

Grinding Rollers with Taper Roller Bearings

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Note: For "Assembly Instructions for Slip Ring Sealing" see Table of Contents of LOESCHE-Mill



1. Description of Bearings

The grinding rollers are equipped with one cylindrical roller bearing, type NU as a floating bearing and a double taper roller bearing in X-arrangement as a fixed bearing. To achieve a suitable axial clearance for the specific load application, the manufacturer tolerances the distance sleeve between the outer rings (or the outer rings themselves) of the double taper roller bearing. Adjustment of clearance on assembly is not necessary.

The arrangement of the bearings is shown on sheet 10, picture 1.
Depending on the manufacturer, the double taper roller bearing has 2 single inner rings or only one inner ring.

2. Assembly

(see picture 4, sheet 12)

2.1 Necessary Auxiliaries

To facilitate the assembly we recommend the following equipment and tools:

- a) Lifting crane (capacity according to the weight of the grinding roller; see assembly drawing "Grinding roller cpl.")
- b) Holding device for roller axle to enable assembly in a vertical position
- c) Gas ring burner (1 - 2 units) or electrical heater for heating-up of the roller hub
- d) Oil bath for heating-up of the bearings.
- e) 3 eyebolts DIN 580 (depending on bearing size M 12, M 16, M 20) for suspension of the outer ring of taper roller bearings
- f) Lowering device for the enclosed outer ring of the taper roller bearing (see picture 2, sheet 11).

2.2 Preparations

The anti-friction bearings must be protected against dirt and humidity during installation. Therefore the assembly place has to be dust-free and dry. All parts to be fitted have to be absolutely clean and free of swarf and castings free from moulding sand residue.



The anti-friction bearings, respectively the parts of anti-friction bearings, should be unpacked just before the assembly. The bearings are preserved at the time of manufacture and must not be washed unless they become, under certain conditions, dirty during assembly. In this case they have to be cleaned with wash-petrol or benzine (fire risk!). Complete bearings have to be rotated during cleaning. Immediately after drying, the bearing must be protected by oil or grease against corrosion.

Each component of the anti-friction bearings - inner ring and outer ring with roller cage assembly of the cylindrical roller bearing as well as the inner ring, outer ring and distance sleeve of the taper roller bearing - is separately packed. Components that fit together are marked with identical figures, respectively numbers, on the rings and on the packing. Correlating bearing rings are marked with additional letters on the bearing side.

We recommend treatment of the bearing seats on the axle and inside the hub with MoS₂ paste, such as "Altemp Q NB 50" from Messrs. Klüber.

2.3 Mounting of the Bearings

Put roller axle in a vertical position with bearing seats at the top (holding device).

Unpack inner ring of the cylindrical roller bearing and heat up to min 50°C (125°F) above ambient temperature, max. 100°C (210°F).

Note: The heating up is executed in an oil bath or on a heating plate. Do not use a torch with open flame! Only specialists (bearing fitters) should be allowed to use a torch with soft flame in emergency cases.

Treat the seat of the inner ring on the axle with MoS₂ paste.

Install inner ring into position until it touches the axle shoulder.

Put distance sleeve for inner ring of cylindrical roller bearing into position.

Heat inner ring(s) of taper roller bearing together with roller cage assembly up to 100°C (210°F) in an oil bath.

Push the aforementioned bearing components onto the roller axle until the inner ring touches the distance sleeve.

Screw cover disc for clamping of the inner rings onto the top face of the axle.

Note: The assembly procedure described under this item must now be executed without interruption to utilize the high temperature of the hub and the corresponding enlargement of the bearing seats

Screw sealing sleeve to hub face (not necessary in case of hubs with a cast shoulder).



Heat up the hub in the area of the bearing seats **externally** to 80°C - 100°C (180°F - 210°F).

Note: If possible use 1 or 2 ring burners pointing inwards. The time for heating up can be reduced with the use of 2 burners. If no ring burner should be available a normal torch can be applied for equal heating up with a soft flame.

A better method is the use of an electric heater inside the hub bore. The hub has to be covered by a thick blanket. Since heating up takes several hours this procedure should take place during the night if sufficient time is available.

Put hub into vertical position with sealing sleeve or cast shoulder facing downwards. Do not support sealing sleeve directly on the ground.

The hub should be positioned at a height that allows free projection of the roller axle after insertion from above when the bearings are in their correct position. Treat bearing seats inside the hub with MoS₂ paste.

Insert outer ring of cylindrical roller bearing together with roller cage assembly until it touches the sealing sleeve, respectively the hub shoulder.

Insert outer distance sleeve into the hub until it touches the outer ring of the cylindrical roller bearing.

Put outer ring of taper roller bearing into position using a lowering device.

Insert roller axle together with pre-mounted bearing components vertically from above into the hub.

Rotate the roller axle during inserting the inner ring of the cylindrical roller bearing into its roller cage assembly in order to avoid scuff marks.

Rotate axle again as soon as it is supported by the taper roller bearing. This action is very important to achieve correct positions of the taper rollers and to avoid an oblique setting of the rollers.

Insert front ring of the taper roller bearing into the hub until it touches the distance sleeve of the bearing outer rings. Rotate the axle again.

Screw hub cover together with O-ring sealing to the hub whilst rotating the axle and clamp bearing outer ring axially.

Retighten cover screws several times using a torque wrench and rotate roller axle simultaneously during cooling of the hub.

Remove hub cover (not necessary in the case of hubs with a cast shoulder). Retighten screws of the sealing sleeve after cooling of the now assembled grinding roller using a torque wrench.

Remount hub cover again whilst rotating the axle.



Put grinding roller into horizontal position after correct tightening of all screws and support roller. In the case of a spring loaded slip ring, shrink locating ring with studs for guiding the springs for the slip ring seal onto the axle. Install remaining parts.

In any other case, see "Installation instructions for slip ring sealing" and install these parts as described.

2.4 Alternative method for Mounting of the Bearings A) (see picture 5, sheet 13)

Alternatively the rollers can be assembled in a different sequence:

Support the hub at a height that allows insertion of the axle in a vertical direction from above or from below.

Mount only the inner ring of the cylindrical roller bearing and the inner distance sleeve onto the axle.

Mount the slip ring components including the shrunk ring only as far as these components belong to the axle and are required for the roller assembly.

Screw the sealing sleeve against the hub.

Heat up the hub to a temperature of 80°C - 100°C (180°F - 210°F) using the above mentioned procedure.

Insert the outer ring and the roller cage assembly of the cylindrical roller bearing until it touches the sealing sleeve, respectively the hub collar.

Insert outer distance sleeve between cylindrical and taper roller bearing into the hub.

Insert the complete taper roller bearing into the hub. The inboard outer ring of the bearing must contact the outer distance sleeve.

Hold the bearings inside the hub axially using clamps.

Treat the inner ring of the cylindrical roller bearing on the axle with oil.

Pull the axle from below into the hub using a crane.

Rotate the axle during insertion of the inner ring into the cage of the cylindrical roller bearing in order to avoid scuffmarks.

Rotate axle during insertion into the inner ring(s) of the double taper roller bearing.

Screw cover disc onto the axle face for clamping the inner rings.

Screw hub cover onto the hub whilst rotating the axle.



Tighten the screws crosswise using a torque wrench (see assembly drawing "Roller cpl." for torque values).

The mounting of the bearings may not be done without rotating the axle because otherwise too small an axial clearance or zero-clearance might arise.

2.5 Alternative method for Mounting of the Bearings B) (see picture 6, sheet 14)

This description is valid for rollers in which the distance sleeves are equipped with lifting lugs.

Put roller axle in a vertical position with bearing seats at the top (holding device)

Heat the inner ring to min 50°C (125°F) above ambient temperature, max 100°C (210°F).

Note: The heating up is executed in an oil bath or on a heating plate. Do not use a torch with open flame! Only specialists (bearing fitters) should be allowed to use a torch with soft flame in emergency cases.

Treat the seat of the inner ring on the axle with MoS₂ paste.

Mount the inner ring of the cylindrical roller bearing onto the axle and ensure that it contacts the axle shoulder.

Insert outer ring of cylindrical roller bearing together with roller cage assembly until it touches the sealing sleeve, respectively the hub shoulder.

Lower the outer distance sleeve carefully into the hub until it contacts the outer ring of the cylindrical roller bearing.

Install the internal outer ring of the taper roller bearing with the aid of a lifting device.

Lower the hub with the previously installed parts in an oiled condition vertically from above over the axle. Rotate the hub as soon as the inner ring of the cylindrical roller bearing contacts the rollers to avoid scuff marks.

Lower the hub until it is a little lower than its usual end position, such that the rollers of the cylindrical roller bearing have passed their inner ring.

Support the hub in this position to simplify the next operations.

Insert the inner distance sleeve until it contacts the inner ring of the cylindrical roller bearing.

Install the inner ring(s) of the taper roller bearing onto the axle until they contact the inner distance sleeve.



Attach the axle cover and clamp all the components on the axle together.

Lift the hub so that the components installed in the hub are loaded by the weight of the axle. Rotate the axle so that the bearing rollers take up their correct position.

Install the upper outer ring of the taper roller bearing.

Mount the roller hub cover in order to clamp the outer ring components of the bearings.

Tighten the bolts of the hub cover crosswise with a torque wrench whilst rotating the axle. (See assembly drawing "Roller cpl." for torque values)

3.0 Dismantling

3.1 Auxiliaries for Dismantling

We recommend the following equipment and tools for dismantling:

- a) crane
- b) dismantling device according to pictures 2 and 3 on sheet 11
- c) hydraulic jack with a stroke of approx. 70 - 100 mm (2.8 - 4 in) and a force of about 1000 kN (100t)
- d) hydraulic pump, manually operated, resp. high pressure pump of the LOESCHE tool box for the fluid injection between mating surfaces.

3.2 Preparations

Dismantle hub cover, cover disc of the axle and - if fitted - the sealing sleeve.

The following dismantling procedure should take place with the roller in a vertical position. The hub will be stripped off the axle in an upward direction.

3.3 Dismantling of the bearings

Remove the hub cover.

To loosen the inner ring(s) of the taper roller bearing on the axle:

Unscrew the plug on the axle face; pump high pressure oil **DIN 51 502 CLPHC** into the grooves of the bearing seats between the inner ring(s) and the axle.

The inner ring(s) will expand under the influence of the high pressure oil and the bearings can be stripped off the axle without difficulty.

Pull off the outer ring of the taper roller bearing on the cover side.

Please note: The outer ring is provided with tapped holes for eyebolts (DIN 580).

With hubs made of cast steel or SG-iron the bearing seat can be expanded by using high pressure fluid injection. A manually operated high pressure pump is part of the mill tools.

For other cases we recommend the use of CO₂ - snow sprayed onto the bearing ring. Due to the extremely low temperature, the bearing ring contracts and becomes loose inside the hub.

Pull off the second outer ring of the taper roller bearing. Use an auxiliary tool consisting of a channel star with movable claws.

Remove the distance sleeve between the outer rings of the taper roller and cylindrical roller bearing. Dismantle the outer ring of the cylindrical roller bearing together with the roller cage assembly.

Please note: Cylindrical roller bearings inside a roller with a screwed-on sealing sleeve can be removed by applying a hydraulic jack. Using dry ice or liquified CO₂ can assist this procedure. (see picture 3, sheet 11).

The liquified CO₂ method should be applied in any case if the roller hub is equipped with a cast shoulder in the area of the cylindrical roller bearing. Should liquefied CO₂ not be available, the hub can be heated up in this area under the simultaneous assistance of jacking screws for the outer ring of the cylindrical roller bearing installed into the cast shoulder of the hub.

Strip off the inner ring of the cylindrical roller bearing from the axle after heating it up with a soft flame (this procedure is only necessary if the bearing ring must be replaced).

3.4 Alternative method for dismantling of the bearings

This description is valid for rollers in which the distance sleeves are equipped with lifting lugs. (See picture 7, sheet 15)

Remove outer ring of taper roller bearing from the hub. To achieve this, remove the plugs in the face of the hub and pump high pressure oil into the relief grooves of the bearing seat. Using eyebolts screwed into the outer ring, remove the ring.

Remove the inner ring(s) of the taper roller bearing together with the roller cages from the axle. To achieve this, remove the plugs in the face of the axle and pump high pressure oil into the relief grooves of the bearing seat.

Using the lifting eyes remove the inner distance sleeve from the axle.

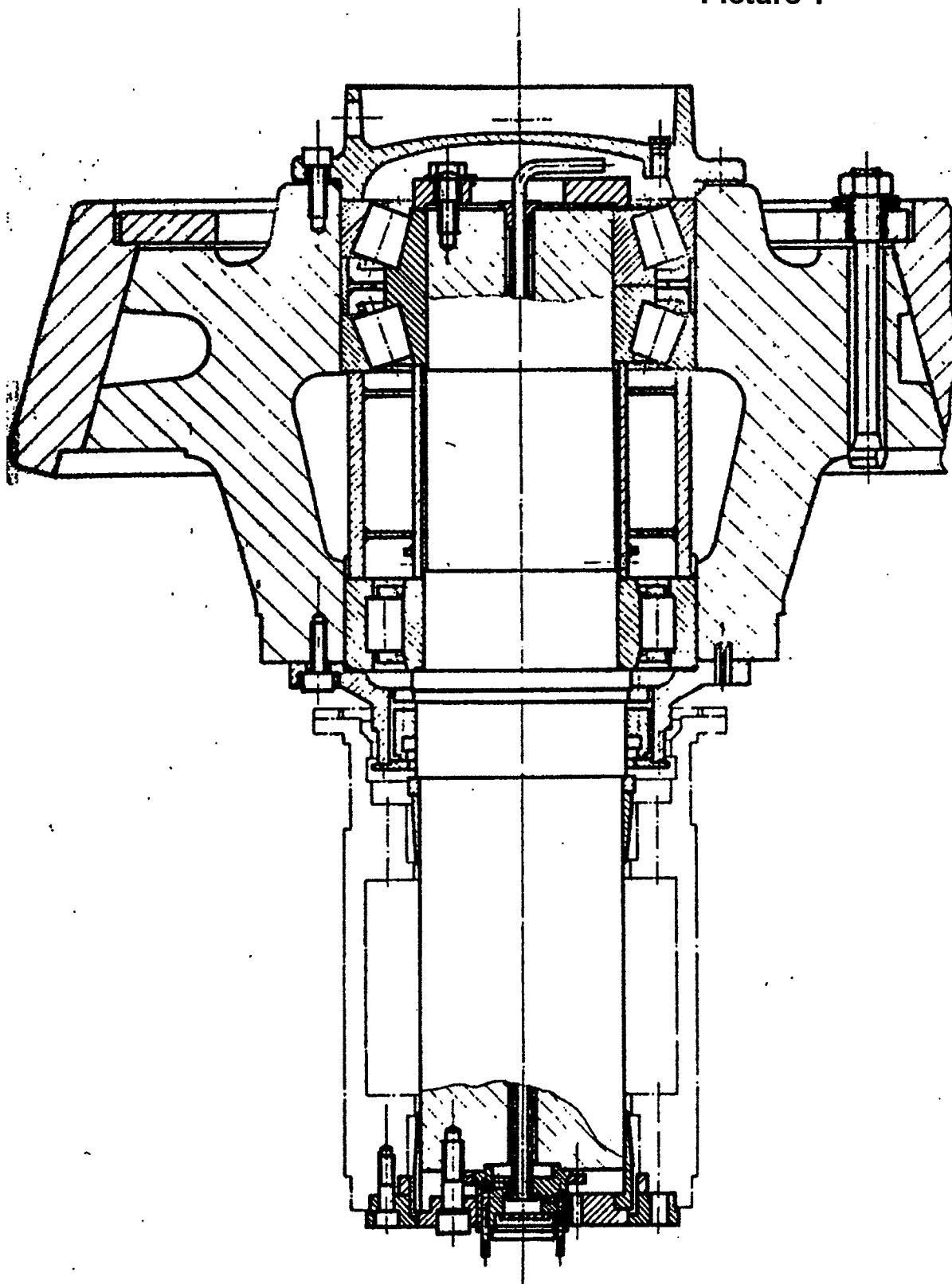
The hub complete with the outer ring and cage of the cylindrical roller bearing as well as the distance sleeve and remaining outer ring of the taper roller bearing can now be lifted clear of the axle.

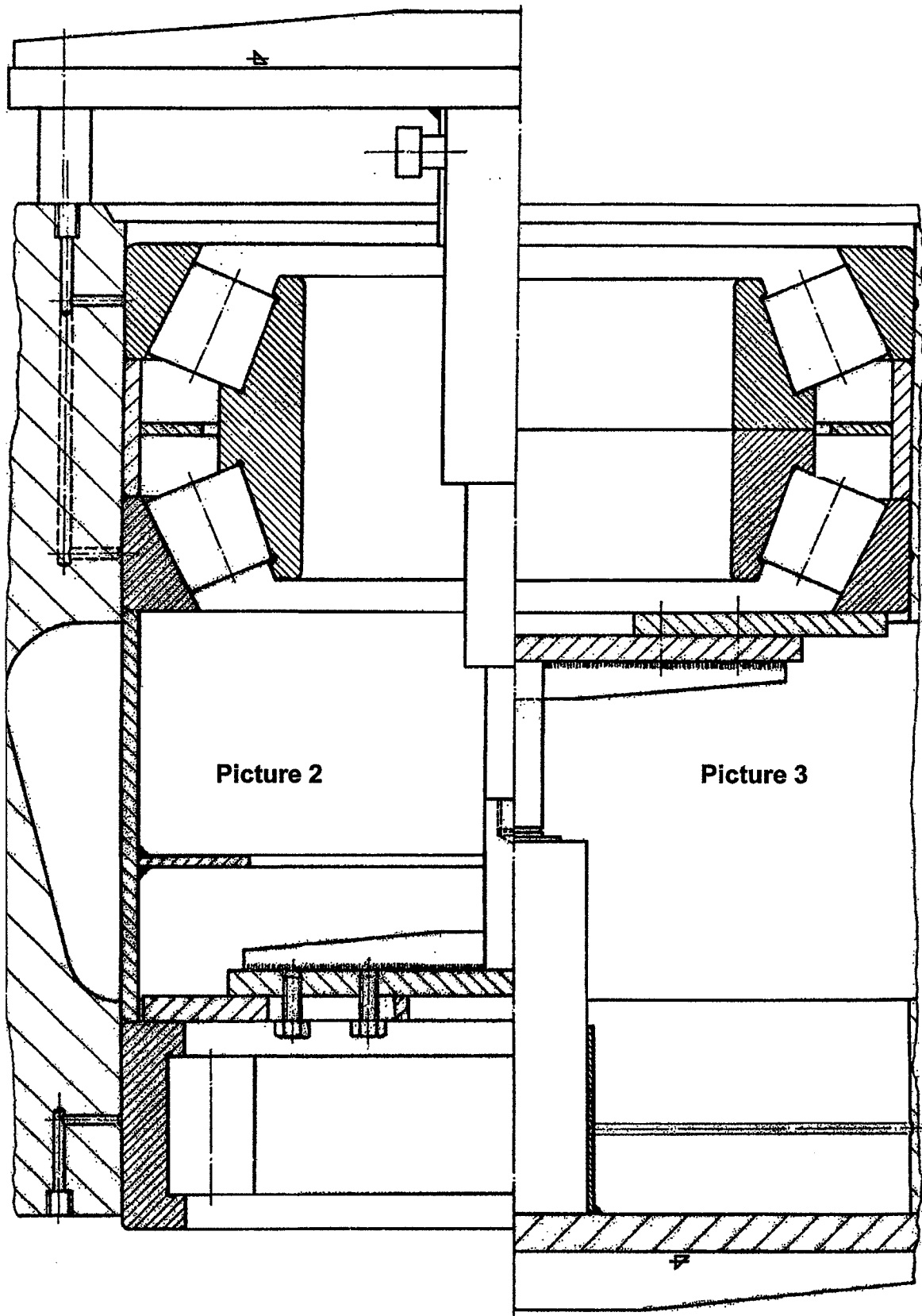
Pull the remaining outer ring of the taper roller bearing out of the hub. For this, a star made of channel section with radially adjustable ends is helpful. If necessary the high pressure oil system can be activated.

Remove the outer distance sleeve with the aid of the lifting lugs.

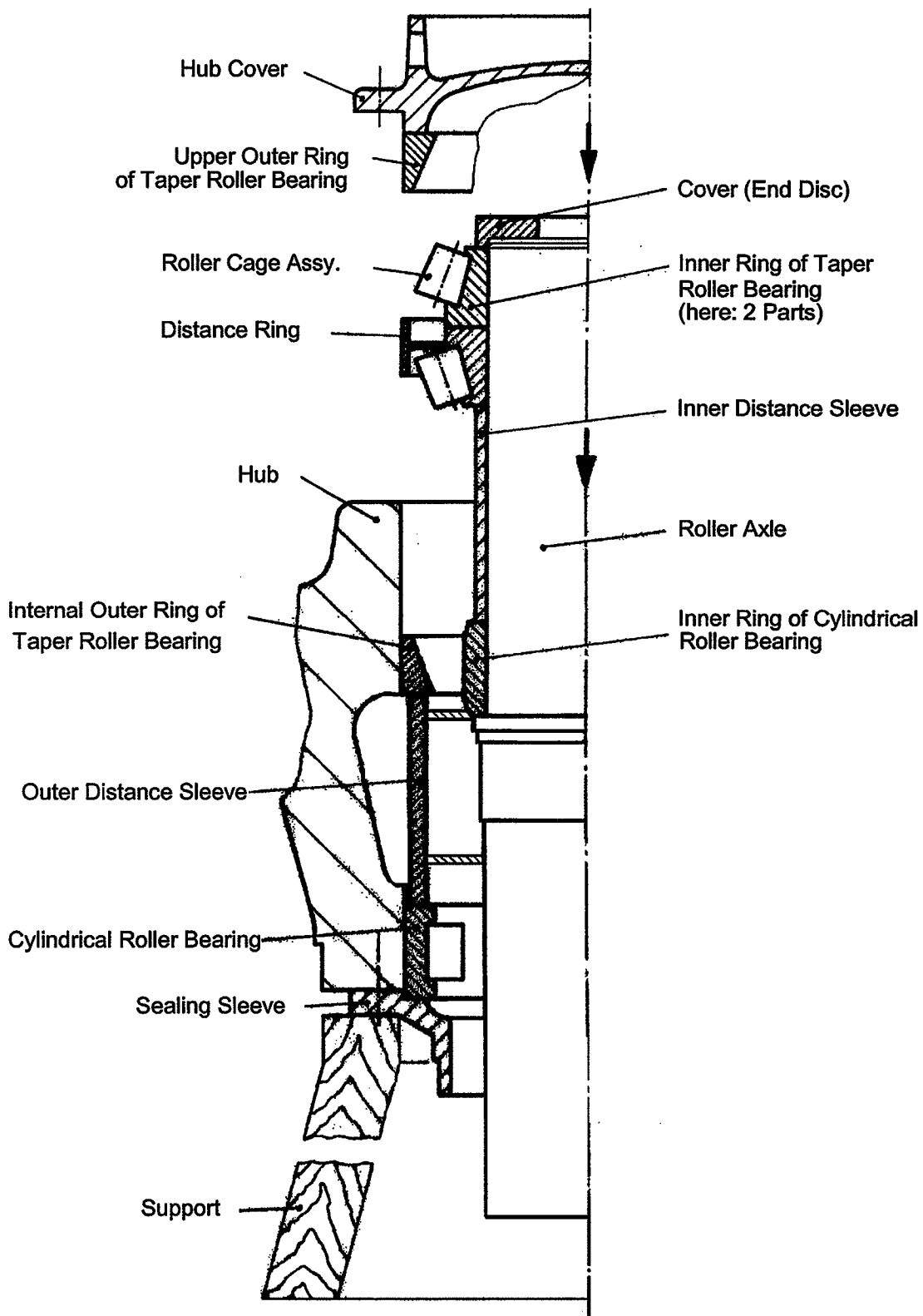
Extract the cylindrical roller bearing from the hub. Tapped holes in the cast flange of the hub allow the installation of jacking screws for this.

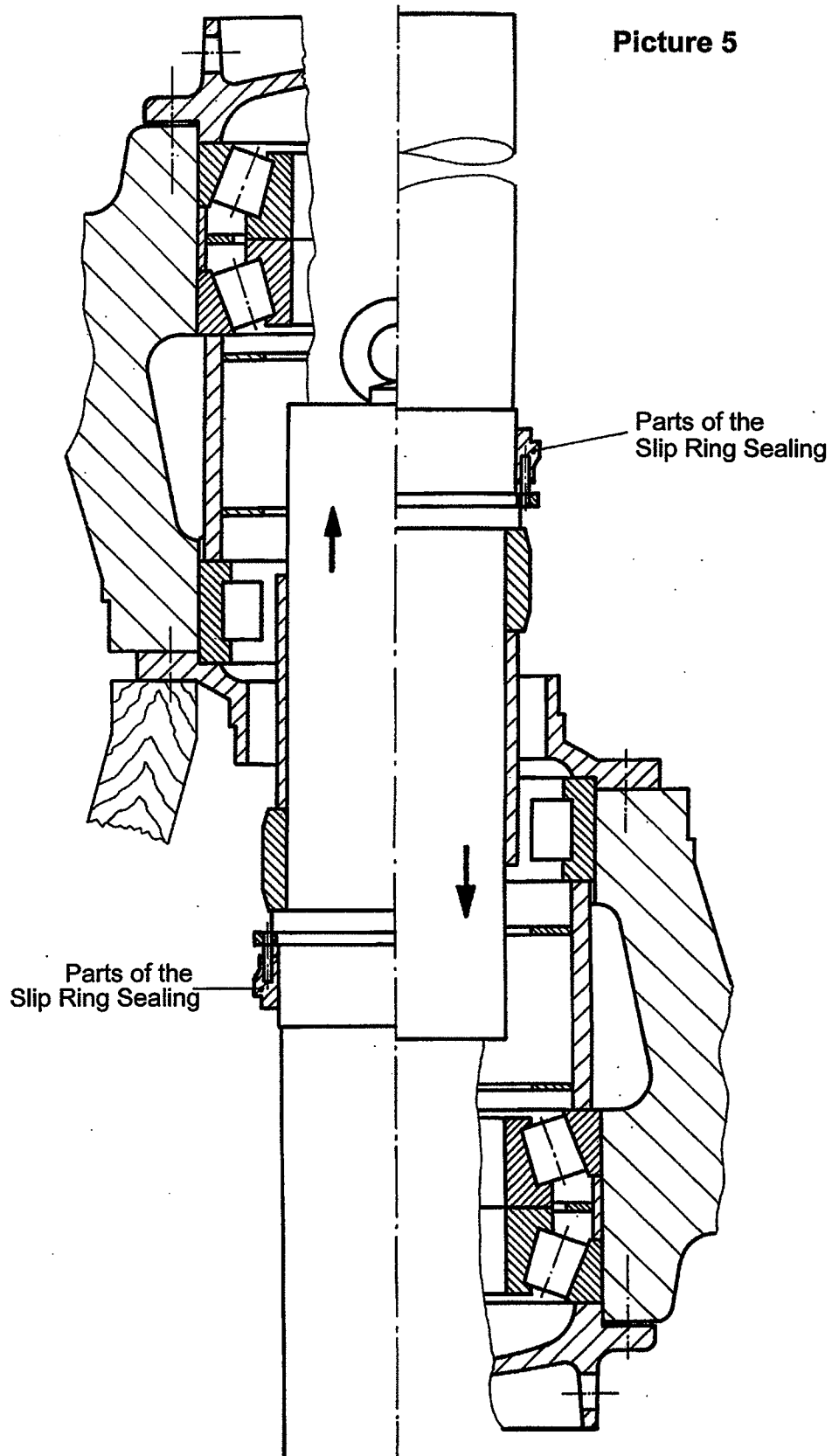
The inner ring of the cylindrical roller bearing can be gently heated with a soft flame, if it is to be removed from the axle.

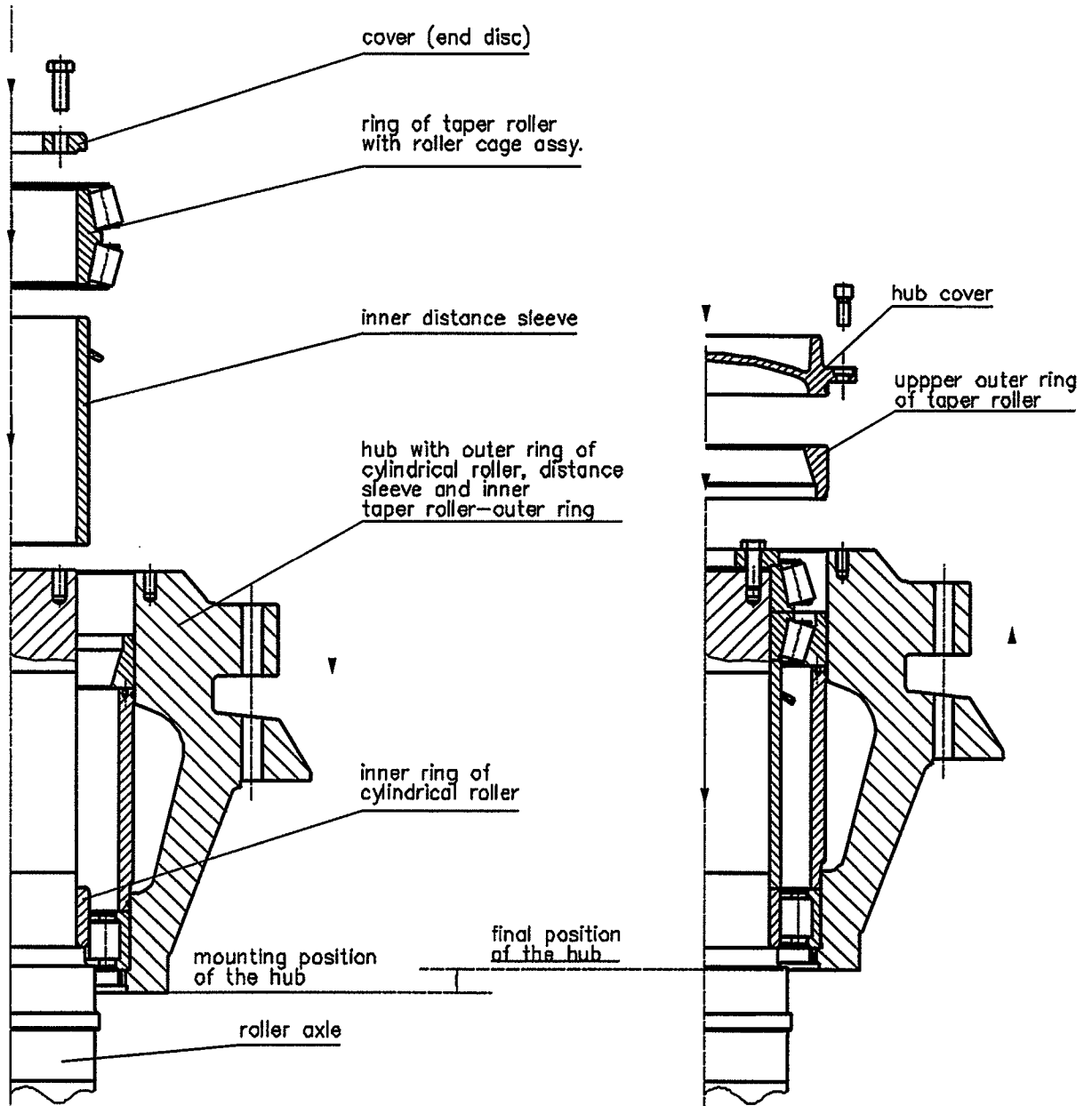
Picture 1



Picture 4



Picture 5

Picture 6


Picture 7

