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(54) IMPROVEMENTS RELATING TO FLYCUTTERS

(71) I, JOHN HENRY SOMMERVILLE, a British Subject of 89 St. Peters Street, St. Albans, Hertfordshire, England, do hereby declare the invention, which was communicated from ARNE MANKOWITZ, a Swedish subject of Swedish New Products Export AB, Kungsgatan 33, S–111 56 Stockholm, Sweden, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to flycutters.

It is known to provide flycutters particularly for metal machining operations on relatively large workpieces. Such flycutters are normally in the form of a cutting tool slidably mounted on a bar (sometimes referred to as a boring bar) so as to be adjustable to its radial position.

The present invention provides a flycutter which is designed for small workpieces and which has particular application to the production of washers.

The normal method for producing washers is by pressing using annular pressing tools, the outer and inner diameters of each pressing tool presenting cutting edges of the required dimensions. Because washers are required in a wide variety of sizes it is necessary to provide a very large number of pressing tools (i.e. having different inner and/or outer diameters) and, when producing a wide variety of washer size, it is necessary to use either a number of pressing machines, each with a different size pressing tool, or to use one pressing machine and repeatedly change its pressing tool.

An object of this invention is to provide alternative apparatus in the form of a flycutter for producing washers in a wide variety of size.

According to the present invention, there is provided a flycutter comprising a shank, a rotatable support body having at one end an axial bore therein adapted to receive one end of the shank, the support body having at least one transverse bore into which said axial bore opens, a cutter bar adapted for insertion into said transverse bore, and biassing and locking means adapted to be fitted into said axial bore and acted on by said shank, the arrangement being such that the shank can be moved from a retaining position in which said biassing and locking means act on the bar with a force permitting sliding radial adjustment of said bar, to a locking position in which said biassing and locking means are urged into locking contact with said bar.

In order that the invention can be more readily understood and further features made apparent one embodiment of flycutter particularly for machining washers will now be described with reference to the accompanying drawings in which:—

Figure 1 is a general view of the flycutter,

Figure 2 is a section in the line II–II of Figure 1, and

Figure 3 is a fragmentary underneath plan view of the flycutter.

Referring to the drawings, the flycutter comprises a shank 1 having a screw thread at one end which screws into a threaded axial bore 2 (see Figure 2) provided in one end of a rotatable support body 3, which is of cirular cross-section. At its other end the support body 3 is provided with two transverse, circular through bores 4 and 5 in the same transverse plane (see particularly Figure 1) which are angled 90° apart and so cross each other centrally within the body 3; the bore 2 opens into the central crossing point of the bores 4, 5.

Each bore 4, 5 is adapted to receive a cutter bar 6, 7 respectively, and each bar for the major part of its length is of semi-circular cross-section to provide flat surfaces 8, 9 respectively. It is thus possible for both bars 6, 7 to be accomodated in their respective bores 4, 5 by arranging said bars with their flat surfaces 8, 9 in sliding contact with each other. One end 6*a*, 7*a* of each bar is of circular cross-section and has a transverse bore therein adapted to support a flycutter blade 10, 11 respectively in a downwardly extending attitude (as shown in the Figures). Each end 6*a*, 7*a* also has an axial bore therein opening into the respective transverse bore (see Figure 2) for locking screws 12, 13 respectively which, in this embodiment, are "Allen"-type socket head screws.

Each bar 6, 7 can thus slide in its respective

bore 4, 5 and across the respective flat surface of the other bar to any adjusted radial position determined by the inner and outer diameters (shown chain dotted in Figure 3) of the particular washer to be machined. To enable small radial positions to be effected by either bar, axial slots 14, 15 are provided in the outer surface of the support body 3 (see particularly Figure 3) so that the respective flycutter blade 10, 11 can be set within the slot in a small radially adjusted position (i.e. at a radial position within the circumference of the support body 3). Once adjusted to their required radial positions, both bars 6 and 7 can be locked simultaneously by a locking member 16 mounted in the bore of the support body 3. The locking member 16 has a stem 17 on which a compression spring 18 is mounted, which spring is accomodated in an axial bore 19 of the shank 1. Thus, the locking member 16 and compression spring 18 provide biassing and locking means, the arrangement being such that, when the shank 1 is loosened into a retaining position the spring 18 biasses the locking member 16 into engagement with the bars 6, 7 at their central crossing point with a force permitting individual adjustment of the bars, but preventing inadvertent movement of the bars once adjusted. When adjustment of both bars has been completed and checked the bars are simultaneously locked simply by screwing the shank 1 into a locking position to overcome the bias of the spring 18 and urge said locking member hard down into said bars.

In use, the shank is mounted in the chuck of a lathe, drilling, milling or other suitable machine tool and the flycutter blades 10 and 11 are made to rotate and feed into a solid workpiece of suitable material to provide an elongated annular piece which is thereafter sliced to the required thickness for the washers.

To facilitate machining, the support body 3 has a centering pin 20, the point of which is protected by an annular cap 21, the cap being held in the position shown in Figure 2 by a compression spring 22.

It will be appreciated that various modifications can be carried out within the scope of the following Claims. For example, individaul washers can be machined from workpieces already of the required thickness, or a number of workpieces of the required thickness can be stacked and clamped together before flycutting, thereby eliminating the need for a subsequent slicing operation.

WHAT I CLAIM IS:—

1. A flycutter comprising a shank, a rotatable support body having at one end an axial bore therein adapted to receive one end of the shank, the support body having at least one transverse bore into which said axial bore opens, a cutter bar adapted for insertion into said transverse bore, and biassing and locking means adapted to be fitted into said axial bore and acted on by said shank, the arrangement being such that the shank can be moved from a retaining position in which said biassing and locking means act on the bar with a force permitting sliding radial adjustment of said bar, to a locking position in which said biassing and locking means are urged into locking contact with said bar.

2. A flycutter according to Claim 1, wherein the support body has two transversely extending bores in the same transverse plane said bores extending at an angle to each other whereby to provide a crossing point and wherein a bar having a longitudinally extending flat surface is provided for each bore, the arrangement being such that the bars can be accommodated in their respective bores and with their respective surfaces in sliding contact at the crossing point of said bores.

3. A flycutter according to Claim 1 or Claim 2, wherein said one end of the shank and said axial bore of the support body have mating threads, and wherein said biassing and locking means comprise a locking member and a compression spring acting between the latter and said one end of the shank.

4. A flycutter according to any one of Claims 1 to 3, wherein the cutter blade for the or each cutter bar is releasably supported in a transverse bore at one end its bar, and wherein one or more slots are provided in the outer surface of the support body so positioned as to enable the or a respective cutter blade to be withdawn into its slot and thereby set at a small radially adjusted position.

5. A flycutter according to any one of Claims 1 to 4, wherein the other end of the rotatable support body has a centering pin the point of which is protected by an annular cap held in position by a compression spring.

6. A flycutter for machining washers constructed, arranged and adapted to operate substantially as hereinbefore described with reference to the accompanying drawings.

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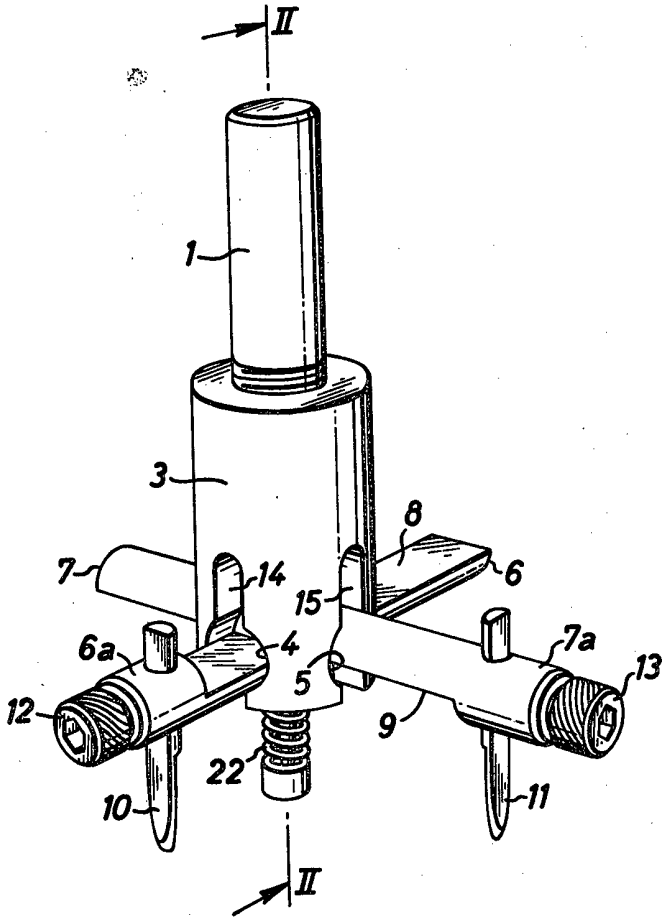

FIG.1

1582413 COMPLETE SPECIFICATION
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Sheet 2

FIG.2

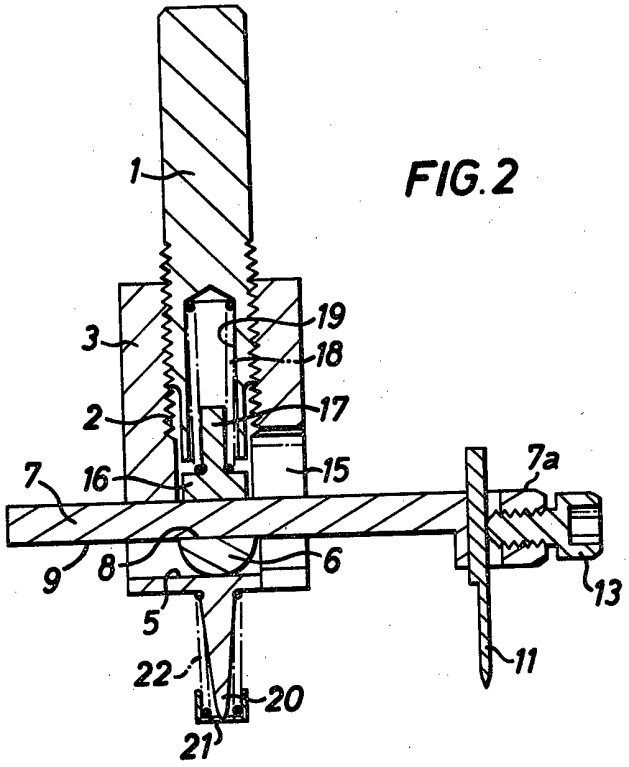

FIG.3