



Instructions for service

2180 - 1

CONTENTS:

1. General safety instructions	1
2. Introduction	1
3. Head of the sewing machine	2
3.1 Hook and hook post	2
3.1.1 Description	
3.1.2 Height setting of the hook	
3.1.3 Setting the distance of the hook from the needle	
3.1.4 Angular setting of the hook (timing)	
3.1.5 Protection of the needle and of the hook point	
3.1.6 Setting of the bobbin case opener	
3.1.7 Setting the regulation of the hook lubrication	
3.1.8 Replacement of the hook	
3.1.9 Setting the gear	
3.1.10 Dismantling of the hook post	
3.2 Needle and thread mechanism	5
3.2.1 Description	
3.2.2 To check the handwheel angular adjustment	
3.2.3 Height setting of the needle bar	
3.2.4 Side setting of the needle bar holder	
3.2.5 Setting the needle (the needle bar holder) in the direction of sewing	
3.3 Throat plate and its post	7
3.3.1 Description	
3.3.2 Mounting and removing the throat plate	
3.3.3 Side setting of the throat plate post	
3.4 Thread tensioner	8
3.4.1 Description	
3.4.2 Setting the tension and switching off the main and the auxiliary tensionmer	
3.4.3 Setting of the adjusting spring	
3.5 Feeding mechanism of the needle feed and of the lower feed wheel	9
3.5.1 Description	
3.5.2 <u>Stitch length mechanism</u>	
3.5.2.1 Setting of the stitch length eccentric	
3.5.2.2 Setting of the stitch length button	
3.5.3 <u>Lower feed wheel</u>	
3.5.3.1 Feeding clutches	
3.5.3.2 Wheel feeder and its post	
3.5.3.2.1 Height setting of the feeder and tensioning of the chain	
3.5.3.2.2 Replacement of the feeder	
3.5.4 <u>Setting the top roller (pressing force, height)</u>	
3.6 Feeding mechanism of the top roller	11
3.6.1 Description	
3.6.2 Side setting of the indented lower pulley	
3.6.3 Side setting of the indented upper pulley	
3.6.4 Setting the tensioning roller	
3.6.5 Replacement of the indented belt	
3.6.6 <u>Top roller</u>	
3.6.6.1 Selection of the top roller diameter	
3.6.6.2 Forward, rearward and side setting	
3.6.6.3 Setting the gear clearance and in the mounting of the top roller	
3.6.6.4 Replacement of the top roller	
3.7 Setting the presser foot lift	15
3.8 Bobbin winder	16
3.8.1 Description	
3.8.2 Setting the bobbin winder stop	
3.8.3 Setting the friction gear	

3.9	Safety clutch	17
3.9.1	Description	
3.9.2	Setting the disengaging moment	
3.10	Indented belt transmission	17
3.10.1	Setting the tensioning roller of the indented belt	
3.10.2	Replacing the indented belt	
3.11	V-belt, motor - head	18
3.11.1	Tensioning	
3.11.2	Replacing the V-Belt	
3.12	Lubrication	19
3.12.1	Description	
3.12.2	Refilling oil	
3.12.3	Multiple oil use	
4.	Maintenance (table of operations)	20
5.	Setting the machine according to the sewing category	20
5.1	Introduction	
5.2	Table of setting the machine according to the sewing category	

1. General safety instructions

The non-observance of the following safety instructions can cause bodily injuries or damages to the machine.

1. The machine must only be commissioned in full knowledge of the instruction book and operated by persons with appropriate training.
2. Before putting into service also read the safety rules and instructions of the motor supplier.
3. The machine must be used only for the purpose intended. Use of the machine without the safety devices is not permitted. Observe all the relevant safety regulations.
4. When gauge parts are exchanged (e.g. needle, top roller, needle plate, feed dog and bobbin) when treading, when the workplace is left, and during service work, the machine must be disconnected from the mains by switching off the master switch or disconnecting the mains plug.
5. Daily servicing work must be carried out only by appropriately trained persons.
6. Repairs, conversion and special maintenance work must only be carried out by technicians or persons with appropriate training.
7. For service or repair work on pneumatic systems the machine must be disconnected from the compressed air supply system. Exceptions to this are only adjustments and function checks made by appropriately trained technicians.
8. Work on the electrical equipment must be carried out only by electricians or appropriately trained persons.
9. Work on parts and systems under electric current is not permitted, except as specified in regulations DIN VDE 0105.
10. Conversions or changes to the machine must be authorized by us and made only in adherence to all safety regulations.
11. For repairs, only replacement parts approved by us must be used.
12. Commissioning of the sewing head is prohibited until such time as the entire sewing unit is found to comply with EC directives.



It is absolutely necessary to respect the safety instructions marked by these signs.
Danger of bodily injuries !
Please note also the general safety instructions.

IMPORTANT WARNING

In spite of all safety measures made on the machines, inappropriate actions of the operator may lead to dangerous situations. In industrial sewing machines, attention should be paid to the following still remaining possible sources of injury:

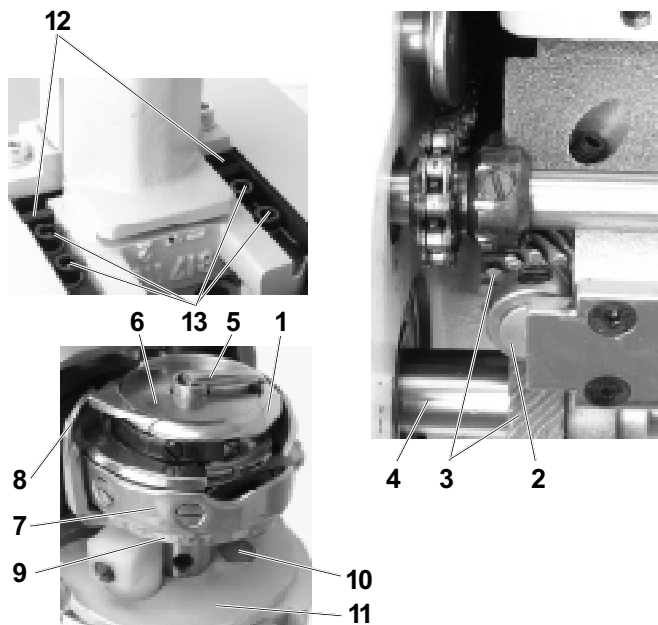
1. Moving sewing needle
 - risk of injury when sewing with raised pressure foot or top roller, because the finger guard is then positioned too high,
 - risk of injury when inadvertently threading down of the motor treadle.
2. Moving thread take-up lever
 - risk of injury when inadvertently or intentionally inserting the finger(s) between the thread take-up lever and its guard.
3. Moving pressure member
 - risk of injury when holding sewn work in immediate vicinity of the pressure member and beginning to insert under the pressure member a considerably thicker sewn work portion,
 - risk of injury when sinking the pressure member.
4. When switched off, the clutch motor slows down by inertia but would be reactivated by an accidental treading down of the motor treadle. To avoid such risk, it is advised to hold the handwheel by hand and slightly to depress the motor treadle.

2. Introduction

This service book contains instruction for regulating the mechanisms of the sewing machine head.

Instructions for use and for putting the machine into operation are not included in this service book, but they are supplied as separate publication.

This sewing machine disposes of a large extent of its use. The machine should be set with respect to the parameters of the sewn material, the sewing thread etc. The setting for the individual categories is given in the chapter 5.2.



3. Head of the sewing machine

3.1 Hook and the hook post

3.1.1 Description

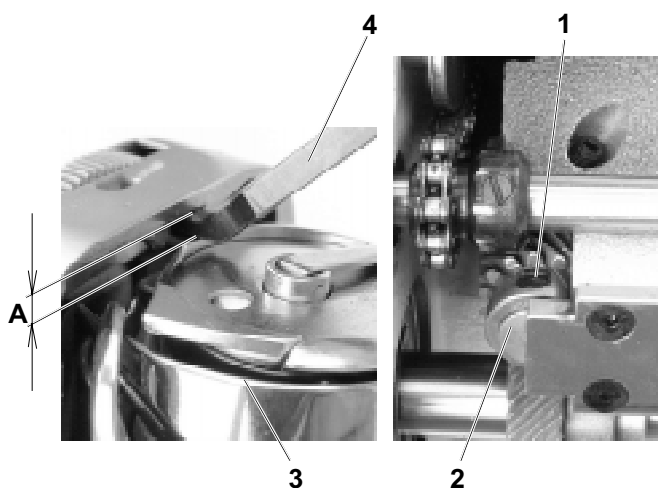
The hook (1) is mounted on the shaft (2) and is driven by the gear (3) from the shaft (4).

The shaft of the hook (2) is slidably mounted on the top, in a post and, on the bottom, in a needle bearing.

The hook is provided with a lever (5) which is tilted when removing the bobbin (6). The protecting sheet (7) protects against the collision of the needle with the hook point. The bobbin case opener (8) is driven by the eccentric (9) on the shaft (2).

The oil tank (10) contains oil supply for the hook lubrication. Superfluous oil is taken by the felt piece (11) used to lubricate sliding mounting hook shafts.

The screws (12) serve for taking up the clearance of the gear. The screws (13) fasten the post to the bedplate.



3.1.2 Height setting of the hook

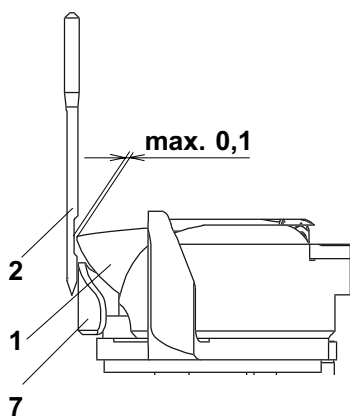
The designated distance „A“ should be for sewing category 100 - 1.5 mm and for sewing category 200 - 2.0 mm.



Caution! Danger of injury!

Switch off the main switch ! Before starting the setting operation, wait until the motor stops!

- Loosen both screws (1).
- Shift axially the shaft (2) with the hook (3) so as to obtain the required distance „A“. For setting up use the setting gauge (4) as per the respective figure.
- Carefully retighten the screws (1) after the adjustment. Caution! One of these screws must bear on the flat of the shaft (2).



3.1.3 Setting the distance of the hook from the needle

The hook point (1) is set up to the maximum distance of 0.1 mm from the bottom of the needle recess (2). For the sewing categories 100, the needle size 100 is set, for the sewing categories 200, it is the needle size 130.



Caution! Danger of injury!

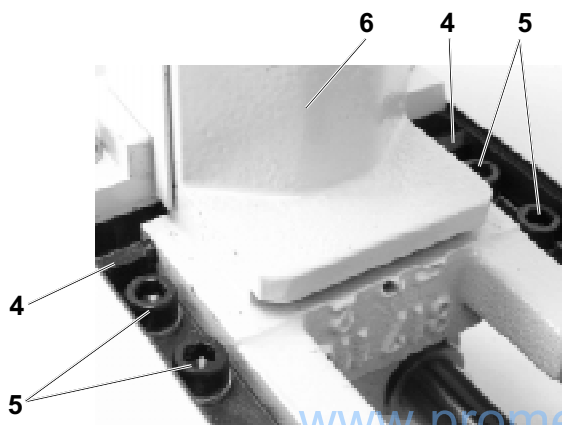
Switch off the main switch ! Before starting the setting operation, wait until the motor stops!

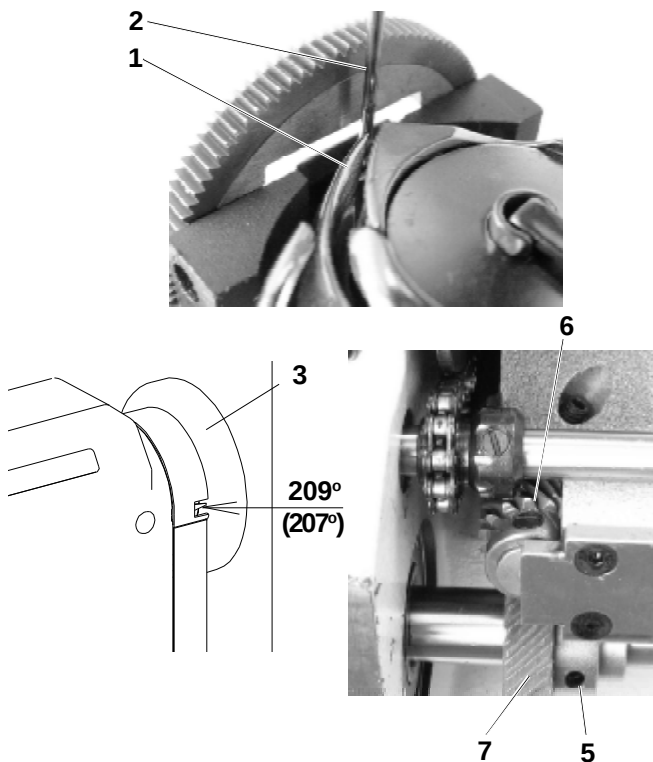
- Loosen only one screw (4).
- Loosen the screws (5) and tighten them only slightly.
- Shift the hook post (6) at the determined distance between the needle and the hook point.
- Tighten carefully the screw (4) (be sure not to damage the threads!)
- Tighten duly the screws (5).
- Check up the setting using a narrow strip of thin paper and proceed to the eventual correction of setting.



Caution!

When changing substantially the sewing category, the protecting sheet of the hook (7) should be set up.





3.1.4 Angular setting of the hook (timing)

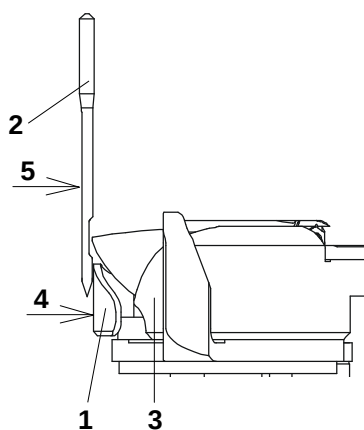
The hook is to be angularly set in such a way that the hook point (1) is opposite the needle at the moment, when the needle shifts by 2.5 mm (sewing category 100) or 2.2 mm (sewing category 200) from its bottom dead center. This corresponds to the 209° (sewing category 100) or 207° (sewing category 200) on the scale of the handwheel (3). Adjust by zero stitch length.



Caution! Danger of injury!

Switch off the main switch! Before starting the setting operation, wait until the motor stops!

- Remove the throat plate.
- Turn the handwheel (3) to the 209° (207°).
- Loosen the screws (5).
- Turn the hook into the required position.
- Set the toothed wheel (6) on the centre of the wheel (7).
- Tighten to the maximum the screws (5).



3.1.5 Protection of the needle and of the hook point

The protecting sheet (1) is to be set up in such a way that the clearance between the protecting sheet and the needle (2) is the least possible. Adjust by max. stitch length.



Caution! Danger of injury!

Switch off the main switch! Before starting the setting operation, wait until the motor stops!

- Remove the throat plate.
- In deforming the protective sheet (1) set the required play between the sheet and the needle (2). After having introduced a suitable screwdriver between the protective sheet and the hook body (3) we shall reduce the play by levering, in applying the pressure on the protective sheet in the sense of the arrow (4), we shall increase the play.
- Check up the protecting effect in pushing against the needle in the sense of the arrow (5). The hook point must not catch the needle. If so, set up the protecting effect, correct eventually the setting of the distance of the hook point from the needle according to the paragraph 3.1.3.



3.1.6 Setting of the bobbin case opener

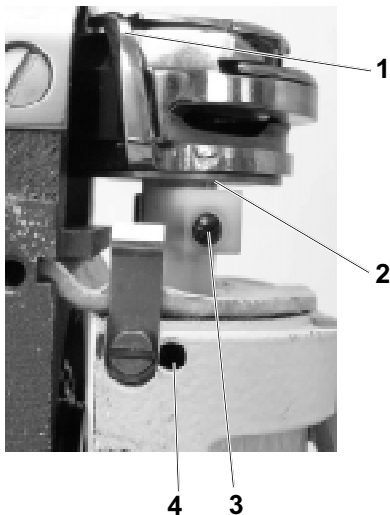
The bobbin case opener (1) is to be set in such a way that, at the moment when the opener is in its dead centre, there would be a clearance „A“ between the opener (1) and the projection (2), whereas the finger (3) bears on the projection (4).



Caution! Danger of injury!

Switch off the main switch! Before starting the setting operation, wait until the motor stops!

- By turning the hand wheel (5), set the bobbin case opener (1) into its dead centre (the clearance „B“ is maximal, the value thereof on the hand wheel is approximative 325°).
- Loosen the screw (6).
- Turn the eccentric (7) in such a way, so that the desired clearance „A“ between the bobbin case opener (1) and of the part (2) of the central portion of the hook is attained /the finger (3) bears against the projection (4)/. For the sewing category 200, set the minimum clearance „A“.
- Set the height of the eccentric (7) in such a way that it is in its highest position in retaining the minimum clearance between the slide (8) and the fork (9).
- Tighten duly the screw (6).



3.1.7 Setting the regulation of the hook lubrication

Oil is wiped from the lubricating wick by the face of the hook eccentric and is then fed by the centrifugal force between the bobbin case lifter (1) and the hook eccentric (2). With the hook R 810, oil is fed also into the hook path. The intensity of oil supply is regulated by turning the screw (3).



Caution! Danger of injury!

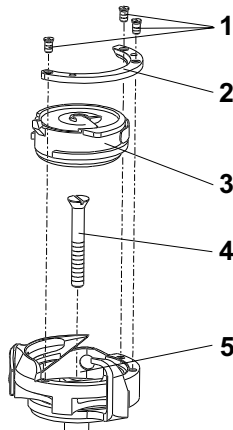
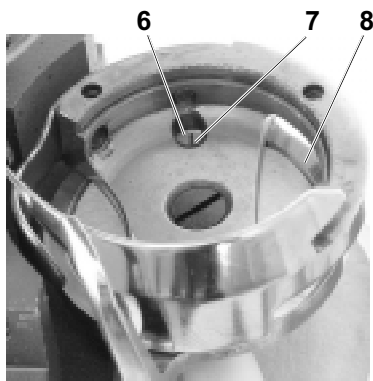
Switch off the main switch ! Before starting the setting operation, wait until the motor stops!

- To reduce the oil supply, turn the screw (3) to the right.
- To increase the oil supply, turn the screw (3) to the left.
- After the adjustment, loosen the screw (4) and set the height of the oil tank so as to ensure reliable contact between the surface of the eccentric and the lubrication wick.



Caution!

The quantity of the fed oil has been set up in the manufacturing factory. This setting is to be done only in emergency events. A bad setting of the quantity of the fed oil or of the height of the lubricating tube may cause a rapid wear or a seizure.



3.1.8 Replacement of the hook

The hook DSH 820 must be mounted on the hook shaft in such a way, so that the gauge mark (7) of the hook eccentric (8) is visible through the hole (6) of the hook body. The hook R 810 is positioned against the hook eccentric (8) by the lubricating tube.



Caution! Danger of injury!

Switch off the main switch ! Before starting the setting operation, wait until the motor stops!

- Remove the throat plate.
- Unscrew the screws (1) and remove the splice (2).
- After having suitably turned a bit the hook, remove the bobbin case (3).
- Unscrew thoroughly the screw (4).
- Remove the body of the hook (5) upwards.
- When mounting, the procedure is inverse.

3.1.9 Setting the gear

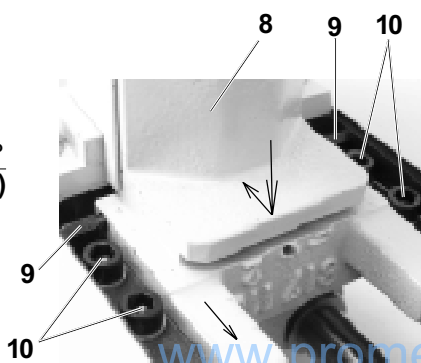
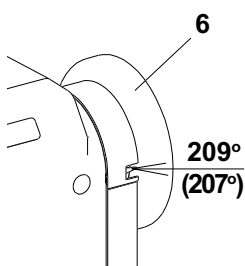
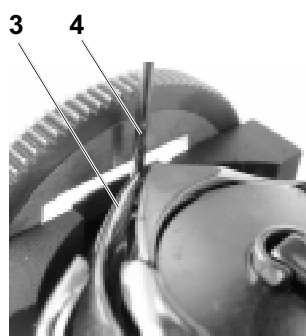
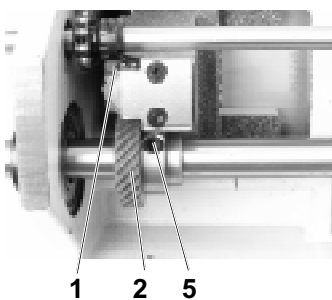
The mutual angular orientation of the gear wheel (1) relative to the gear wheel (2) should ensure the accessibility of the screw (5) at the moment when the hook point comes to lie opposite the needle (4). The wheel (2) is to be set with its gear rim symmetrically to the centre of the gear wheel (1). The clearance between the gear wheels is to be the least possible.

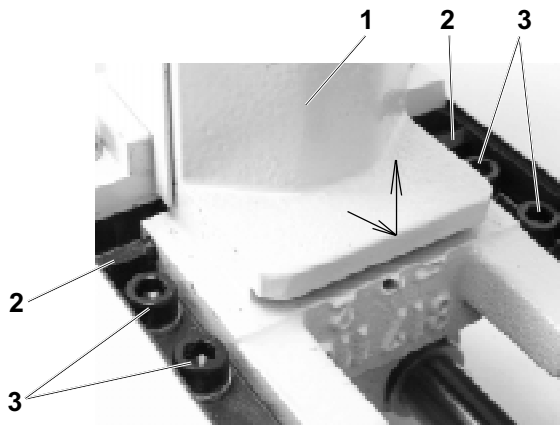


Caution ! Danger of injury!

Switch off the main switch! Before starting the setting operation, wait until the motor stops!

- Set the hook timing angle of 209° (207°) on the hand wheel (6).
- On the removed post of the hook (8), according to the paragraph 3.1.10, the hook point (3) is to be turned a bit according to the illustration.
- Turn the gear wheel (2) into the suitable position and insert the post of the hook into the machine according to the respective arrows. Check up, whether the screw (5) is accessible and, if not, repeat the procedure.
- Set the distance of the hook from the needle according to the paragraph 3.1.3.
- Set the precise angular displacement of the hook according to the paragraph 3.1.4.
- Loosen the screw (10) and tighten them slightly.
- Set the clearance in the gear in turning the screws (9). Check up, whether the gear has a clearance during the whole revolution of the hook. Turn the handwheel step by step by 15° and, with each step, grasp the hook and try, if there is an angular dead travel. Tighten carefully the screws (9).
- Tighten duly the screws (10) and try anew the clearance of the gear.





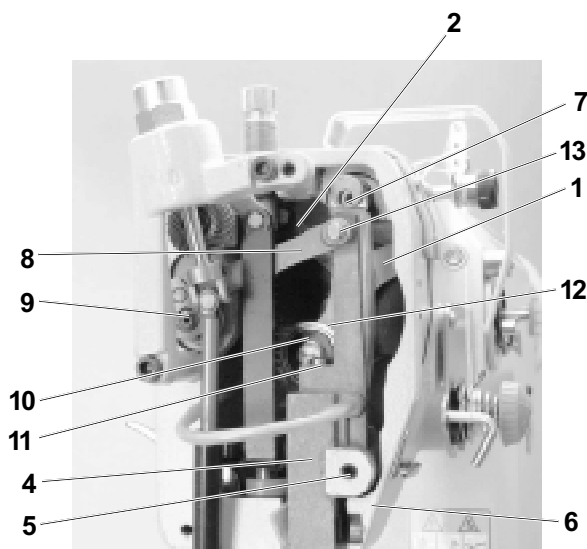
3.1.10 Dismantling of the hook post



Caution ! Danger of injury!

Switch off the main switch! Before starting the setting operation, wait until the motor stops!

- Loosen only one screw (2).
- Unscrew the screws (3).
- Shift the post(1) in the sense of the arrows and remove it out from the machine.
- When mounting it, proceed inversely.



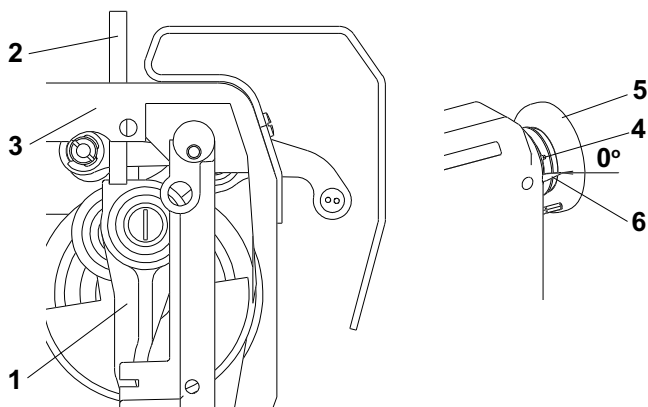
3.2 Needle and thread mechanism

3.2.1 Description

The take-up lever (1) is mounted in ball bearings, both at the spot of its suspending on the connecting rod (2) and in the mounting on the loop (12). The take-up lever is of aluminum and is provided with a stuck-in eye for the thread passage.

The needle rod holder (4) is mounted through the pivot (5) in a rotating way in the arm (6). In its top part, the holder is guided by the guide pin (7). The movement for the needle feed is given to it by the connecting rod (8) driven by the feeding shaft (9). The connecting rod (8) is mounted by pin (13) with needle bar holder (4).

The connecting rod (10) of the needle bar (11) on the loop (12) is mounted in a ball bearing and it is slidingly mounted on the needle bar carrier. The mechanism is lubricated by means of a central-wick lubricating system.



3.2.2 To check the handwheel angular adjustment

The handwheel (5) must be situated in its precise position relative to the needle and thread mechanism. This position is given by a pin (2), which locks the connecting rod of the needle rod (1) through a hole in the arm (3). In this position, the indicator (6) of the handwheel must show „0“. The position is fixed by the handwheel screw (4) contacting a small flat surface provided on the upper shaft.

The correct adjustment of the angular position has been carried out at the producer's.



Caution ! Danger of injury!

Switch off the main switch! Before starting the setting operation, wait until the motor stops!

3.2.3 Height setting of the needle bar

At the moment, when the hook point passes around the needle, the upper edge of the needle eye must be about 1 mm below the hook point. In an opposite case, it is necessary to set the height of the needle bar as follows:



Caution ! Danger of injury!

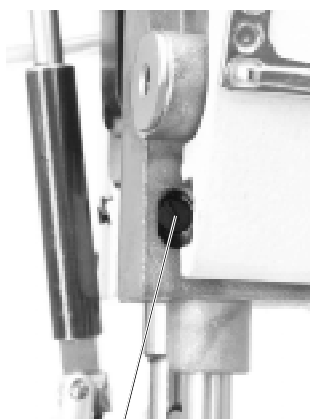
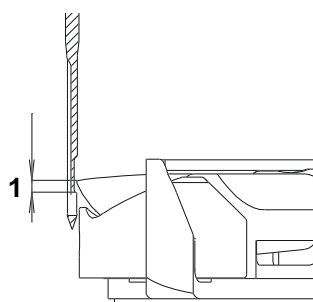
Switch off the main switch! Before starting the setting operation, wait until the motor stops!

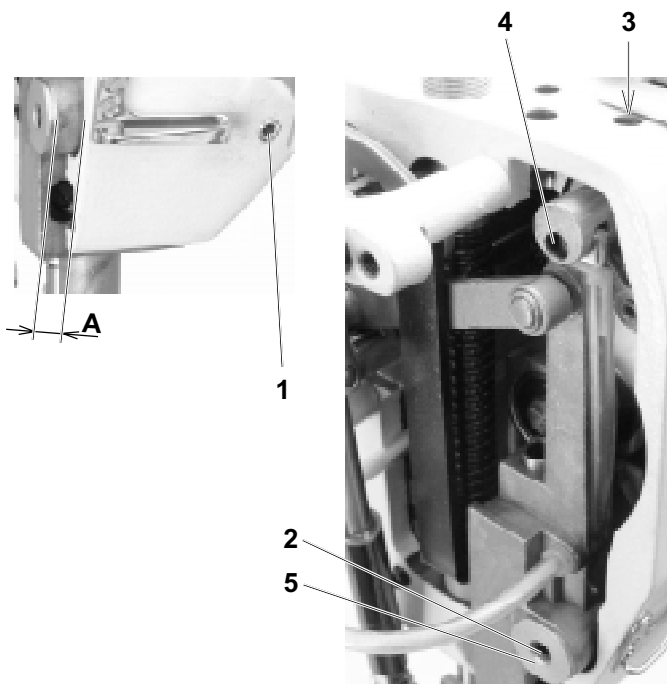
- Remove the front guard.
- Loosen the screw (1) of the needle bar carrier
- Set the correct height of the needle bar and tighten anew the screw (1).



Caution !

An incorrect setting of the needle bar height may cause the striking of the hook point against the needle. The intensity of oil supply is regulated by turning the screw (3).





3.2.4 Side setting of the needle bar holder

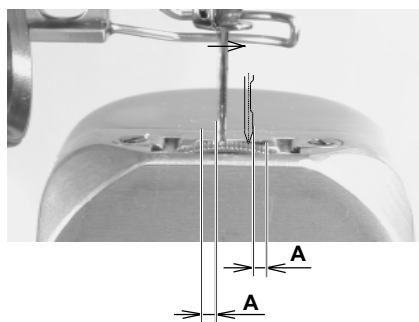
The correct position of this holder is in such case, when the needle bar is lined up with the presser-foot bar. The needle bar holder can be set as follows:



Caution! Danger of injury!

Switch off the main switch! Before starting the setting operation, wait until the motor stops!

- Loosen the screw (1) of the pin (2).
- Loosen the screw (3) of the guide pin (4).
- In shifting the pin (2) set the needle bar holder on the measure „A“ = 8 mm (distance between the front face of the arm and the front face of the safety bolt (5) of the needle bar holder) /at the same time the pin (4) shifts/.
- The guide pin (4) is to be set in such a way that the needle bar holder moves easily.
- Tighten the screws (1 and 3).



3.2.5 Setting the needle (the needle bar holder) in the direction of sewing

The distances „A“ between the needle and the edges of the needle hole when shifting the needle in and out from the throat plate must be the same.



Caution ! Danger of injury!

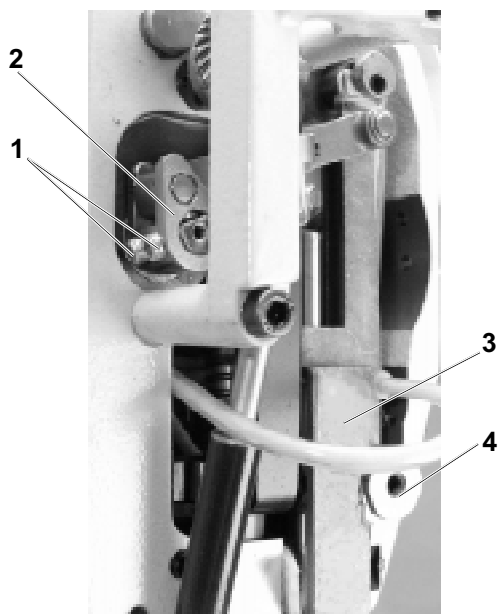
Switch off the main switch! Before starting the setting operation, wait until the motor stops!

- Set the maximum stitch length.
- By turning the hand wheel, find out the distances „A“.
- Loosen the screw (1) of the lever (2).
- By turning the needle bar holder (3) around the pin (4) set its desired position.
- Tighten up the screws (1) and check up the setting.



Caution!

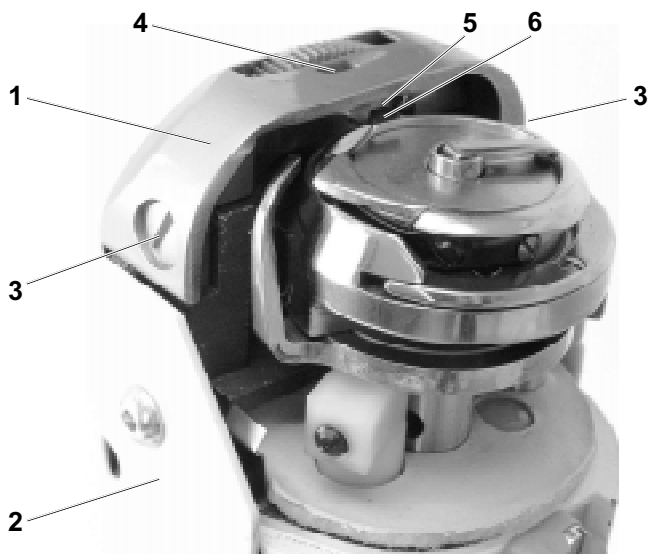
A faulty setting may cause bending or breaking of needles against the throat plate.



3.3 Throat plate and its post

3.3.1 Description

The throat plate (1) is clamped to the throat plate post (2) with two screws (3). Each sewing category (100, 200) has got its own throat plate. They differ by the size of the piercing hole (4) and of the recess (5) of the hook lock/.



3.3.2 Mounting and removing the throat plate

When mounting the throat plate (1), the finger of the hook (6) must fit into the recess (5) of the throat plate.



Caution! Danger of injury!

Switch off the main switch! Before starting the setting operation, wait until the motor stops!

- Turn slightly the finger (6) in the sense towards the throat plate (1).
- Place the throat plate (1) and screw in the screws (3).

3.3.3 Side setting of the throat plate post

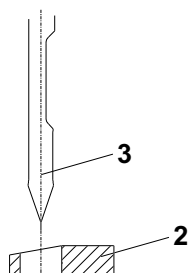
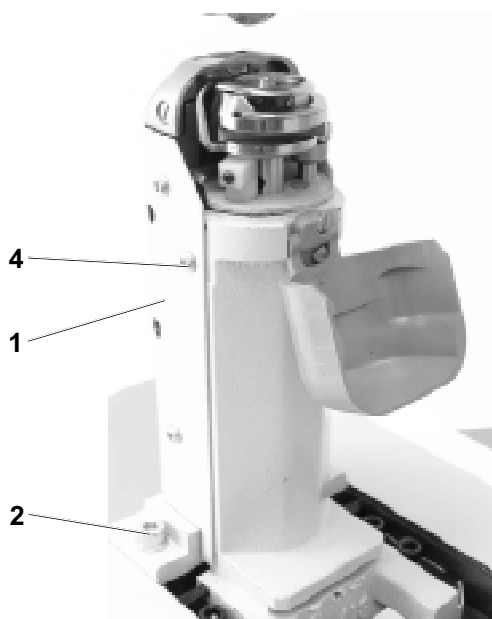
The throat plate post (1) is to be set by its side (laterally) in such a way, so that the axis of the piercing of the throat plate (2) is in the needle axis (3).



Caution! Danger of injury!

Switch off the main switch! Before starting the setting operation, wait until the motor stops!

- Loosen the screws (4 and 5) (from the rear side of the post as well).
- Shift the post (1) in the sense required.
- Tighten the screws (4 and 5) and check up for the correct setting.



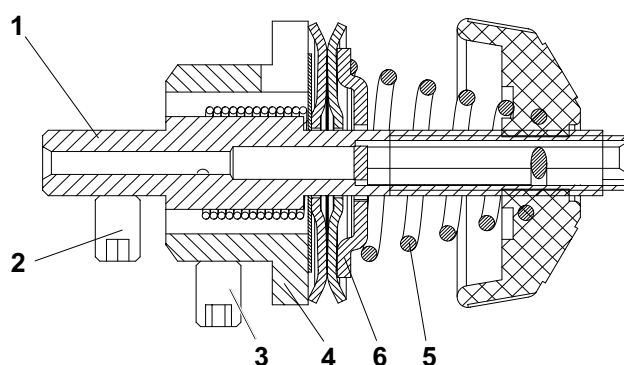
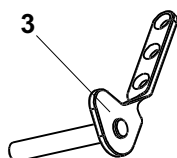
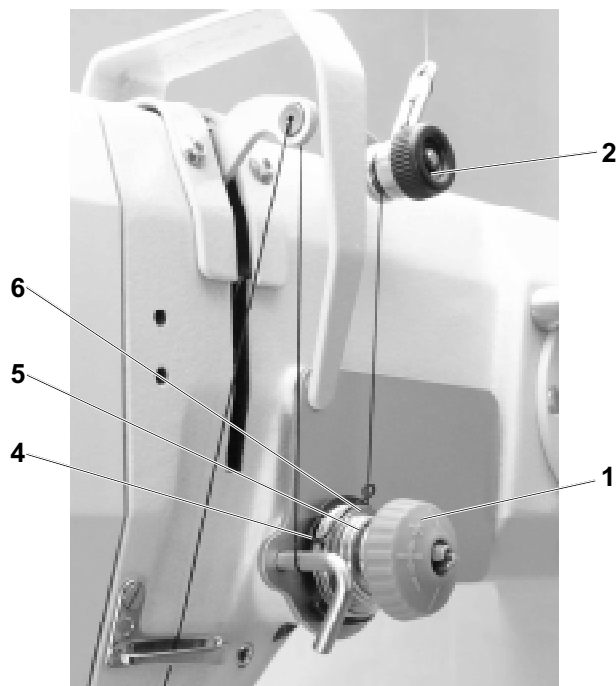
3.4 Thread tensioner

3.4.1 Description

The tensioner (1) serves for producing thread tension when tightening the stitch. The secondary tensioner (2) serves for producing a low thread tension, which is necessary for the correct function of the main tensioner. This holds good for high values of the top thread tension when sewing in category 200 (threads No 20, 10). If we shall not use in such cases the secondary tensioner, falling out of the thread from the disks of the main tensioner may occur. For the sewing category 100, only the thread guide (3) will fully suit.

The adjusting spring (4) holds the top thread in tensioned state when passing the thread through the hook and when entering the needle into the sewn material.

The tensioner is relieved by the mechanism for lifting the presser foot (hand or knee lever).



3.4.2 Setting the tension and switching off the main and the auxiliary tensioner

The tension of the main thread tensioner is controlled by the nut (1). The size of the given force differs according to the stitching category (according to the needles and threads used) and its orientation value is given in the paragraph 5.2. For attaining the value of the thread tension with the category 200, a stronger spring of the tensioner (5) is used. For relieving the disks of the main tensioner there is a gap of $0,5 \pm 1$ mm between the disks. This will be attained by suitable shaping of the relieving disk (6) of the tensioner – the respective setting has been done in the manufacturing factory.

The tension of the secondary tensioner is controlled by the nut (2). The tension should be the lowest possible one, but sufficient for avoiding falling out the thread from the disks of the main tensioner.

3.4.3 Setting of the adjusting spring

The mechanism of the adjusting spring is mounted on the shank (1) of the main tensioner. The starting position of the equalizing spring should be as shown on the respective figure, so that „A“ = 3 mm (see figure)



Caution! Danger of injury!

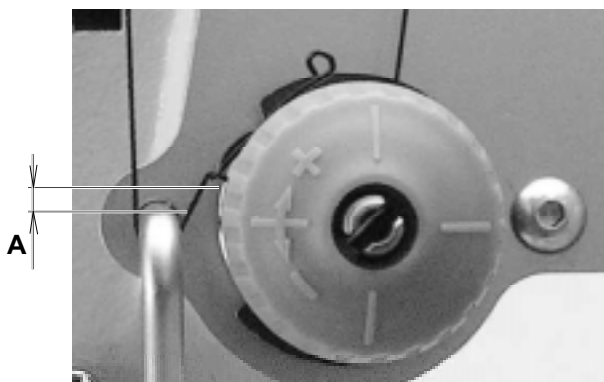
Switch off the main switch! Before starting the setting operation, wait until the motor stops!

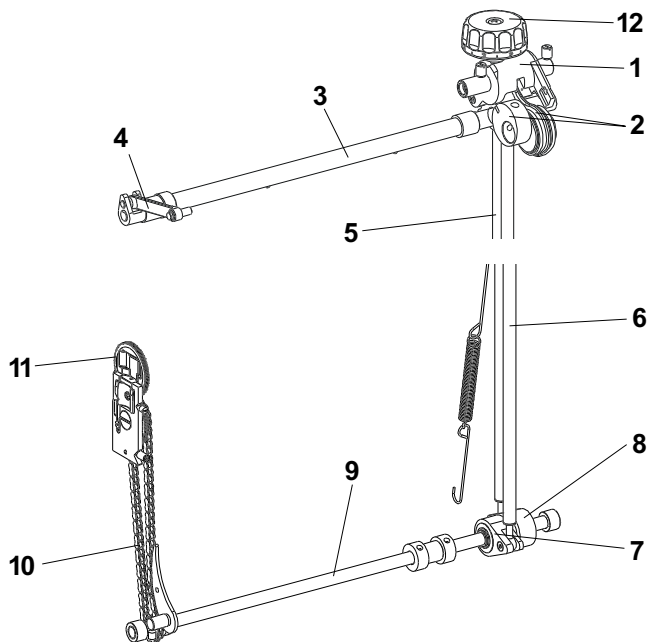
- Loosen the screw (2) of the shaft (1) of the tensioner, in turning the shaft in clockwise direction, the spring force increases and on the contrary.
- Tighten the screw (2), check the setting.
- Loosen the screw (3) of the tensioner body (4), by turning the body (4) set the starting position (or another one when needed).



Caution!

During the setting operation, the shaft (1) or the body (4) may axially shift. This can cause worsening of the function switching off of the main tensioner.

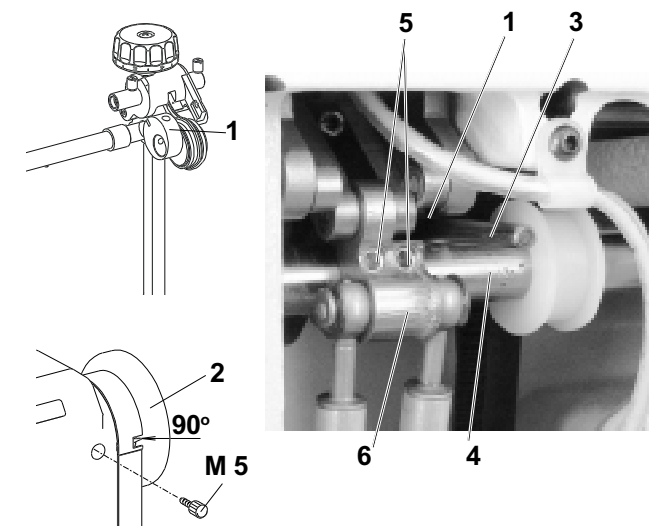




3.5 Feeding mechanism of the needle feed and of the lower feed wheel

3.5.1 Description

The feeding mechanism is formed by the leverage (1) which is driven from the main shaft through the eccentric with connection rod (2). The feeding movement is transmitted by the shaft (3) on the needle bar holder by means of the connecting rod (4) and by means of draw bars (5) and (6) on the clutches of the wheel feed (7) and (8). The circular movement is transmitted by the shaft (9) through the chain drive (10) on the wheel feeder (11). The stitch length is set by the button (12) located on the machine arm.



3.5.2 Stitch length mechanism

3.5.2.1 Setting of the stitch length eccentric

The eccentric (1) must be set in its angular position in such a way that the horizontal component of the needle motion is in a phase delay from the vertical component of the needle of this movement. This refers to the angle of 90° on the handwheel (2), when the setting stick (3) is engaged into the eccentric (1) and leans from above against the feeding shaft (4).



Caution! Danger of injury!

Switch off the main switch! Before starting the setting operation, wait until the motor stops!

- Set the angle of 90° on the handwheel (for fixing the position, the screw M5 screwed into the machine arm can be used – to be tightened with care.)
- Loosen the screws (5) of the lever (6).
- Insert the setting bar (3) into the hole in the eccentric (1) and prop it from above against the feeding shaft (4).
- Shift axially the eccentric (1) on the shaft into its extreme positions and place it in the middle.
- Tighten the screws of the eccentric (1) to the maximum (one screw first and, after having turned slightly the hand-wheel, the second screw as well).
- Tighten the screws (5) of the lever (6).

3.5.2.2 Setting of the stitch length button

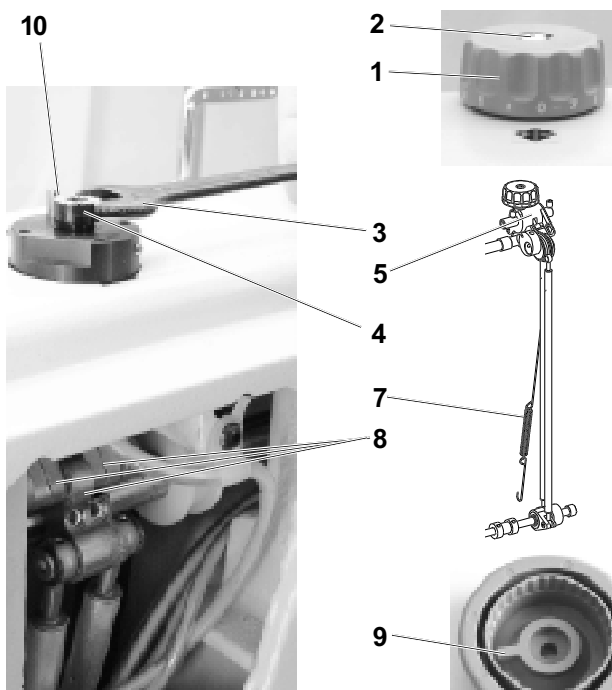
The button controlling the length of the stitch (1) should be set in such a way, so that when turning it in clockwise direction up to the stop, the maximum stitch length (7 mm) is attained. The mark ± on the button is to show at zero when having zero stitch length.

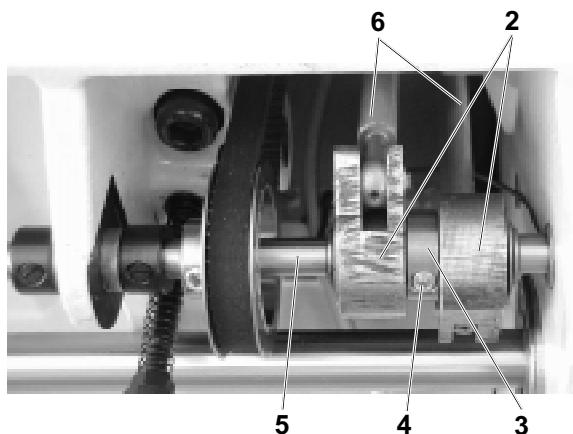


Caution! Danger of injury!

Switch off the main switch! Before starting the setting operation, wait until the motor stops!

- Loosen the screw (2) of the button (1) and remove it.
- Using the spanner (3) No 10, turn the screw (4) in clockwise direction /the screw turns the lever (5) across the cam (6) of the lever, on the other side, the lever (5) is drawn by the spring (7)/.
- Turn carefully the spanner until having the connecting rods (8) in alignment. This corresponds to the zero stitch length (the feeder and the wheel do not rotate).
- Set the button (1) on the screw (4), turn it in clockwise direction up to the stop /the partition (9) of the button will bear against the pin (10)/.
- Put on the screw (2) and tighten it.





3.5.3 Lower feed wheel

3.5.3.1 Feeding clutches

The feeding clutches are formed by two unidirectional clutches which are pressed into the levers (2). Both clutches are located on the hub (3), which is connected by means of the screws (4) with the shaft (5). The movement of the clutches is given by the draw bars (6) connected with the mechanism of the stitch length.

When dismantling and reassembling, mind the correct position of both clutches (they are not identical), as originally having been set by the manufacturer. Mind the arrows on the clutches.

3.5.3.2 Wheel feeder and its post

3.5.3.2.1 Height setting of the feeder and tensioning of the chain

The wheel feeder (1) is to be set in such a way that the points of its teeth overtop the throat plate by „X“ = 0.3 to 0.7 mm. When sewing soft and thick materials, it is necessary to increase the value „X“, until a good quality of feeding is attained.

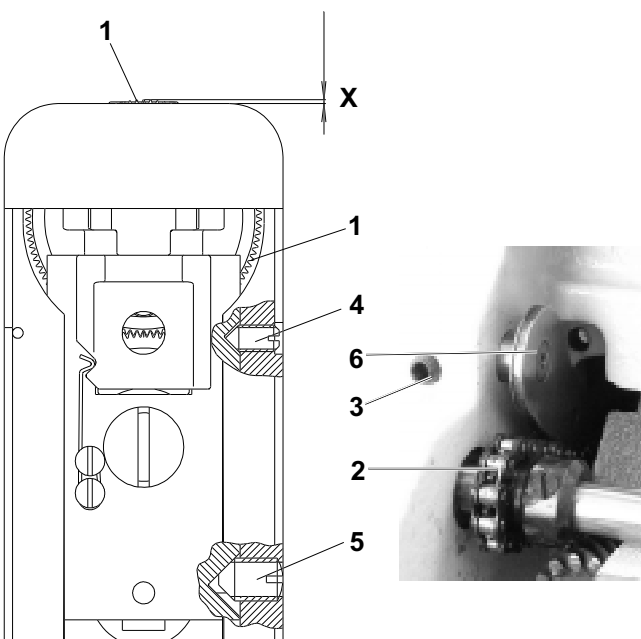
With every correction of the teeth height, the tension of the chain (2) is to be corrected.



Caution! Danger of injury!

Switch off the main switch! Before starting the setting operation, wait until the motor stops!

- Loosen the screw (3).
- Loosen the screw (4).
- Loosen or tighten the screw (5) and push simultaneously with finger the feeder (1) downwards, until the required height of the teeth „X“ of the wheel feeder is attained.
- Tighten then still the screw (5) by 45° (1/8 revolution).
- Tension the tensioner (6) up to the stop. Be careful in side shifting it to the centre of the chain. Tighten the screw (3).
- Loosen the screw (5) by 45° (1/8 revolution), into its original position. In this way, the optimal clearance of the chain transmission is attained.
- Tighten the screw (4).
- Correct the set height of the top roller according to the par. 3.5.4.



3.5.3.2.2 Replacement of the feeder

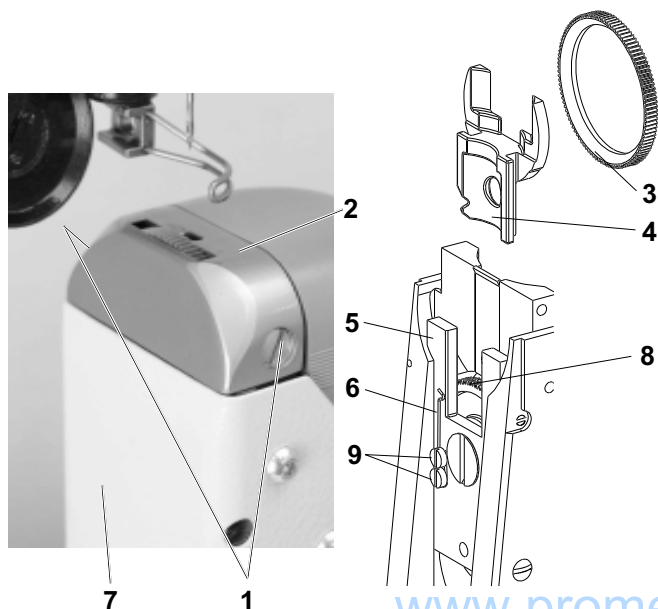
For the replacement of the wheel feeder (change of the wheel feeder according to the machine setting - see par. 5.2 - setting of the machine - feeder - pitch of the teeth).

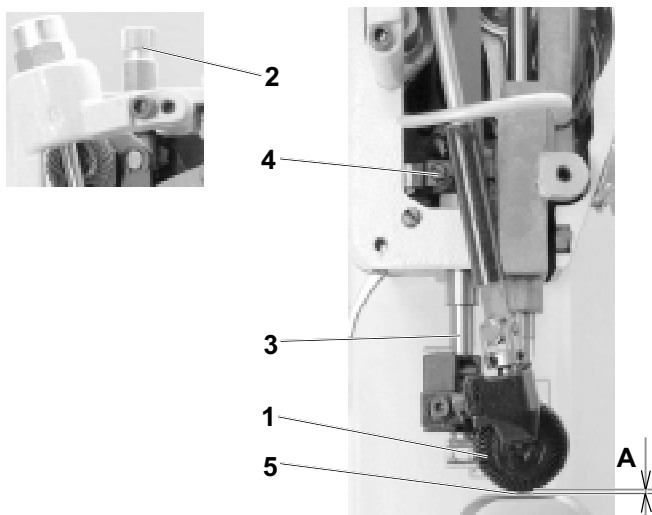


Caution! Danger of injury!

Switch off the main switch! Before starting the setting operation, wait until the motor stops!

- Unscrew the screws (1) and remove the throat plate (2).
- Unscrew the guard (7).
- In pulling upwards (securing by a spring), pull out the feeder (3) with the guide (4).
- Replace the feeder (3).
- Insert the feeder with the guide into the groove of the holder (5).
- Mount the throat plate (2) and tighten up the screws (1).
- Check up, if the spring (6) pushes the guide (4) with the feeder (3) against the wheel (8).
- In the opposite case, loosen the screws (9), tense up the spring (6) in such a way, so that the guide (4) with the feeder (3) is pushed against the wheel (8) and tighten the screws (9).
- Mount the guard (7) and tighten the screws.





3.5.4 Setting the top roller (pressing force, height)

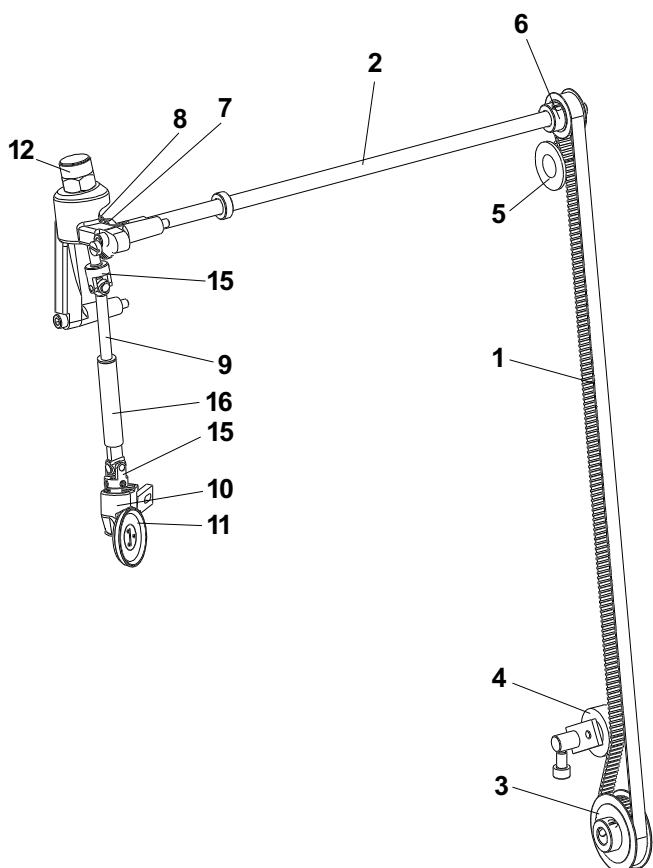
When lowering the top roller (1), set the clearance „A“ between the feeder (5) and the top roller to the maximum of 0.2 mm. Set the pressing force of the top roller (1) so as to avoid the slippage of the sewn material when feeding it.

Method of setting the height of the top roller

- Lower by hand the presser bar (3) with the top roller (1) above the wheel feeder (5).
- Loosen the screw (4) and set the required value „A“ (0.2 mm).
- Tighten the screw (4).

Setting the force of the top roller (1)

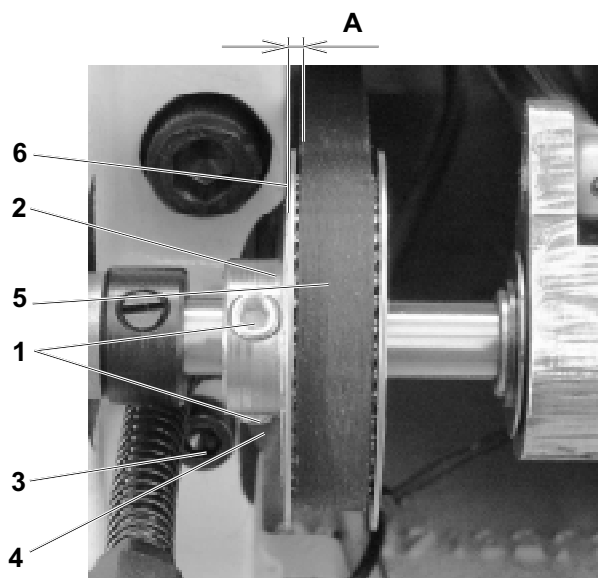
- In screwing in the screw (2), the force of the top roller is increased and inversely.



3.6 Feeding mechanism of the top roller

3.6.1 Description

The starting movement for the drive of the top roller feeder is the bottom feeding shaft. From this shaft, the movement is transmitted by the indented belt (1) onto the top feeding shaft (2). A component part of the transmission by indented belt is the pulley (3), the tensioning roller (4), the roller (5) and the pulley (6). Starting from the shaft (2), the movement is further transmitted through the wheels (7 and 8) onto the articulated shaft (9). From this articulated shaft, the movement is transmitted by a cone transmission, situated in the holder (10), onto the feeder wheel (11). The shaft of the wheel (8) is mounted in the screw (12) on bearings. The articulated shaft (9) contains two joints (15) and a telescopic part (16). Both these elements secure the lifting and the tilting of the top roller.



3.6.2 Side setting of the indented lower pulley

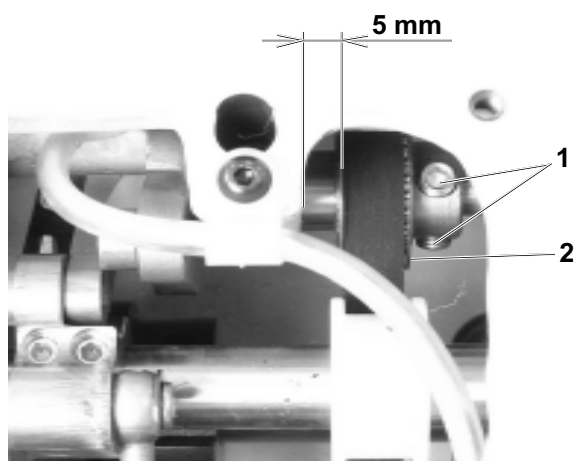
The belt pulley must be set in such a way, so that the belt passes 5 mm from the edge „A“ of the bedplate. The setting operation is to be done as follows:



Caution! Danger of injury!

Switch off the main switch! Before starting the setting operation, wait until the motor stops!

- Loosen the screws (1) of the pulley (2).
- Loosen the screw (3) of the tensioning roller (4)
- Set the belt pulley in such a way, so that the belt passes 5 mm from the edge „A“ of the bedplate.
- Tighten the screws (1).
- Set the tensioning roller (4) axially in such a way that the belt (5) is set at the middle of the tensioning roller (4).
- Set the tensioning roller (see par. 3.6.4).
- Tighten up the screw (3) of the tensioning roller (4).



3.6.3 Side setting of the indented upper pulley

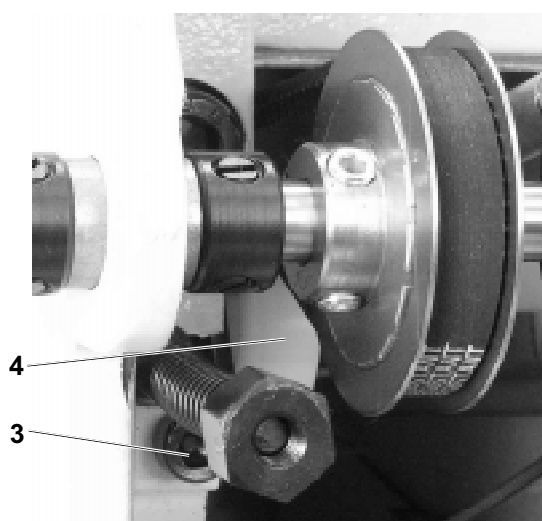
The pulley is to be set in such a way that the indented belt is not crossed and the pulleys are in line. The setting thereof is to be done as follows:



Caution! Danger of injury!

Switch off the main switch! Before starting the setting operation, wait until the motor stops!

- Loosen the screws (1) of the pulley (2).
- Set the pulley (2) in such a way that the distance of 5 mm is attained in accordance with the illustration.
- Tighten the screws (1).



3.6.4 Setting the tensioning roller

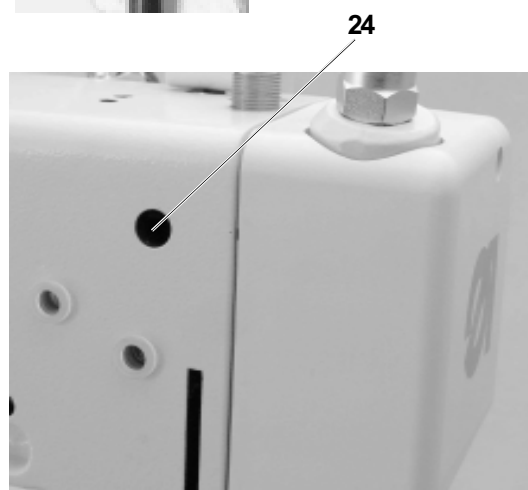
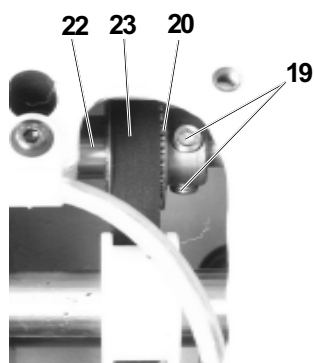
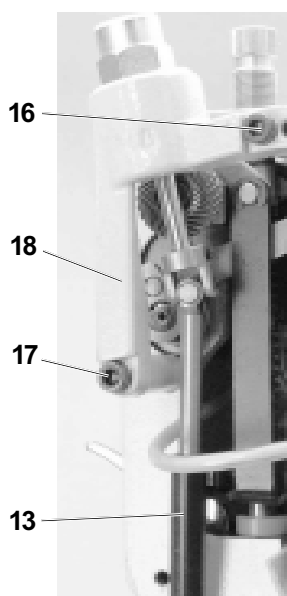
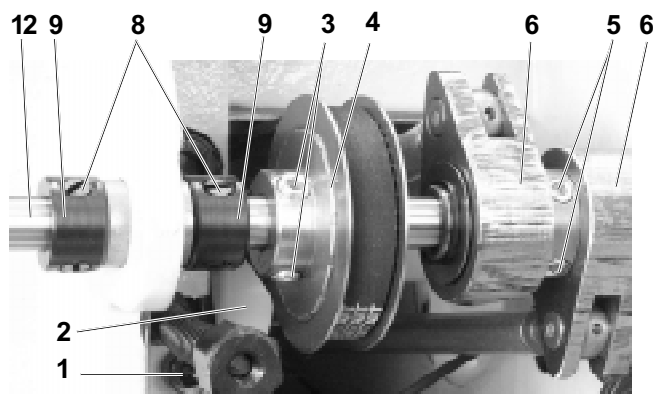
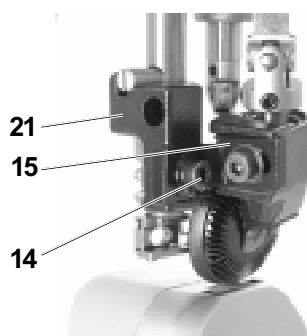
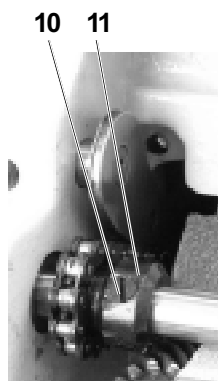
The tensioning roller of the indented belt of the top feeding is mounted in a rotary way on the bedplate. The belt must be ten-sioned as needed in such a way that there is ensured the correct function of the transmission. Insufficient tension can cause skipping of the teeth, on the contrary, excessive tensioning enormously loads the mounting of the top shaft. The setting thereof is to be done as follows:



Caution! Danger of injury!

Switch off the main switch! Before starting the setting operation, wait until the motor stops!

- Loosen the screw (1) securing the lever of the tensioning roller (2).
- Tension the belt as needed (theoretically, in applying the force of 10 N in the middle of the belt with the deflection of 4 mm).
- Tighten the screw (1).



3.6.5 Replacement the indented belt

Before replacing the indented belt, the bottom feeding shaft is to be removed. The procedure is as follows:



Caution! Danger of injury!

Switch off the main switch! Before starting the setting operation, wait until the motor stops!

- Loosen the screw (1) of the tensioning roller (2) and loosen it.
- Loosen the screws (3) of the pulley (4).
- Loosen the screws (5) of the feeding clutches (6).
- Loosen the screws (8) of the axial rings (9).
- Loosen the screws (10) of the chain wheel (11).
- Push the shaft (12) to the left in such a way that it is out of the pulley (4).
- Remove the pulley (4).
- Remove the front guard.
- Loosen and unscrew the screw (14) of the holder of the wheel (15) and remove it from the holder (21).
- Loosen the screws (16 and 17) of the holder (18).
- Remove the holder (18) together with the holder (15) and articulated shaft (13) from the machine.
- Loosen the screws (19) of the pulley (20).
- Loosen the screw of the ring through the hole (24).
- Hold the pulley (20) and pull out the feeding shaft (22) from the arm in such a way that it is possible to remove the indented belt (23) from the arm of the machine.
- Replace the belt with a new one and proceed to the assembly (inverted procedure of dismantling).
- Proceed to the setting operation according to the par. 3.6.2, 3.6.3 and 3.6.4.

3.6.6 Top roller

3.6.6.1 Selection of the top roller diameter

The machine can be supplied with three types of top roller, namely with the diameter of 25, 35 and 45 mm. The suitability of the diameter used depends on the type of sewing and on the concrete technological operation.

There are in general valid the following principles for the selection of the wheel diameter:

smaller $\varnothing$ - for sewing small radii

higher $\varnothing$ - for sewing straight sections or big radii

- for sewing with great passages to thicker materials

Fig. 1

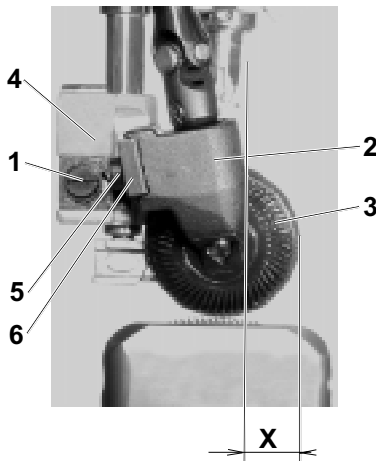


Fig. 2



3.6.6.2 Forward, rearward and side setting

The top roller must be in a defined position in relation to the needle:

a) view (see Fig. 1) - the value „X“ depends on the diameter of use top roller ($\varnothing$ 25 - 8 mm; $\varnothing$ 35 - 13 mm; $\varnothing$ 45 - 18 mm), it is measured from the the needle bar up to the roller edge when turning the handwheel to the 180° of the scale against the indicator

b) view (see Fig. 2) - the wheel edge must fit with the edge of the needle aperture at the spot of the needle punch.

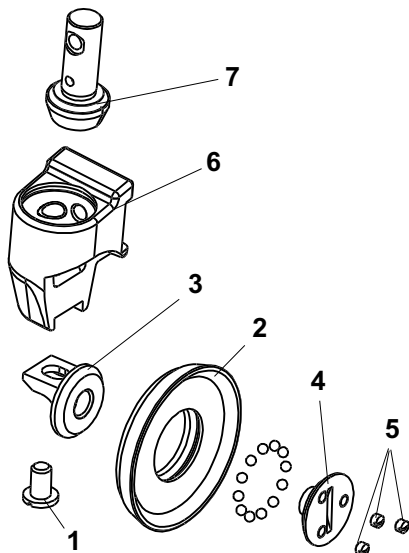
These values are to be set as follows:



Caution! Danger of injury!

Switch off the main switch! Before starting the setting operation, wait until the motor stops!

- Loosen the screw (1).
- By shifting the holder (2) with the top roller (3) in the groove of the holder (4) set the required value „X“ and tighten the screw(1).
- Loosen the screw (5)
- By shifting the holder (2) in the holder (6) set the bottom edge of the roller to the edge of the needle aperture.
- Tighten the screw (5).



3.6.6.3 Setting the gear clearance

and in the mounting of the top roller

In the cone gear of the drive of the top roller foot, the minimum clearance must be set. A too small clearance will increase the friction resistance of the gear, the excessive clearance will influence the inaccuracy of feeding. The top roller itself is mounted on balls. With this type of mounting, it is also necessary to set the minimal possible radial clearance.

The given clearances are set as follows:



Caution! Danger of injury!

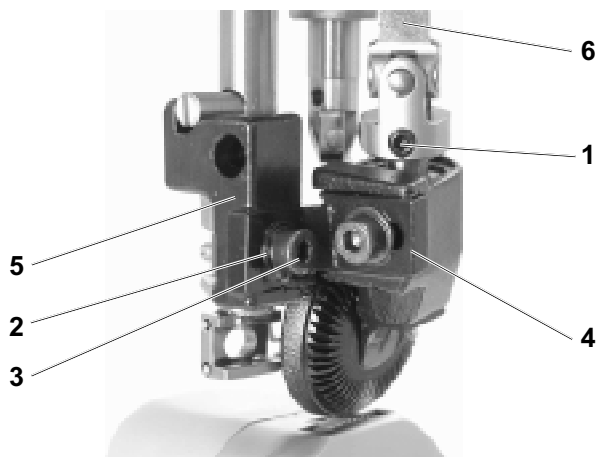
Switch off the main switch! Before starting the setting operation, wait until the motor stops!

Clearance in the wheel mounting

- Loosen three screws (5) /only slightly/.
- Using the screw (4) set the minimum clearance in the top roller mounting (2) /it must easily rotate without any rubbing and with a minimum clearance/.
- Tighten the screws (5), check the set up clearance, even-tually, repeat the setting procedure.

Clearance in the conic gear

- Loosen the screw (1), in shifting the wheel, resp. the holder (3) in the holder groove (6), set the minimum clearance, the pinion (7) must be pushed up to the holder bottom (6).
- Tighten the screw (1), check the set up clearance.



3.6.6.4 Replacement of the top roller

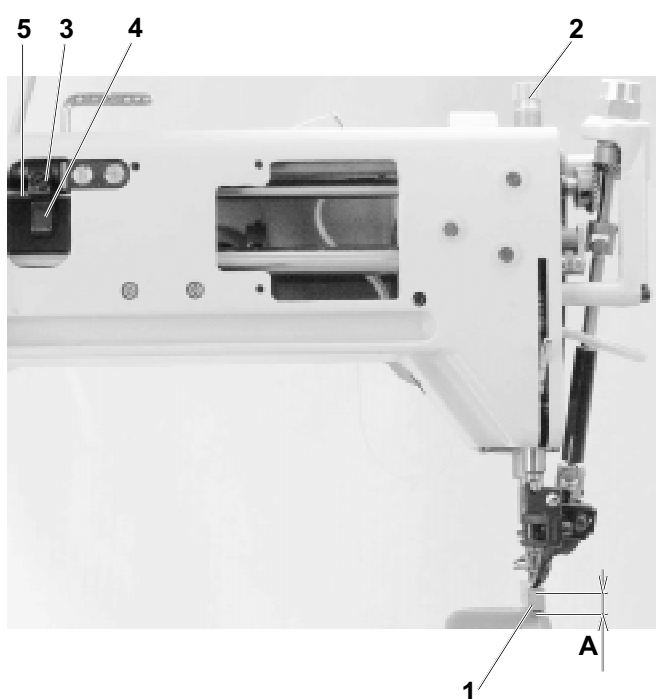
When replacing the top roller, proceed as follows:



Caution! Danger of injury!

Switch off the main switch! Before starting the setting operation, wait until the motor stops!

- Unscrew the screw (1).
- Unscrew the screw (3) with the washer (2).
- Remove the driven top roller with the holder (4) from the holder (5) and from the articulated shaft (6).
- Mount another top roller in inverted procedure to dismantling.
- Set the top roller according to the par. 3.6.6.2.



3.7 Setting the presser foot lift

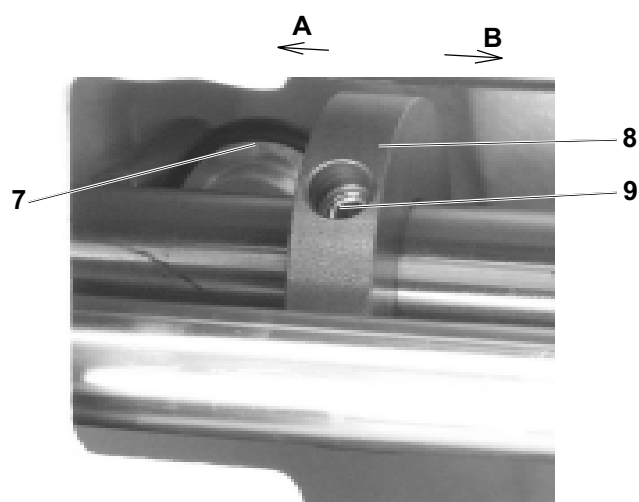
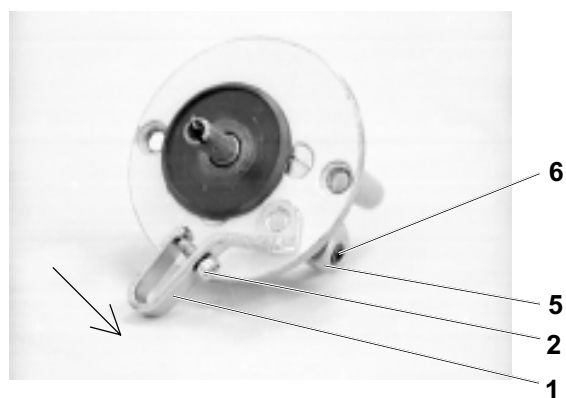
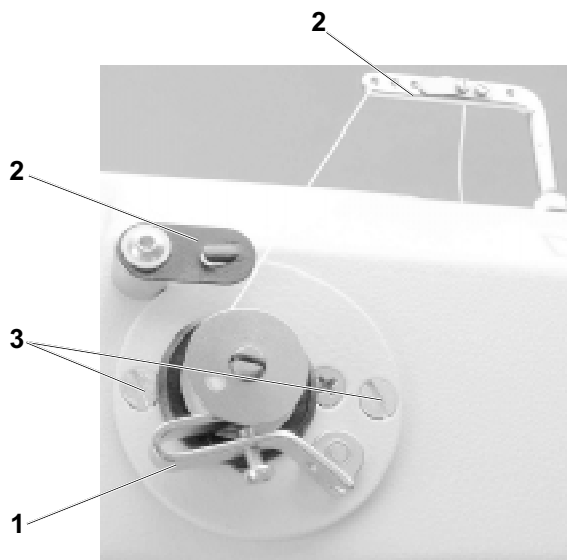
The maximum lift of the presser foot when lifting the foot with knee lever or with treadle is to be „A“ = 12.5 mm.



Caution! Danger of injury!

Switch off the main switch! Before starting the setting operation, wait until the motor stops!

- Place a cube (1) having the height of „A“ = 12.5 ± 0.7 mm under the presser foot.
- Screw in thoroughly downwards the screw (2).
- Tighten slightly the screw (3) in such a way that the lever (4) turns on the shaft (5) with a certain friction moment.
- Push with the screwdriver on the lever (4), until it attains the wall inside the arm of the sewing machine.
- Return the lever (4) back by about 1 mm and tighten the screw (3). With the maximum top roller lifting, the lever will not strike into the machine arm.
- Check the axial clearance of the shaft (5) which should be the least possible.
- Using the screw (4) set the normal pressure force of the presser foot.



3.8 Bobbin winder

3.8.1 Description

The winder (bobbin winder) winds a reserve of the hook thread. It is driven by a spring-mounted friction gear, which stops after having filled the bobbin.

An ideal winding is attained with a sufficient pretension of the thread obtained on the thread guide (4) and with 1 mm under the diameter of the bobbin. The shaft is mounted in a swinging way and the friction gear is put into engagement by means of a pickup lever (1) and a cam. The winder is fixed on the machine arm by two screws (3). The thread is passed through according to the illustration, the thread is cut off after having stopped the winding operation using the cutting device (5).

3.8.2 Setting the bobbin winder stop

The moment of interrupting the winding is determined by the mutual position of the pickup lever (1) and the cam (5) on a common shaft. The cam is locked in its functional position by the screw (6). The mutual position is to be set on a not incorporated winder in such a way that in the moment, when the pickup lever leaves the space of the bobbin, the pressing function of the cam on the winder's shaft is interrupted and it moves in the sense of the arrow. A fine setting is to be done on an incorporated condition in the machine. Using the screw (2), the position of the friction part of the pickup lever (1) is adapted. In opening the lever, the stopping function is accelerated. Its inverse function delays it. A test is to be done after having inserted the bobbin, when passing the thread through the device and when winding at the running of the machine.

3.8.3 Setting the friction gear

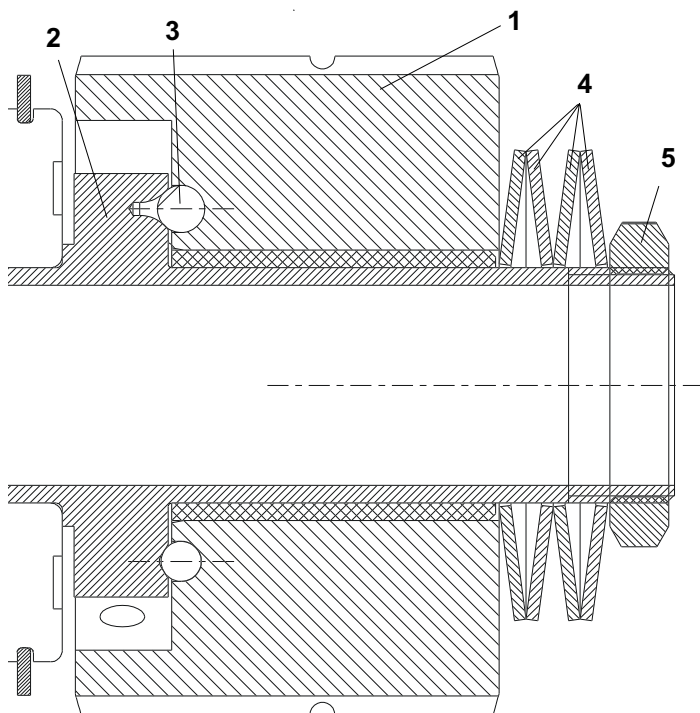
The friction gear is formed frontally by the disk (8) on the main top shaft of the machine and by the disk (7) with a rubber ring on the shaft of the winder.



Caution! Danger of injury!

Switch off the main switch! Before starting the setting operation, wait until the motor stops!

- Proceed to the setting operation with a removed rear guard.
- The winder is in its stopped position.
- Loosen two screws (9) in the disk (8) through the hole in the arm.
- By shifting axially the disk in the sense A, B, set the disks of the winder (7) at the distance of 0.5 mm from the rubber ring.
- Tighten the screws (9) in the disk (8).
- Put the winder in its working position and proceed to a winding test.
- Mount the rear guard.



3.9 Safety clutch

3.9.1 Description

The machine is provided with a safety clutch which enables the turning through of the lower belt wheel (1) on the hub of the lower shaft (2), when the hook is blocked. This blocking occurs due to the penetration of thread into the hook path. With current running, this clutch should not disengage during the normal running. The mutual coupling of the belt wheel (1) and the hub (2) is effected by means of the bills (3) which are firmly connected with the belt wheel (1). The bills fit in the conic holes of the hub (2) and are pushed therein by means of the springs (4).

Putting the clutch in its working position, eventual checking its correct position are to be done in blocking the hook using a screwdriver and in turning a bit the handwheel.

3.9.2 Setting the disengaging moment



Caution! Danger of injury!

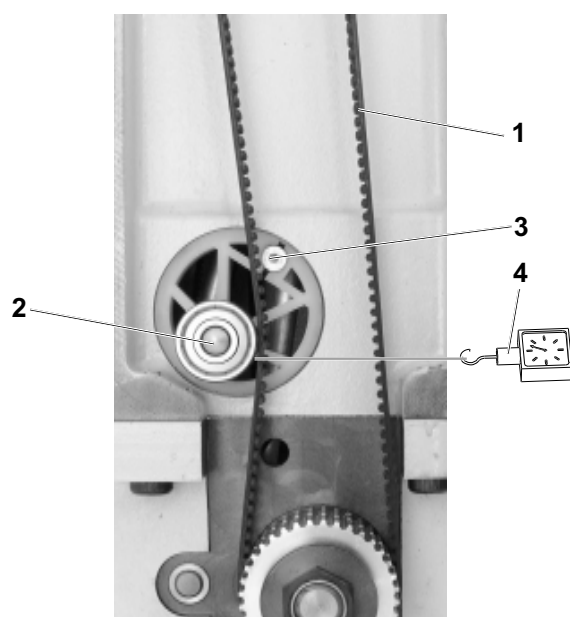
Switch off the main switch! Before starting the setting operation, wait until the motor stops!

The correct value of the tensioning moment (8 Nm) has been set up by the manufacturer. when this value is lower, in a current running, the clutch may disengage. In an opposite case (the moment is higher), the clutch will not disengage. In both cases it is necessary to proceed to a correction of the moment. In turning the nut (5) to the right, the moment will increase and on the contrary. The value of the tensioning moment is very sensible to the turning of the nut (5). When setting it, it is necessary to proceed very carefully, set it up only in emergency cases! Check the moment using a torque-limiting wrench.



Caution!

The clutch guarantees only one mutual position of the hub of the lower shaft (2) and that of the belt wheel (1). No checking according to the gauge marks is needed. Putting the clutch out of operation by excessive tightening of the nut (5) can cause, when blocking the hook, the destruction of the gear within the drive of the hook.



3.10 Indented belt transmission

3.10.1 Setting the tensioning roller of the indented belt

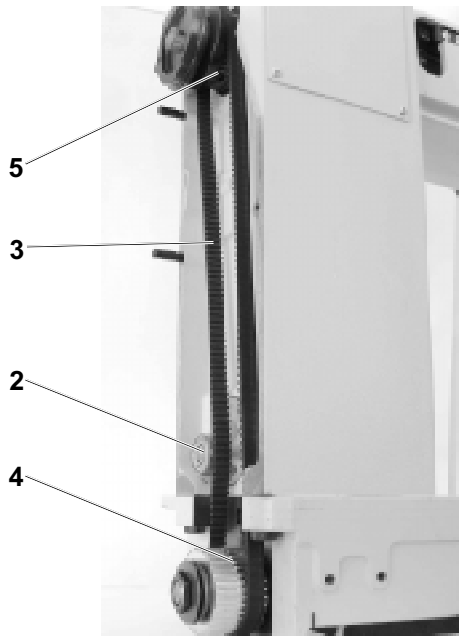
The optimum tension of the indented belt (1) is attained in setting the tensioning roller (2) in such position, when the roller applies the pressure of $F = 20 \text{ N}$ against the belt. The roller must be side set in such a way that the edge of the indented belt does not overlap over the edge of the roller.



Caution! Danger of injury!

Switch off the main switch! Before starting the setting operation, wait until the motor stops!

- Remove the handwheel and the belt guard, remove the V-belt.
- By means of the screw (3), loosen the tensioning roller (2).
- Turn the roller against the belt and then, using the dynamometer (4), pull the roller in horizontal sense with the force of 20 N. Tighten the clamping screw (3) in this position.
- Check the side shifting of the roller.



3.10.2 Replacing the indented belt

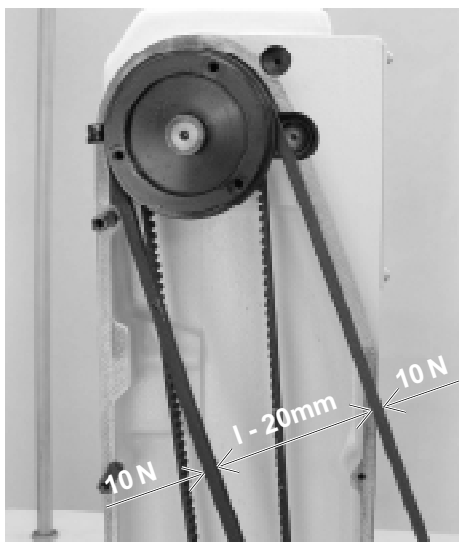
When replacing the indented belt, the mutual position of the pulleys (4 and 5) should be maintained.



Caution! Danger of injury!

Switch off the main switch! Before starting the setting operation, wait until the motor stops!

- Remove the handwheel, the belt guard and the V-belt.
- Mark with a pencil the instantaneous position of the indented pulleys against the machine head in any position.
- Loosen the tensioning roller (2)
- Remove the indented belt (3) from the bottom indented pulley (4) first, and then remove the whole belt.
- Apply a new indented belt on the top indented pulley (5) first.
- Turn both indented pulleys in the formerly marked positions and apply the indented belt on the indented pulley (4).
- Tension the belt and mount the dismantled components in the inverse order.



3.11 V-belt, motor - head

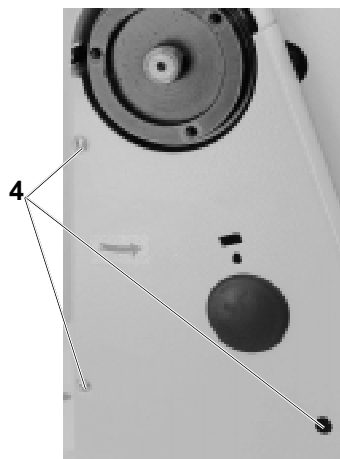
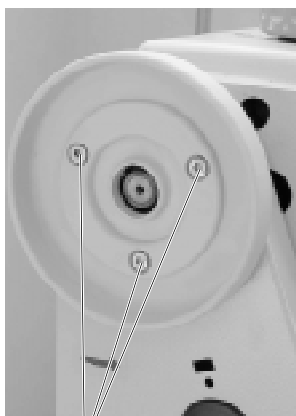
3.11.1 Tensioning



Caution! Danger of injury!

Switch off the main switch! Before starting the setting operation, wait until the motor stops!

The belt is correctly tensioned, when the opposite sides of the belt approach one to another by up to 20 mm in applying the force of 10 N. The belt is tensioned in turning respectively the motor in its holder.



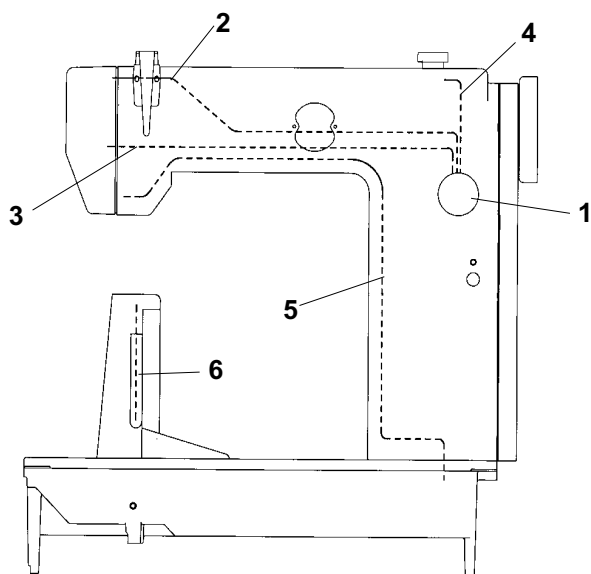
3.11.2 Replacing the V-Belt



Caution! Danger of injury!

Switch off the main switch! before starting the setting operation, wait until the motor stops!

- Unscrew the screws (3) of the handwheel and dismantle it.
- Unscrew the screws (4) of the belt guard and tilt the guard.
- Remove the belt guard of the motor and tilt the protections against falling out the belt from the motor pulley.
- Replace the belt.
- Tension the belt (see par. 3.11.1).



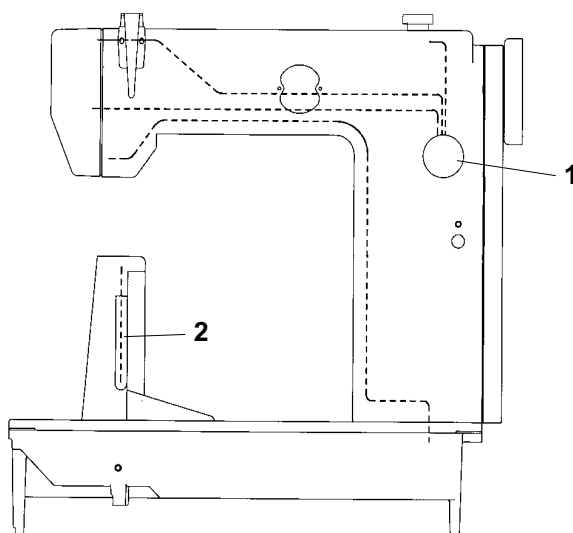
3.12 Lubrication

3.12.1 Description

From the lubricating tank (1) there issue three suction wicks. The wick (2) lubricates the pin of the thread mechanism, the wick (3) lubricates the needle mechanism and the wick (4) lubricates the stitch length mechanism. The superfluous oil from the needle and thread mechanisms is sucked off by the wick (5).

The hook has its own oil reservoir (6).

The hook DSH 820 has got a lubricated path of the bobbin case lifter. The hook R 810 has got a lubricated circulating path of the middle part of the hook as well.

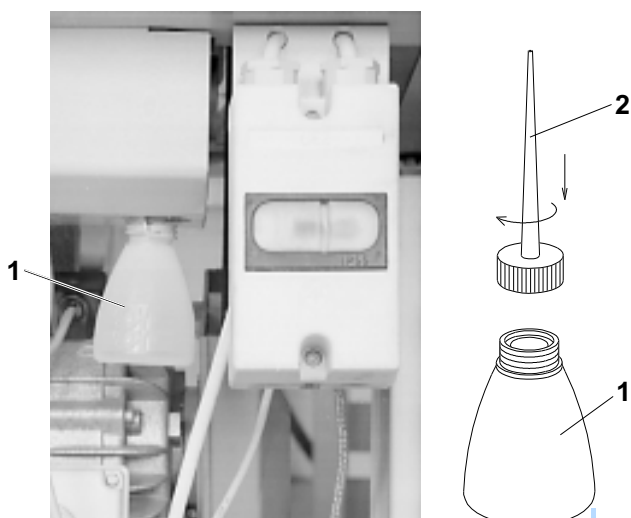


3.12.2 Refilling oil

For lubricating the machine oil Esso SP-NK 10, DA 10 is used or other oil with the same quality. When putting the machine into operation, each mechanism of the machine is to be lubricated with several drops of oil. Oil is only refilled thereafter into the oil reservoirs using an oil can.

The oil tank (1) of the central distribution is to be filled up to the mark max.

The oil reservoir (2) for lubricating the hook is to be filled after having removed the sealing plug, up to its top edge.



3.12.3 Multiple oil use

Oil which runs into the oil cup is collected in the collector (1) and may be reused for refilling the oil reservoirs in the machine - see par. 3.12.2.

The oil collector (1) with the collected oil is unscrewed and the top part of the oil can (2) which is added in the machine packing is screwed in. Oil is then refilled into the reservoirs on the machine head and everything is put into the original condition.

4. Maintenance



Caution! Danger of injury!

The maintenance operations should be performed only with the machine switched off and with the motor stopped!

In the following table there are given the operations which should be performed and the respective time intervals between the individual operations.

Operation	Time interval
Removal of the throat plate and its cleaning out. Cleaning out of the wheel feeder, hook and their surrounding space. Removal of the residues of material and threads from the top roller.	1 day
Lubricating of the hook (the path of its middle part) with some drops of oil.	1 day
Checking of the oil level in the oil tank of the hook.	1 month
Checking of the oil level in the central oil tank.	1 month
Checking the hook wear. Checking the function of the safety clutch against the hook overload.	6 months
Checking the V-belt and the indented belts.	1 year

5. Setting the machine according to the sewing category

5.1 Introduction

This sewing machine enables sewing operations within a large extent from the light up to the medium heavy-duty sewing. The parameters of the respective sewing operation must be in accordance with the given machine setting which includes also the replacement of some components, such as the needle, the throat plate. For this reason, the setting of the machine is divided into 2 categories:

1 ... light sewing

2 ... medium heavy-duty sewing

In the factory, where this machine has been manufactured, the machine has been set with respect to the standard parameters of the required sewing category which is designed by the number included in the commercial designation of the machine. If the user desires changing the given setting to another sewing category, this operation should be performed by a specialized mechanician.

The standard parameters of sewing are described in the following paragraph. The actual parameters of sewing inside the given sewing category may be different, which means that the machine operative must adapt respectively the setting of the machine, e.g. the tension of the upper thread.