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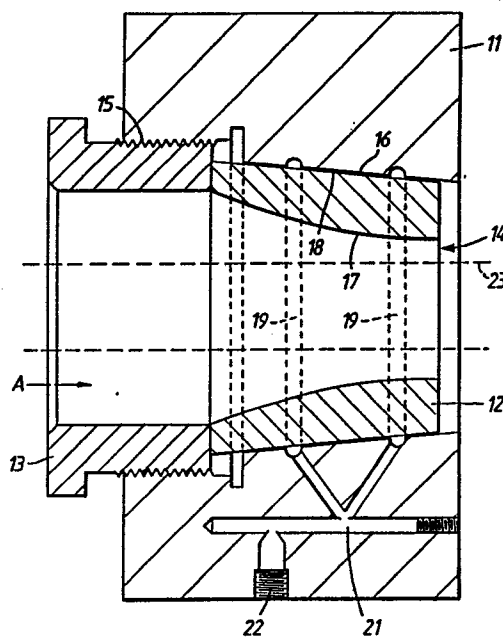
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⑤④ **Die for tube drawing.**

⑤⑦ A die for tube drawings comprising a housing (11) a die member (12) in a bore (14) in the housing (11) and a screw-threaded collar (13) engaging a screw-threaded portion (15) of the bore (14). The die member (12) and bore (14) are tapered. Rotation of the collar (13) exerts axial pressure on the die member (12) to give fine adjustment of the die internal dimension.



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Die For Tube Drawing

The present invention relates to a die for tube drawing for example the manufacture of plain bearings by drawing. Such bearings may include semi-cylindrical bearing shells and cylindrical bearing bushes.

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The general principles of manufacturing plain bearings by drawing, as developed by the present inventor, are described in the present Applicants' co-pending European Application No. 85303751.3. The present invention is directed more specifically to the actual construction of the die and it is an object of the invention to provide a die construction for tube drawing which can produce plain bearings to very close tolerances, particularly the internal and external diameters, and thus the wall thickness.

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According to the invention, a die for manufacturing plain bearings by drawing comprises a housing, a die member and a pressure member, the housing having a bore, part of which is tapered or part-conical, the die member having a tapered outer surface corresponding to that of the bore and being located in the tapered part of the bore, and the pressure member being arranged to exert axial pressure on the die member in the direction of taper of the bore and die member surface.

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Preferably the pressure member extends into the bore to make contact with the die member by way of a screw thread connection with the housing. Thus, the axial pressure can be exerted on the die member by

screwing the pressure member into the housing. In this way fine adjustment of the die member inner dimension may be achieved by its slight contractions and expansions. The die member may be of a ceramic material, one possible material being silicon nitride, though other known ceramic material may be used.

A central plug or mandrel is preferably located down the centre of the bore to form the inside surface of the drawn bearing. Accurate dimensions can be obtained for both the inside and outside surface of the formed bearing and therefore an overall dimensional accuracy can be achieved. These dimensions can be changed by changing the die member and plug.

The degree of taper of the die member may be up to 10° (for the half angle) though it is unlikely to exceed 3° and is preferably between 30 minutes and 2° . The tapered bore surface is preferably provided with lubricant channels leading to grooves which preferably extend circumferentially. Furthermore, lubricant is preferably supplied under pressure, since this tends to force the die member away from the bore slightly thus minimising the risk of jamming and so allowing the die member to be removed and also allowing fine adjustment by the pressure member to be effected more easily.

The die of the present invention may be used with any strip, for example bearing strip consisting of a metal backing and a lining of bearing material. Its use, together with a suitable severing apparatus, can enable finished bearings to be produced from a flat

strip without any subsequent machining and without risk of damage to the lining material.

The invention may be carried into practice in various ways and one embodiment will now be described
5 by way of example with reference to the accompanying drawings in which the single Figure is an axial section through a die in accordance with the invention.

The die comprises a housing 11, a die member 12 and a pressure member in the form of a screw-threaded
10 collar 13. The housing 11 has a bore 14 having a screw-threaded portion 15 engaging the screw-threaded collar 13 and a tapered section 16. The die member 12 has an internal forming surface 17 polished to a high finish and an external surface 18 which is tapered to match
15 the tapered section 16 of the bore 14 and is located therein as shown.

It should be noted that for the sake of clarity, the degree of taper of the tapered section 16 and the die external surface 18 shown in Figure 1 has been
20 greatly exaggerated. In practice, the degree of taper is unlikely to exceed 1° (for the half angle) and would preferably be between 20 and 45 minutes. In the embodiment shown, the taper has a half angle of 35 minutes.

The tapered surface 16 has two oil grooves 19
25 extending circumferentially. These are supplied with lubricant under pressure via a supply network 21 formed in the housing 11. A tapped inlet 22 is provided for connection to a suitable source of oil under pressure (not shown).

30 A plug indicated in broken lines 23 extends through

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the die member 12 and collar 13. This also has a highly polished surface.

In use, a flat bearing strip is introduced into the die member 12 in the direction of arrow A and drawn through thereby 'wrapping' it around the plug 23 to form effectively a closed cylindrical tube. This is then severed to form plain bearings of the desired length. If semi-cylindrical bearings are required, two separate strips may be introduced. These can be formed together as a tube and then separated.

Claims:

1. A die for tube drawing comprising a housing (11) and a die member (12), characterised in that: the die further comprises a pressure member (13), the housing (11) has a bore (14), part of which is tapered or part-
5 conical (16) the die member (12) has a tapered outer surface (18) corresponding to the tapered part (16) of the bore (14) and is located in the tapered part (16) of the bore (14), and the pressure member (13) is arranged to exert axial pressure on the die member
10 (12) in the direction of taper of the bore (14).
2. A die as claimed in claim 1 characterised in that it is arranged for manufacturing plain bearings from a bearing strip comprising a metal backing with a lining
15 of bearing material.
3. A die as claimed in claim 1 or claim 2 characterised in that the pressure member (13) extends into the bore (14) to make contact with the die member (12) by
20 way of a screw thread connection (15) with the housing (11).
4. A die as claimed in any preceding claim characterised by a central plug (23) located at the centre of
25 the bore (14).
5. A die as claimed in any preceding claim characterised in that the degree of taper of the die member (12) is up to 1° (for the half angle).

6. A die as claimed in claim 5 characterised in that the degree of taper is between 25 and 40 minutes (for the half angle).
- 5 7. A die as claimed in any preceding claim characterised in that the tapered bore surface (16) is provided with lubricant channels (21).
8. A die as claimed in claim 7 characterised in that
10 the lubricant channels (21) lead to grooves (19) in the bore surface (16).
9. A die as claimed in claim 8 characterised in that the grooves (19) extend circumferentially.

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