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

(71) We, MANNESMANN AKTIENGESELL-
 SCHAFT, a joint stock company organised
 under the laws of Germany, of Mannes-
 mannuf 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:—

The present invention relates to an appa-
 ratus for the internal trimming or deburr-
 ing of longitudinal seam welded tubes or
 section members.

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
 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, re-
 placement requires the entire installation to
 be at a standstill for a relatively long time.
 The working life of such tools, which often
 have brazed-on hard metal cutting edges, is
 limited by fractures thereof which are pro-
 duced 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 pro-
 vides an apparatus for the internal deburr-
 ing of longitudinal seam welded tubes or
 section members which comprises an elon-
 gate 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.

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°.

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.

The invention will now be further des-
 cribed by way of example with reference to
 the accompanying drawings in which:

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

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

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.

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 1¹ 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 suit-
 able manner, for example by rollers. This
 means of guiding by rollers is intended
 particularly for internal tube diameters of
 say >15 mm.

Figure 2 shows an apparatus of the pre-
 sent 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

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.

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.

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. 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.

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.

A chip guide shoe 5 can be arranged for better chip guidance, this shoe being made to project into the tubular cutter 2.

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.

2. An apparatus as claimed in Claim 1, wherein a chip guide shoe projects into the interior of the tubular cutter.

3. An apparatus as claimed in Claim 1 or 2, wherein the tool housing head is interchangeably and adjustably mounted on the shank.

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.

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.

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°.

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.

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.

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.

10. A deburring apparatus substantially as hereinbefore described with reference to the accompanying drawings.

LLOYD WISE, TREGAR & CO.

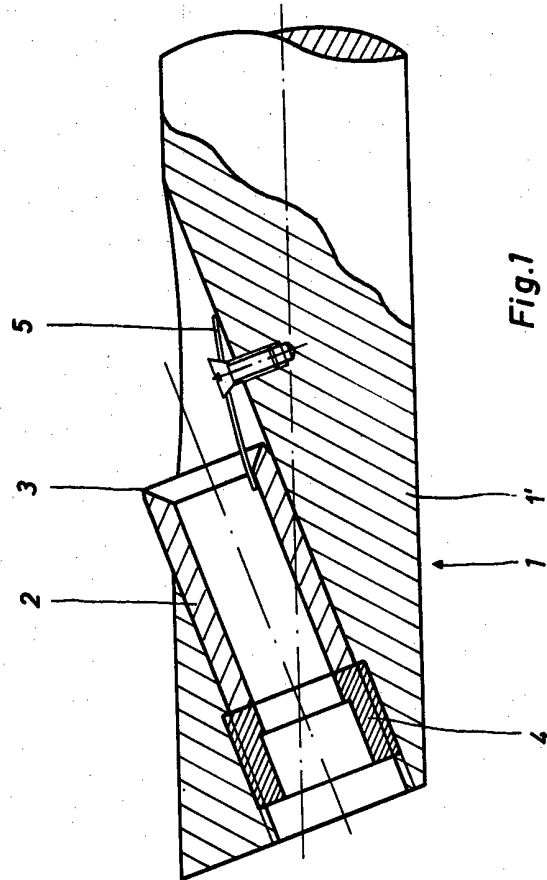
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COMPLETE SPECIFICATION

3 SHEETS

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the Original on a reduced scale*

Sheet 1



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Sheet 2

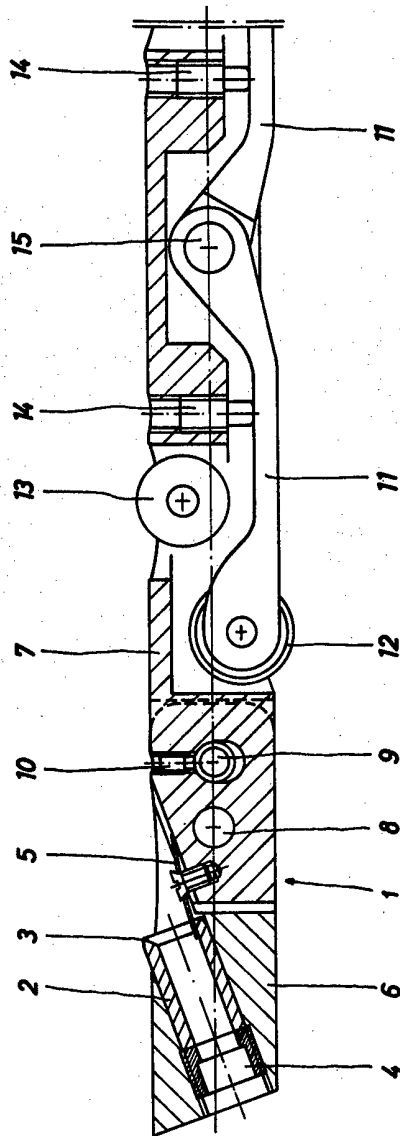


Fig. 2

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COMPLETE SPECIFICATION

3 SHEETS

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Sheet 3

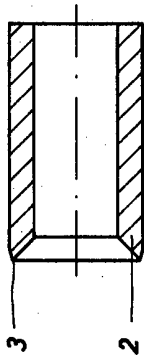


Fig. 3

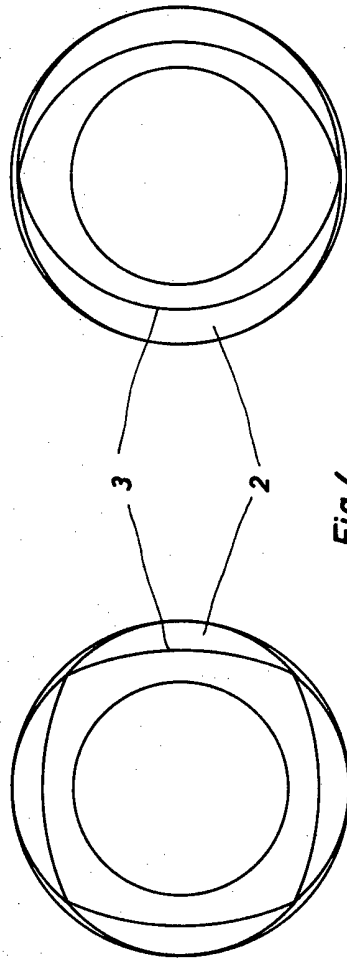


Fig. 4