Dec. 9, 1958 K. KLOPFER 2,863,209

BORE CALIBRATING STAMP

Filed April 19, 1955

Fig.2

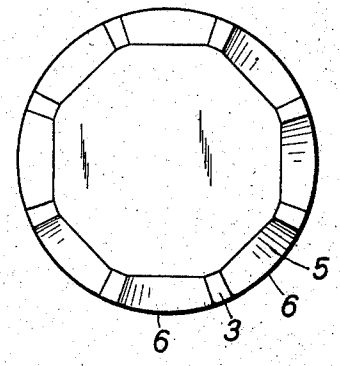
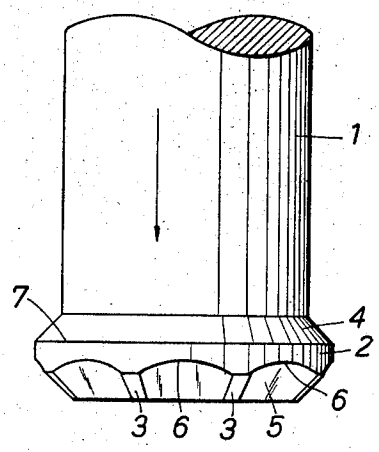


Fig.1



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BORE CALIBRATING STAMP

Karl Klopfer, Wil, St. Gallen, Switzerland, assignor to K. Klopfer A.-G. Werkzeug- und Maschinenfabrik, Bronschhofen, St. Gallen, Switzerland

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2 Claims. (Cl. 29—90)

The present invention relates to a bore calibrating stamp serving to finish pre-machined bores at a desired accurate diameter.

The production of bores of accurate diameter in the metal industry still presents many difficulties. A number of tools, such as reamers, are known by means of which the bores may be finished. The quality of the surface and the accuracy of the bore diameter which may be obtained by using such tools, is, however, not always sufficient. It is also known to press balls or ball-shaped stamps into these bores in order to smoothen their surfaces. The use of such tools may some times be very advantageous. They have, however, the draw-back that a high pressure is necessary to force the tool into the bore. This may give rise to undue deformations of the work piece. In addition the bores may only have slight variations or deviations from a pre-machined diameter, since the material is only pressed by such tools, which have no cutting effect.

An object of the present invention is to provide a calibrating stamp which will prevent deformations in the work piece due to pressure applied by the calibrating stamp when the latter is pressed through the bore.

A further object of the present invention is the provision of a bore calibrating stamp having in addition to a calibrating surface a forward cutting edge adapted to cut material from the walls of a bore when the calibrating stamp is pressed therethrough.

A still further object of the present invention is the provision of a calibrating stamp comprising a rear cutting edge by means of which a second finishing operation may be carried out when the stamp is drawn out of the bore in a direction opposite to the one in which it was pressed in.

Further objects and advantages of the present invention will become clear from the following description and the appended claims in which the features believed to be characteristic are set forth.

In order that the invention may be better understood and put into practice, one embodiment thereof will hereinafter be described by way of example and with reference to the accompanying drawings, in which:

Fig. 1 shows a side view of the calibrating stamp and Fig. 2 shows a view of the stamp as seen from below.

The calibrating stamp shown in the drawing comprises at its front end a cylindrical calibrating face **2** adjacent to the ends of which two tapered annular faces **3** and **4** are arranged to include an angle of 45° with the calibrating face **2**. The front annular face **3** has flat face portions **5**, which include the same angle of inclination with the calibrating face and are equally spaced over the circumference of the tapered annular face **3**. These flat face portions **5** intersect the calibrating face along bent lines which form cutting edges **6** of corrugated configuration. Between the calibrating face **2** and the rear annular face **4** a cutting edge **7** is arranged which is situated in a plane perpendicular with respect to the axis of the calibrating stamp **1**.

The described calibrating stamp functions as follows: In order to use the calibrating stamp, the bore must first be machined to a diameter which is about 0.05 mm. smaller than the desired accurate diameter, which the bore is to have in its finished state. This pre-machined bore may have uneven portions in its surface. If the calibrating stamp described, is pressed through such a bore, for instance by means of a hand press, a small drill or a turret lathe in the direction of the arrow, material is cut away from the walls of the bore by means of the cutting edge **6**. If this cutting edge were not corrugated, i. e. if the latter were situated in a plane perpendicular with respect to the axis of the stamp, such as the edge **7**, the lateral grooves made by previous machining operations in the bore would influence the stamp such that the bore surface obtained would have slight corrugations. By means of the corrugated configuration of the cutting edge **6**, the uneven portions in the pre-machined bore may be removed. These uneven portions therefore have no adverse effect upon the quality of the finished bore. Since the cutting angle of the edge **6** is negative, the material will be pressed to a small extent thus producing a smoothing of the bore surface. Due to the front tapered face **3** the stamp **1** will center itself when being pressed through the bore.

If the stamp **1** is drawn back out of the bore opposite to the direction indicated by the arrow, the bore will be smoothened completely, thus removing all uneven portions from the bore surface.

Bores which are finished in the described manner by means of the calibrating stamp according to the invention will be absolutely accurate in their diameter the machining tolerance being in the order of only about 0.005 mm. In addition the surface of the bore obtained thus, will be very smooth. No checking of the bore by means of a caliper gage is necessary after finishing, since deviations from the desired diameter may be found by means of the calibrating stamp. If the diameter is too large, the stamp may be introduced too easily into the bore thus showing that the work piece is to be excluded. If the pre-machined bore is too small in its diameter, the latter will be finished to the desired accurate measure such that the piece must not be subjected to an additional machining operation. Further it is possible to work with double the operating speed possible if the pieces were checked by means of a caliper-gage.

The calibrating stamp according to the invention has the advantage to permit finishing of bores having very thin walls, since the material is mainly machined off, while with previously used tools, such as balls or round stamps, which only smoothen the bore, such pieces of small wall thickness will be unduly enlarged.

If a number of different stamps of successively larger diameter are used, a bore may be enlarged to any desired measure.

I claim:

1. A bore calibrating stamp comprising a shaft, a cutting head on an end of the shaft, a cylindrical calibrating face arranged circumferentially on the cutting head, a tapered annular face adjacent one end of the calibrating face, a corrugated cutting edge situated intermediate the said cylindrical calibrating face and said tapered annular face, a second tapered annular face adjacent the other end of the calibrating face, and a circular cutting edge situated intermediate the said cylindrical calibrating face and said second tapered annular face, said corrugated cutting edge and said circular cutting edge being respectively effective upon movement of the stamp into and out of the bore for cutting and smoothing action.

2. A bore calibrating stamp comprising a shaft, a cutting head on an end of the shaft, a cylindrical calibrating face arranged circumferentially on the cutting head,

a tapered annular face adjacent to an end of the calibrating face, flat portions on said tapered annular face and equally spaced over the circumference thereof, a corrugated cutting edge at the intersection of said flat portions with said cylindrical calibrating face, a second tapered annular face adjacent to the other end of the calibrating face, and a circular cutting edge situated intermediate said cylindrical calibrating face and said second tapered annular face, said corrugated cutting edge and said rear circular cutting edge being respectively effective upon movement of the stamp into and out of the bore for cutting and smoothing action.

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