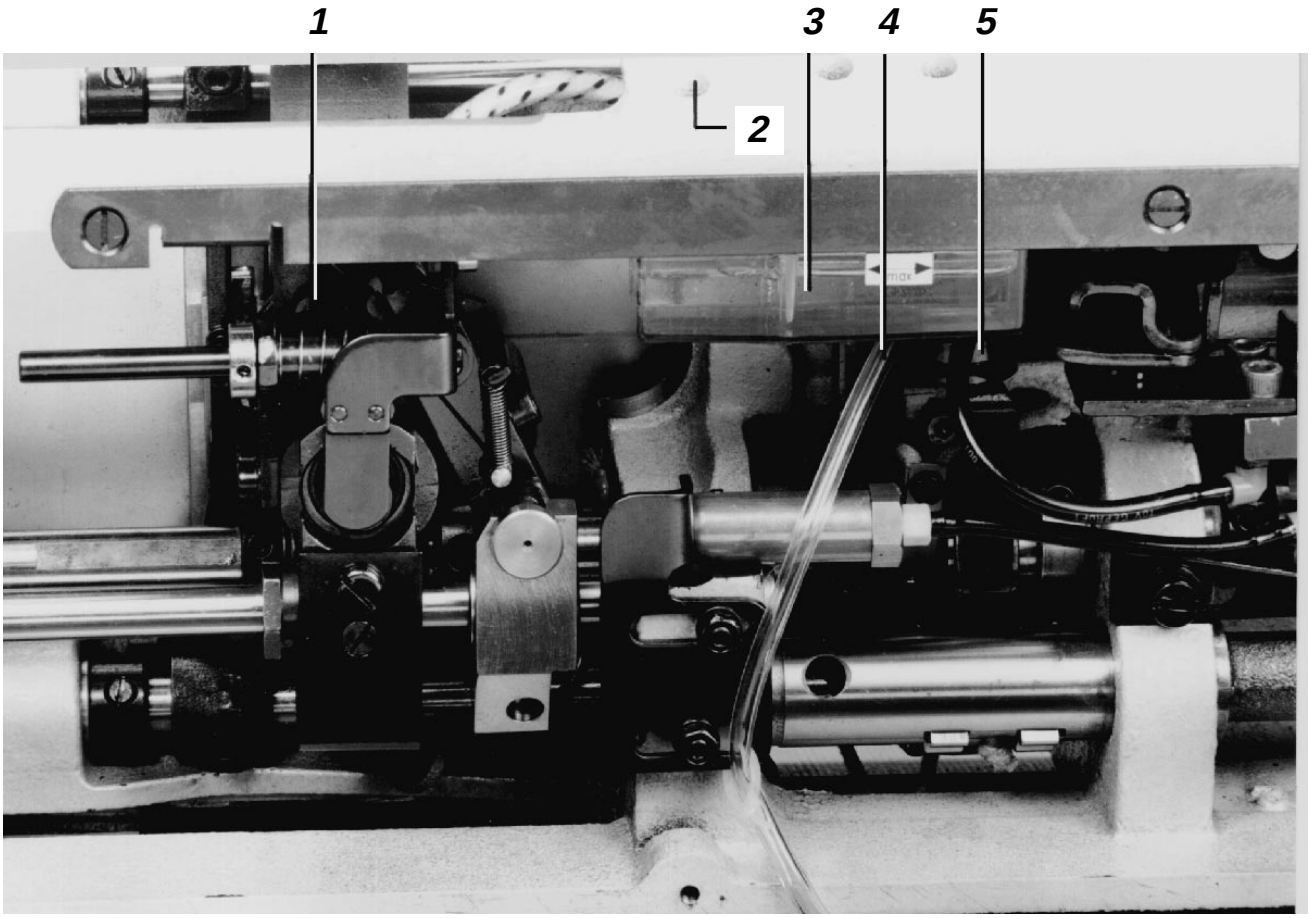
Turn in the regulating screw 1 completely and then turn it out by 4 turns.

Correction:

Turn the regulating screw 1 accordingly.
Turning the screw to the right: decreasing the oil quantity.
Turning the screw to the left: increasing the oil quantity.

2.11.4 Hoses at the pump

The pump 5 can only operate properly, when the hose 4 leading to the oil retainer sheet is connected to the connection S (suction), and the hose leading to the arm is connected to the connection D (pressing).
Please note this after having removed the hoses.



2.12 Speed limitation in the case of greater sewing foot strokes and stitch lengths

2.12.1 General information

The maximum speed of 4,000 rpm can only be reached with smaller sewing foot strokes and stitch lengths under 6 mm. In all other cases, the speed is limited through sliding contacts as follows:

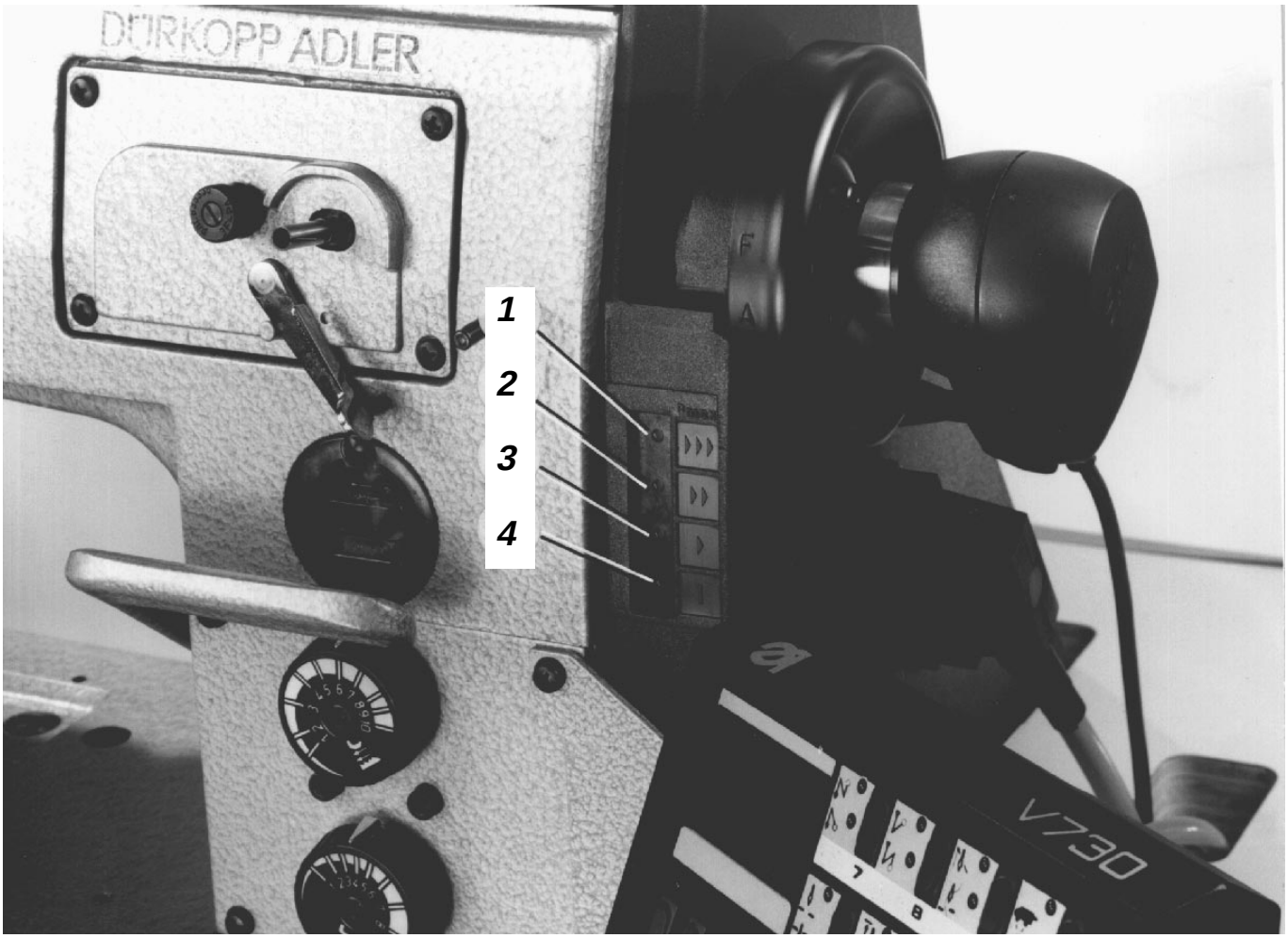
Sewing foot stroke mm	Max. speed rpm
2.5 - 4	3000
4 - 7	2000

Stitch length mm	Max. speed rpm
Forward:	
6 - 8	3000 (stroke < 4 mm) 2000 (stroke > 4 mm)
8 - 10	2000
Reverse:	
up to 6	3000
6 - 8	2000

2.12.2 LED display

The speed up to which the machine can be regulated using the pedal can be seen on the 4 vertically arranged luminous diodes (LEDs):

Activ. LEDs	Max. speed rpm
1234	4000
234	3000
34	2000



3. Thread trimmer

Turn off main switch!
Otherwise there is danger of injury!

3.1 Function sequence

When the pedal is heeled completely to actuate the trimming action:

– When the 1st position has been reached (handwheel position F) a solenoid valve is activated that momentarily pressurizes the cylinder 6 with air. Its piston rod then presses the roller bolt of the element 8 against the face of the cam 9.
– The thread tension is released momentarily.
– The sewing machine runs at the trimming speed 150 rpm.
– The piston rod of the cylinder 6 presses the roller bolt of the element 8 into the recess of the cam. At the same time, the thread catcher is swung away from the counter knife.

When the thread catcher is swung towards the counter knife:

The function sequence is as follows:

– The thread catcher catches both threads.
– The bobbin brake is activated momentarily.
– The threads are trimmed. At the same time the bobbin thread is clamped.

When the take-up lever is nearing the top of its travel and thus the 2nd position has been reached:

When "positioning the needle at the top of its stroke" is activated:

– Turn back the arm shaft until the needle has reached the top of its stroke.

When "positioning the needle at the top of its stroke" is not activated:

– The motor stops.

3.2 Activation timing of the bobbin brake 1

Explanation:

When the thread catcher draws bobbin thread, the bobbin should be braked to prevent it from "over-running".

Rule:

The distance between the latch 11 and the shackle 10 should be 2.5 mm, when the screw 3 of the lever 4 rests against the housing.

Correction:

Turn the screw 3 at the lever accordingly.

3.3 Braking effect of the bobbin brake

Rule:

When the bobbin brake 1 is activated, a slight braking effect should be perceptible when thread is drawn from the bobbin.

Check:

– Turn the handwheel into position B.
– Initially, swing the thread catcher away from the counter knife, and then swing it back until the latch 11 is located below the shackle 10.
– Draw thread from the bobbin by hand.

Correction:

Change the position of the shackle 10 accordingly.

Turn off main switch!
Otherwise there is danger of injury!

3.4 Position of the cam

Explanation:

The cam 9 determines the motion sequence of the thread catcher and thus the timing of thread catching and trimming.

Rule:

– In position C of the handwheel the motion of the thread catcher towards the counter knife should just be completed.
– When the screw 3 rests against the housing the distance between the roller bolt and the face of the cam should be 0.1 mm.

Checking the motion:

– Turn the handwheel into position C.
– Press the roller bolt against the cam.
– Turn the handwheel back and forth.

Correction:

Loosen the screws and change the position of the cam accordingly.

3.5 Position of the cylinder

Rule:

The distance between the retracted piston rod of the cylinder 6 and the element 8 should be 5 mm.

Correction:

Change the position of the holding angle 7 accordingly.

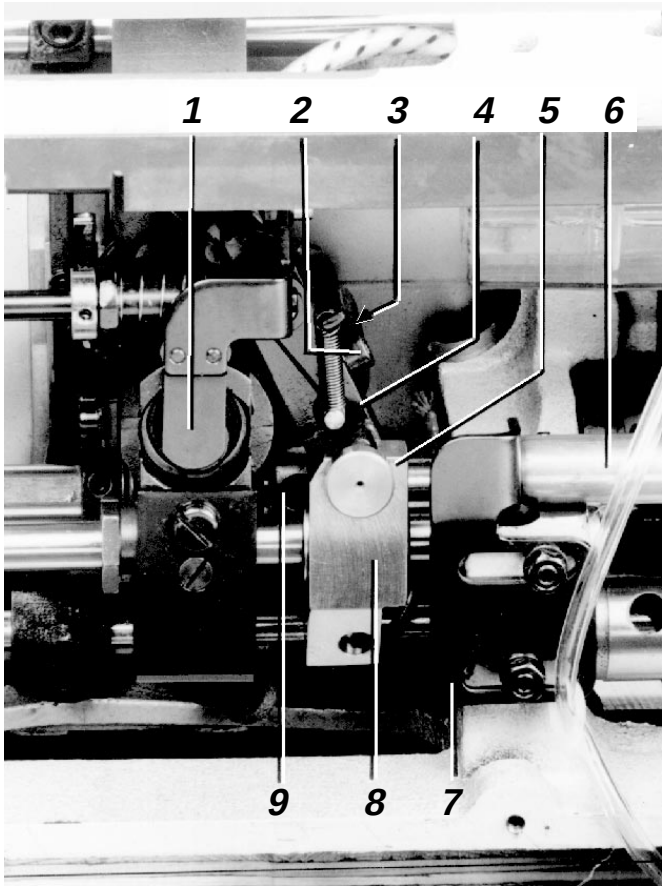
3.6 Height of the thread catcher

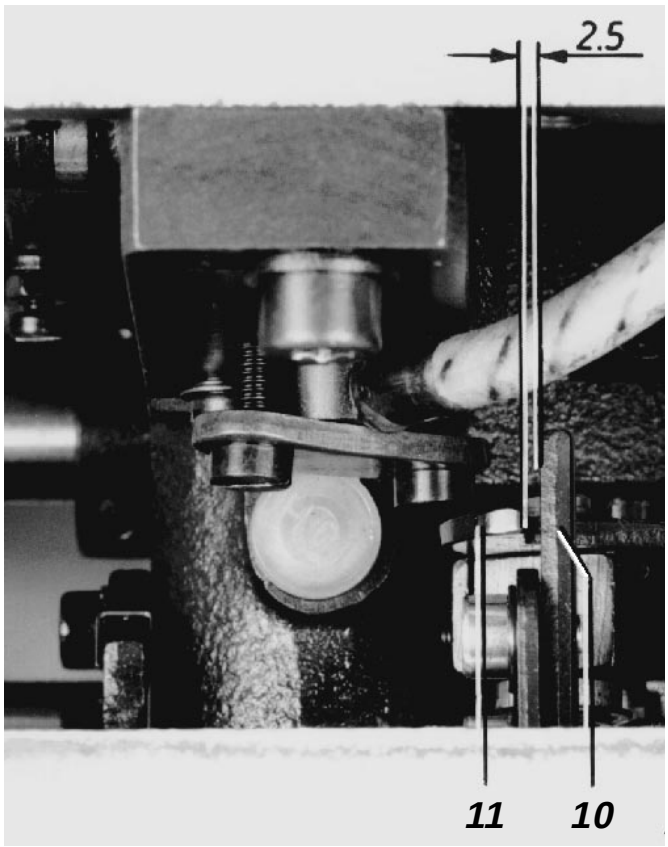
Rule:

The distance between the thread catcher 6 (page 35) and the bearing should be 11.5 - 12 mm. This distance can be checked using the gauge 241 1011.

Correction:

– Loosen the screw 7 (page 35).
– Change the height of the thread catcher accordingly.





Turn off main switch!
Otherwise there is danger of injury!

3.7 Thread catcher range of motion

Rule:

When the thread catcher 6 has been swung into its home position, its point should be located below the counter knife and be at a distance of 1 mm to the cutting edge of the counter knife 2.

Correction:

Loosen the screw 8 and change the position of the thread catcher accordingly.

3.8 Pressure of the counter knife on the thread catcher

Rule:

The knives should trim securely with minimum pressure.

Basic adjustment:

– Bring the handwheel to position B.
– Turn back the pressure screw 1.
– Swing the thread catcher 6 under the counter knife 2.
– Turn in the pressure screw 1 accordingly, loosen the screw 4 at the carrier, and then use the screw 5 to change the position of the carrier such that the counter knife is parallel to the thread catcher.
– Make a trimming test by moving the thread catcher by hand.

Correction:

Turn the pressure screw 1 accordingly and position the counter knife parallel to the thread catcher using the screw 5.

Please note:

The lower the knife pressure, the less the wear of the blades.

3.9 Position of the bobbin thread clamp

Explanation:

During the trimming action the clamp 3 is to clamp the bobbin thread so that the needle thread securely carries the bobbin thread with it during the first stitches.

Rule:

The side of the clamp 3 should rest against the carrier.

3.10 Position of the released thread tension

Rule:

The thread tension should be opened just enough so that threads of the size 11/3 pull easily through the tension discs.

Check:

Press the lever 9 in the arrow-indicated direction as far as possible.

Correction:

Change the position of the stopper 10 accordingly.

3.11 Pressure of the thread pre-tension

Explanation:

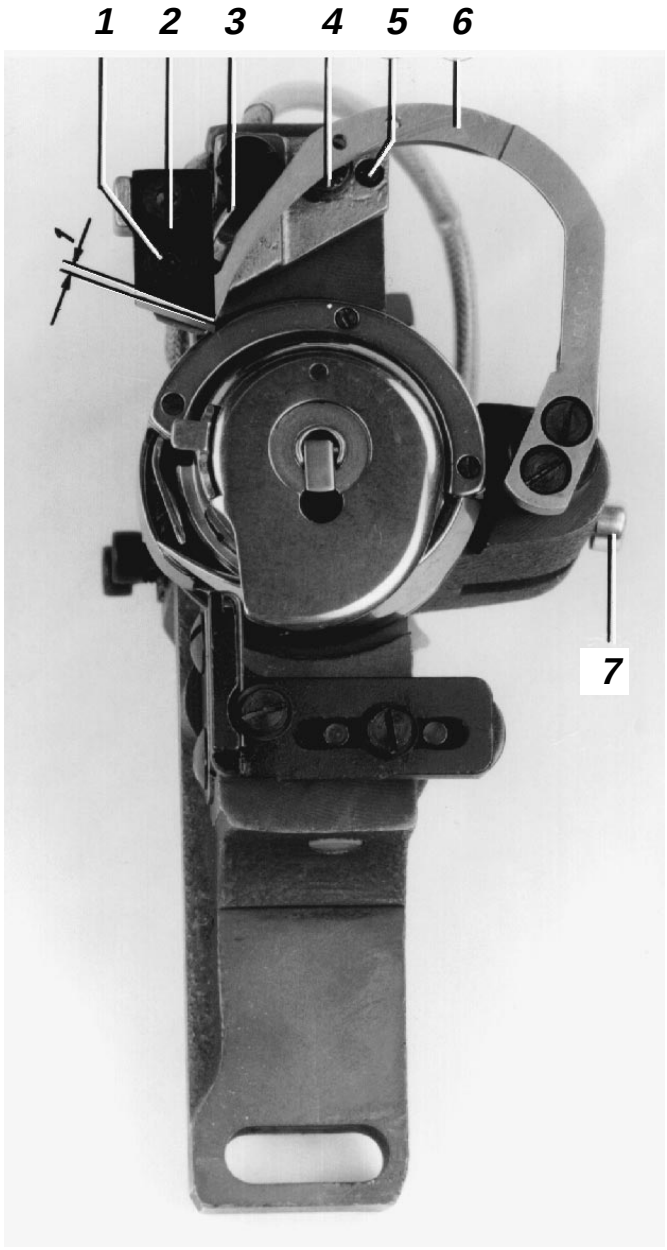
During thread trimming the main thread tension is opened so that just the thread pre-tension is effective.

Rule:

The thread end hanging out of the needle after thread trimming should be sufficiently long so that it can be pulled up to the front throat plate screw.
The required adjustment depends on the size and texture of the thread.

Correction:

Turn the button of the thread pre-tension at the face plate accordingly.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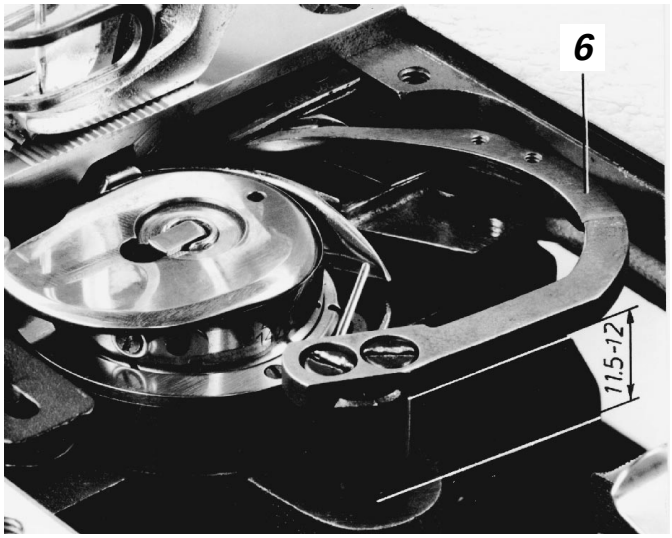
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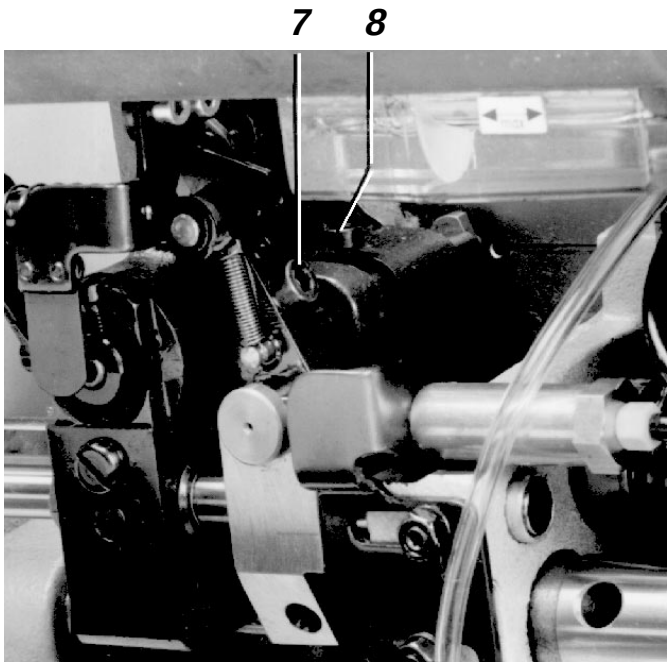
11.5-12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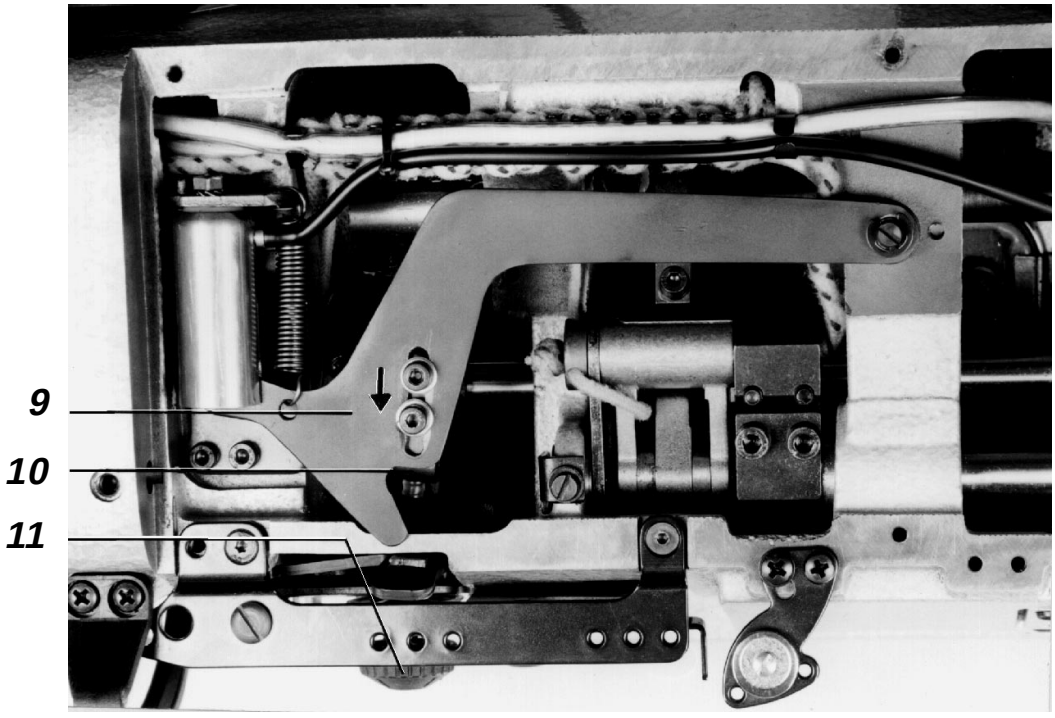
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4. Synchronizer

4.1 Reference position

The reference position of the synchronizer is to be determined after the following steps:

– Attaching the synchronizer during installation of the machine.
– Changing the synchronizer.
– Changing the control box.
– After unscrewing the synchronizer.

After the reference position has been determined, the signals for the 1st and 2nd position are given in the moments laid down by the factory.

Process	**Remarks / Display text (DT)**
Prerequisite:	
– Synchronizer screwed on in any position.	
– Main switch turned off.	
1. Calling up the correction mode:	
– Press the key **P** and keep depressed.	
– Turn on main switch.	– DT: C-0000
– Release the key **P**.	
– Enter the code no. **1907**.	
– Press the key **E**.	– DT: F-100
	– The text "C-0000 Error 0" on the display indicates that the wrong code no. has been entered.
2. Calling up the adjustment no. 170:	
– Press the key **P**, enter **170**.	
– Press the key **E**.	– DT: F-170.
– Press the key **F**.	– DT: Position.
3. Determining the reference position:	
– Turn the handwheel approx. 1 turn in operating direction. Lock the handwheel in position **D**.	– The handwheel must be turned one revolution to position D for this operation. In position D the thread lever is in the lower position. The reference point is set dependent on the type of motor. Should the ref. point not be reached, conduct a correction as follows:
4. Calling up setting no. **171**:	
– Press the key **P**, enter **171**.	
– Press the key **E**. Turn the handwheel into the 1st needle position **F**.	– Insert the timing pin for positioning, remove the timing pin.
– Press the key **E**. Turn the handwheel into the 2nd needle position **C**.	– Insert the timing pin for positioning, remove the timing pin.
– Press the key **P** (2x).	
5. Return device:	
Turn on:	
– Press the key **P**, enter **180**.	– The needle may not extend beyond the raised sewing foot.
– Press the key **E**, enter **20**.	– Return run.
– Press the key **P**, enter **182**.	
– Press the key **E**, enter **ON**	– Return device on.

Process	Remarks / Display text (DT)
– Press the key **P**, enter **171**.	
– Press the key **E**. Turn the handwheel into the 1st needle position **F**.	
– Press the key **E**, enter **188**.	
Turn off:	
– Press the key **P**, enter **182**.	
– Press the key **E**, enter **OFF**. Thereafter the control must be readjusted resetted as described under point 4 no.171.	– Return device off.
6. Duration of the cutting impulse: Set at **180-200** at the factory. Enter a correction via parameter **190**.	

4.2 1st and 2nd position

Explanation:

– Both positions have a defined angular relationship, defined by the corresponding number of increments, to the reference position. Therefore, the 1st and 2nd position are accurately determined after the reference position has been adjusted. With the 1st position it may be necessary in some special cases to deviate from this determined adjustment.

– In the 1st position the following functions take place:
Start of the trimming action.
Machine stop when the pedal is released during sewing.

– In the 2nd position the thread trimming action is completed.

4.3 Stop position after "needle re-positioning" from the 2nd position

Explanation:

– After a corresponding input (see instruction manual of the motor manufacturer), when the 2nd position has been reached, the arm shaft is turned back until the needle is at the top of its stroke. In this position the needle point no longer juts out from under the lifted sewing feet after thread trimming.

– The adjustment of the reference position determines the stop position.

5. Changing the elements

Turn off main switch!
Otherwise there is danger of injury!

5.1 Changing the hook

Removing the hook:

– Unscrew the throat plate.
– Remove the bobbin case cap 1.
– Loosen the 3 screws 2 accessible through the hole in the bobbin case base and remove the hook.

Installing the hook:

– Fasten another hook on the shaft.
  Due to the different angular positions of the 3 holes in the hook base, the hook can be attached on the hook shaft in a defined position only. This assures that the loop stroke is not changed after hook change.
– Install the bobbin case cap.
– Screw on the throat plate.
  Make sure that the holding nose of the bobbin case cap is in the throat plate recess.

After hook change:

Check, and if necessary rectify the distance between the hook point and the needle and the position of the needle guard.

5.2 Changing the circuit board

When the circuit board 5 is re-installed be sure to note the following!

When both dials for the sewing foot stroke and the stitch length (forward) are set at the smallest value, the following conditions must be fulfilled:

– The pins 4 on both shafts must point vertically upward. Besides, the pins 4 must be aligned axially such that they are at a distance of approx. 0.5 mm to the bottom of the slot in the sliding contact 3.
  To correct, loosen the screw 7 at the shaft 6 and change the position of the pin accordingly.
– The mark on the exterior part of the sliding contact 3 must point to the arrow on the circuit board.