

# PATENT SPECIFICATION

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## (54) APPARATUS FOR THE INTERNAL DEBURRING OF LONGITUDINAL SEAM WELDED TUBES

(71) We, MANNESMANN AKTIENGESELLSCHAFT, a joint stock company organised under the laws of Germany, of Mannesmannufer 2, 4 Dusseldorf 1, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 The present invention relates to an apparatus for the internal trimming or deburring of longitudinal seam welded tubes or section members.

15 It is known to carry out deburring of longitudinal seam welded tubes by means of scrapers or milling cutters which are secured on supporting bars and act on the burr through the still open gap in the tube being welded. Such apparatus is usually

20 adapted to the particular internal diameter of the tube and has to be replaced when there are programme changes. A further disadvantage of known apparatus is that when the cutting tool becomes worn, replacement requires the entire installation to be at a standstill for a relatively long time.

25 The working life of such tools, which often have brazed-on hard metal cutting edges, is limited by fractures thereof which are produced by unavoidable stress which occur when new cutting edges are added.

We have sought to provide an apparatus for the internal deburring of longitudinal seam welded tubes or section members which is capable of receiving an easily interchanged cutting tool of considerably longer working life than previous tools, and which with precise adjustment of the necessary cutting depth, comprehends a specific diameter range of the tubes which are to be deburred.

Accordingly the present invention provides an apparatus for the internal deburring of longitudinal seam welded tubes or section members which comprises an elongate tool shank with an axially extending tool housing head and tubular cutter having a circumferential cutting edge, the tubular cutter being inserted in the tool housing head at an angle to the axis thereof, a hollow

adjusting screw being arranged at the same angle to support the tubular cutter. 50

The shank may be provided with guide rollers, which are located opposite the tubular cutter and are adjustably and elastically mounted and offset by 180°. 55

It is possible to renew the cutting ability of the apparatus of the present invention without varying the cutting depth, that is to say without re-setting the apparatus. The cutting tool can be used to a great extent merely by simple grinding. There is no problem in removing the cutting chips, due to the tubular shape of the cutting tool. 60

The invention will now be further described by way of example with reference to the accompanying drawings in which: 65

Figure 1 is a longitudinal section through part of one embodiment of an apparatus of the present invention having a one-piece shank; 70

Figure 2 is a partial cross-section of another constructional form of the apparatus with an angularly adjustable head and spring roller; 75

Figure 3 shows the cutting tool in section; and

Figure 4 shows front views of the cutting surfaces of the cutting tool with modified cutting edge arrangement. 80

In the apparatus illustrated in Figure 1, a tubular cutter 2 is inserted in a hole situated at an angle of 20° in the shank body 1<sup>1</sup> of apparatus 1 with its cutting edge 3 projecting therefrom, and is held by a hollow adjusting screw 4 adjusted to the cutting depth required. The apparatus 1 is guided in the interior of the tube in a suitable manner, for example by rollers. This means of guiding by rollers is intended particularly for internal tube diameters of say >15 mm. 85

Figure 2 shows an apparatus of the present invention capable of being adjusted to a limited tube diameter range. Referring to Figure 2, a tool housing head 6 of shank body 7 of the apparatus 1 is arranged in a movable manner. It has a tubular cutter and adjusting screw 4 as described with 95

- reference to Figure 1, the head 6 being supported by means of a pivot pin 8. Adjustment of the head 6 from the axial line of the tube may be effected by means of an adjusting screw 10, the head 6 being subsequently clamped by means of a clamping screw 9. 5
- A guide roller 12 situated opposite the tubular cutter 2 is mounted on adjustable spring arms 11 which are adjusted by a pressure adjustment screw 14 and are pivotable about a pin 15. The bearing arrangement may also consist of ball elements in known manner. The adjusting screw 4 is provided with an internal hexagon and the tubular cutter 2 usually has an encircling cutting edge 3 but this may be given a curved shape as shown in Figure 4 or can be polygonal in shape. 10
- When using the deburring apparatus, the tubular cutter 2 is inserted in the adjustable tool housing head 6 of the tool shank 7 in such a manner that it abuts on the adjusting screw 4. When wear occurs at the cutting edge 3, the tubular cutter 2 is turned in accordance with the cutting width and the apparatus is again ready for operation. When the encircling cutting edge 3 of the tubular cutter 2 is completely worn the tube is taken out and replaced by a new tube without re-setting of the tool being necessary. 15
- The replaced tubular cutter 2 can be subsequently ground in order to allow it to be re-used. The adjusting screw 4 is used to compensate for change of position of the tubular cutter 2. 20
- By means of the adjustable head 6 of the tool shank 7, simply by tightening or releasing the adjusting screw 10, a coarse adjustment for a limited diameter range is possible. These measures considerably increase the range of use of the internal deburring apparatus provided by the present invention as compared with known tools. 25
- A chip guide shoe 5 can be arranged for better chip guidance, this shoe being made to project into the tubular cutter 2. 30
- WHAT WE CLAIM IS:—**
1. An apparatus for the internal deburring of longitudinal seam welded tubes or section members which comprises an elongate tool shank with an axially extending tool housing head and tubular cutter having a circumferential cutting edge, the tubular cutter being inserted in the tool housing head at an angle to the axis thereof, a hollow adjusting screw being arranged at the same angle to support the tubular cutter. 55
2. An apparatus as claimed in Claim 1, wherein a chip guide shoe projects into the interior of the tubular cutter. 60
3. An apparatus as claimed in Claim 1 or 2, wherein the tool housing head is interchangeably and adjustably mounted on the shank. 65
4. An apparatus as claimed in Claim 3, wherein from the basic position in which it is aligned with the axis of the shank, the tool housing head is adapted to be adjusted by means of an adjusting screw, a clamping screw being provided to hold the head in the desired position. 70
5. An apparatus as claimed in any of the preceding claims, wherein the tubular cutter is inserted in the tool shank at an angle of 20° relatively to the axis of the shank. 75
6. An apparatus as claimed in any of the preceding claims, wherein the shank is provided with guide rollers, which are located opposite the tubular cutter and are adjustably and elastically mounted and offset by 180°. 80
7. An apparatus as claimed in any of the preceding claims, wherein the cutting edge of the tubular cutter has a shape which is otherwise than cylindrical. 85
8. An apparatus as claimed in any of the preceding claims, wherein guide balls are inserted in the shank for use with tubes having internal diameters below 15 mm, the balls acting oppositely to the tubular cutter and being elastically mounted. 90
9. A tubular cutter for the internal deburring apparatus according to any of the preceding claims characterised in that the end of the tubular cutter which is opposite from the cutting edge is constructed as an abutment surface for a hollow adjusting screw. 95
10. A deburring apparatus substantially as hereinbefore described with reference to the accompanying drawings. 100

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3 SHEETS *This drawing is a reproduction of the Original on a reduced scale*

Sheet 1

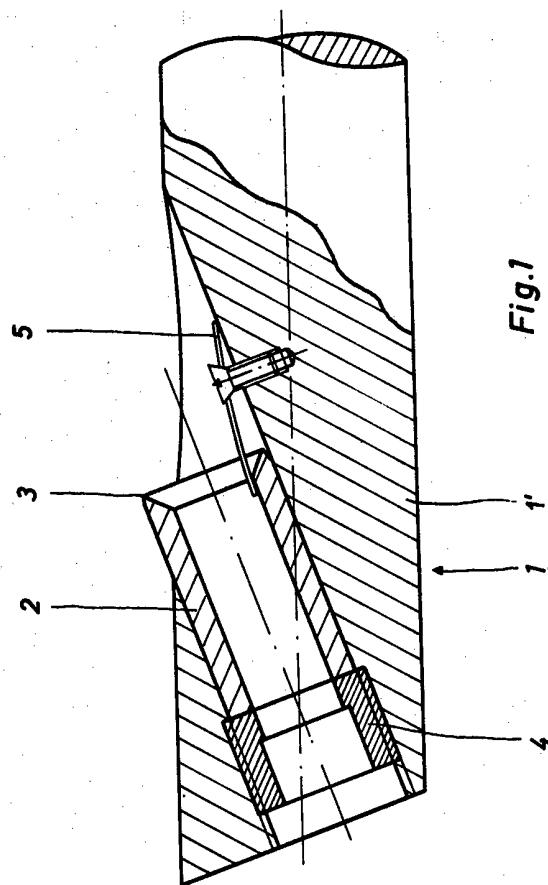


Fig.1

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Sheet 2

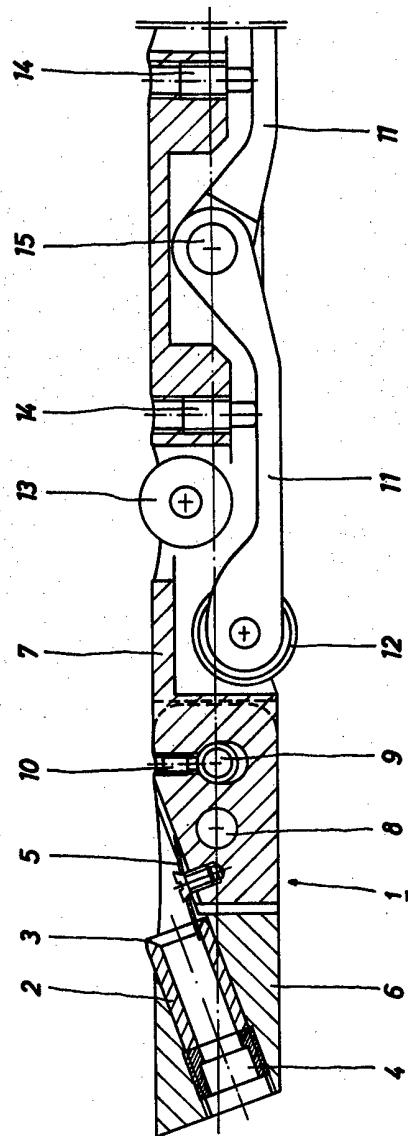


Fig. 2

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Sheet 3*

