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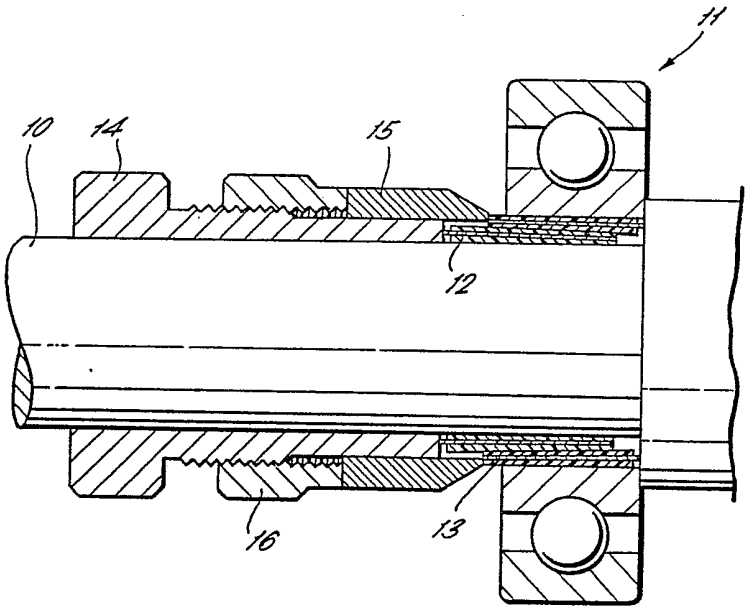
(71) Applicant
Aktiebolaget SKF (Sweden),
415 50 Goteborg, Sweden

(72) Inventor
Stig Lennart Hallerback

(74) Agent and/or Address for Service
Boult, Wade & Tennant, 27 Furnival Street, London EC4A 1PQ

(54) Securing members to shafts

(57) When mounting a machine element such as a rolling bearing 11 on a shaft 10, a desired radial expansion is required. To reliably obtain this, a mounting tool incorporates a driving up sleeve 14, which is intended to co-operate with tapering sleeves 12, 13 by means of which the element is to be mounted, and on the driving up sleeve 14 is arranged an axially adjustable spacing ring 15. The spacing ring 15 is used to show the necessary axial movement of the sleeve 14 required to produce the desired radial expansion.



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The drawing originally filed was informal and the print here reproduced is taken from a later filed formal copy.

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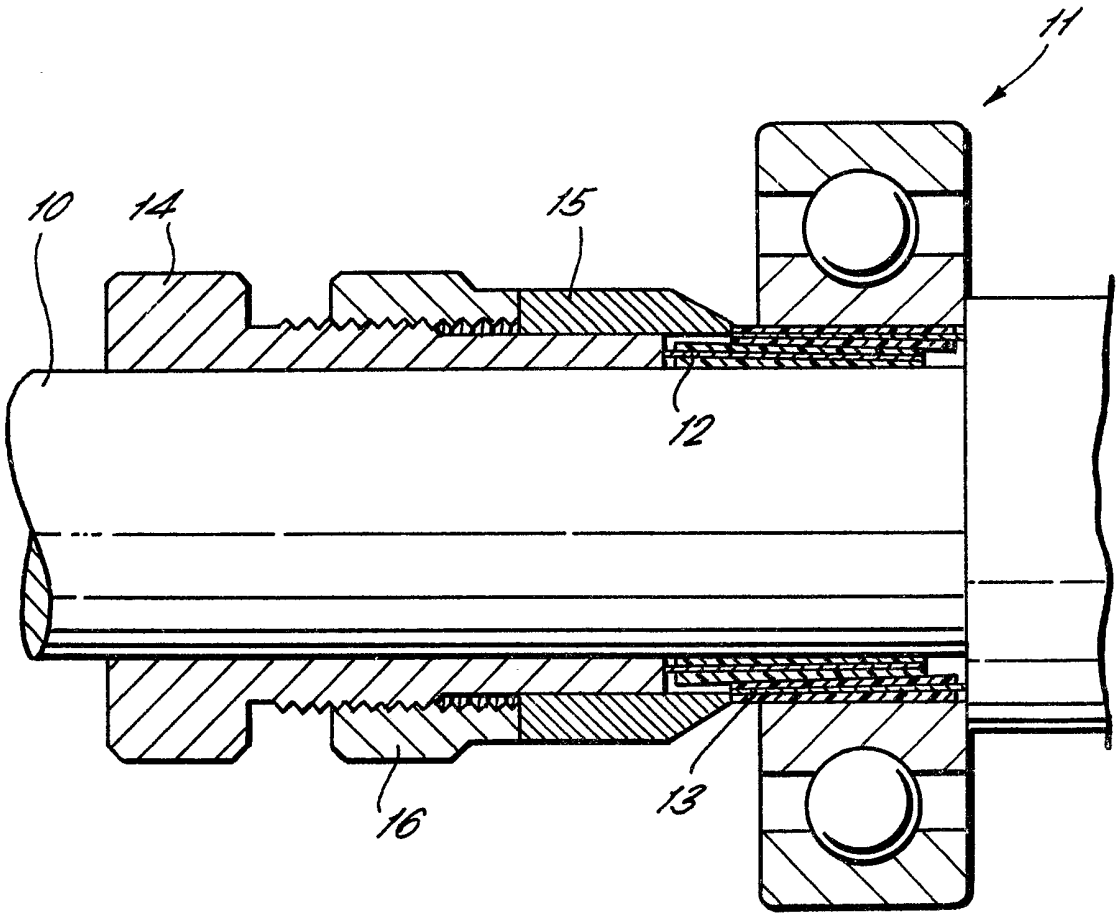

SPECIFICATION

A mounting tool

The present invention refers to a mounting tool for fitting a machine element, such as a rolling bearing, onto a shaft.

Machine elements, such as rolling bearings, are generally mounted on a shaft by a method in which an element, which often is provided with a tapering bore, is fitted on a tapering sleeve and is driven up on this sleeve by means of a nut, which engages a threaded cylindrical end of the tapering sleeve. With sufficient tightening of the nut the element will then expand somewhat in the radial direction and tensions will arise, which clamp the element to the shaft via the tapering sleeve. The tightened nut is then often arrested in its position by means of a locking washer.

If the machine element is a rolling bearing then it is important that the radial expansion of the inner race ring, which is fitted to the shaft via the tapering sleeve, can be calculated. This is because a certain play must be present in a rolling bearing to allow the bearing to operate satisfactorily. If therefore the inner race ring is driven up too far on the tapering sleeve then the radial expansion thereof will also be too great and the play in the bearing will be too little. In order to calculate this play to some extent a so called dynamometric wrench is used, by means of which the nut is tightened and on which it is possible to read the torque by which the nut has been put under load. With experience the play the bearing will receive can be forecast. This is not a certain method and in some cases the play of the bearing must be measured with particular methods.

The present invention provides a mounting tool and a method for mounting a machine element on a shaft in which in a simple manner the desired play can be achieved. According to the invention a mounting tool, for fitting a machine element on a shaft by means of one or more tapering sleeves, incorporates a driving up sleeve intended to co-operate with the tapering sleeve or one of the tapering sleeves and an axially adjustable spacing ring arranged on or in the driving up sleeve.

The spacing ring can be provided with screw-threads which co-operate with screw-threads on the driving up sleeve. The spacing ring can also be provided with a stop screw for arresting the ring.

The invention also provides a method of mounting a machine element, such as a rolling bearing on a shaft with use of a mounting tool according to the invention, wherein the driving up sleeve of the mounting tool is brought to drive up the tapering sleeve until a radial expansion of the element is just ready to begin, whereupon the spacing ring is moved back a distance calculated for the expansion of the element and then the driving up sleeve is driven further up until the spacing ring again contacts the element.

An embodiment of the invention will now be described by way of example, reference being made to the accompanying drawing, which in section shows a mounting tool during mounting of a ball bearing on a shaft.

The drawing shows a shaft 10 on which is fitted a ball bearing 11, which are to be connected by means of two oppositely tapered sleeves 12 and 13. These sleeves can be made from plastics material and they are further described in patent specification GB 2041 157. On the shaft 10 is arranged a driving up or mounting sleeve 14. On this mounting sleeve 14 there is in turn arranged a spacing ring 15 and a stop ring 16. The stop ring 16 has a screw-threaded bore engaging a screw-threaded portion of the mounting sleeve 14.

When the bearing 11 is to be mounted it is arranged upon the sleeves 12 and 13 and the mounting sleeve 14 is pushed in against the tapering sleeve 12 with manual force just so hard as possible without the inner race ring beginning to expand radially. The spacing ring 15 is thereupon brought up against the end of the tapering sleeve 13 by means of the stop ring 16. This stop ring 16 is then screwed back a certain calculated distance and the mounting sleeve 14 is then made to drive up the tapering sleeve 12 until the spacing ring 15 again contacts both the stop ring 16 and the tapering sleeve 13. The inner race ring of the bearing 11 then has been expanded so much as has been calculated by allowing the spacing ring 15 to move a certain distance. It is assumed that a stop on the end of the bearing which faces away from the mounting tool will prevent the bearing from moving axially.

The stop ring 16 and the spacing ring 15 can, if so desired, be made in one piece. It is possible to omit the threads and to allow the spacing ring 16 to slide freely, but it is then necessary to be able to lock it by means of, for example, a stop screw or the like.

When mounting a bearing according to the invention a very accurate expansion of the inner race ring is obtained. With a size according to the scale used on the drawing a very accurate expansion of the inner race ring is obtained with about 5μ if the stop ring 16 is screwed back one turn once thread having a pitch of 5 mm. An almost linear relation between the expansion and the number of threads the stop ring is screwed back is obtained.

It is not necessary for the spacing ring 15 to be arranged on the outside of the mounting sleeve 14. The opposite arrangement can also be present, whereby the driving up is brought about by means of the outer of these two concentric members.

The driving up sleeve can be actuated either by mechanical or hydraulical devices.

The invention provide a very simple and reliable mounting tool and a method for fitting machine elements to shafts and the like, whereby high demands on a controlled radial expansion is fulfilled. A further advantage is that an accurately machined shaft surface is not necessary.

CLAIMS

1. A mounting tool for fitting a machine element, such as a rolling bearing on to a shaft in

which the element is intended to be given a precalculated radial expansion and is mounted on one or more tapering sleeves, wherein the tool incorporates a driving up sleeve intended to co-operate with the tapering sleeve or one of the tapering sleeves and an axially adjustable spacing ring arranged on or in the driving up sleeve.

2. A mounting tool according to claim 1, wherein the spacing ring is provided with screw-threads which co-operate with screw-threads on the driving up sleeve.

3. A mounting tool according to claim 1, wherein the spacing ring is provided with a stop screw intended for locking the ring.

4. A mounting tool according to claim 1, wherein a separate stop ring with internal screw-threads is arranged on the driving up sleeve for restriction of the axial movement of the spacing ring.

5. A mounting tool substantially as herein described with reference to and as shown in the accompanying drawing.

6. A method of mounting a machine element, such as a rolling bearing on to a shaft and using a mounting tool according to any preceding claim, wherein the driving up sleeve of the mounting tool is brought to drive up the tapering sleeve until a radial expansion of the element is just ready to begin, whereupon the spacing ring is moved back a distance calculated for the expansion of the element and then the driving up sleeve is driven further up until the spacing ring again contacts the element.

7. A method of mounting a machine element substantially as herein described with reference to and as shown in the accompanying drawing.

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