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(54) APPARATUS FOR MACHINING PIPE BENDS

(71) We, SIDRO ROHRBOGEN G.m.b.H., a Company organised under the Laws of the Federal Republic Of Germany of 94-100, Borriestrasse, D-4980 Bünde 1, Federal Republic of 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 a machine in which pipe bends can be finished or trimmed to required dimensions.

The production of pipe bends is well known in the art. Complete pipe bends are prepared with calculated lengths, that is to say the pipes are cut to the required lengths and are led over the bending mandrel one after the other. By this method the piece of pipe forms itself into a pipe bend.

According to the kind and the production of the materials to be used, the pipe bends emerge from the pipe bending press with a temperature between 700 and 900 degrees Celsius. Because of the method of forming, these pipe bends are not identical so far as concerns their cross section, and must be calibrated. After the calibration it is necessary to cool the pipe bends before a further operation.

After the pipe bend is sufficiently cooled, it passes into the so-called sawing station. Here the pipe bend is cut, by means of two- or three-cut saws to the required length of bend. During the cutting of the pipe bend the measurement precision always lies in the upper field of tolerance. Occasionally, this tolerance field will be exceeded, and another additional after-operation on the pipe bend by means of further cold calibration is necessary. This cold calibration is nevertheless only an end calibration, that is to say, the ends of the pipe bend, on the above described junction measurement are brought within the tolerance field.

If now during this end calibration the angle of the pipe bend is affected, then re-grinding is necessary. Re-grinding will also be necessary if the pipe bend has not been precisely clamped up to the saw blade which

will then make an oblique cut. All this finishing work which is necessary to keep within the prescribed tolerance limits is mainly manual work involving high cost. Recently tolerances for pipe or tube bends used in marine engineering have been further tightened with a consequential rise in the cost of production due to the extra finishing work.

The inventor has set himself the task to so improve the machine for the complete preparation of pipe bends that as well as the hot calibration and possible chamfering there can be a de-burring of the correctly dimensioned pipe bend ends.

According to the invention we provide an apparatus for machining a pipe bend blank, said apparatus comprising a frame, a die set for receiving and hot calibrating a pipe bend blank mounted on the frame, and four machining tools mounted on said frame which are movable with respect to the die set, two of said machining tools disposed above and to the side of the die set being formed by motor-driven trimming means which are displaceable by means of pressure cylinders in a direction for effecting a trimming movement transversely of the ends of the pipe bend, and two machining tools being arranged beneath and to the side of the die set and being formed by motor-driven chamfering tools which are displaceable on inclined slideways along the longitudinal axis of the pipe ends respectively, whereby following the trimming to size of the pipe bend actuation of the chamfering tools effects chamfering of the pipe ends.

The invention will now be described by way of example with reference to the accompanying drawing which shows the apparatus in front elevation.

The apparatus comprises an upright die 2 in a machine frame 1. Two trimming devices 5 are arranged to move diagonally from the top to the bottom.

An electric motor 5² provided with a trimming tool 6 is here carried by a piston rod 8 of a hydraulic cylinder 7.

For the formation of a chamfer for subsequent trouble-free seam welding there are

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provided in the machine frame 1 suitable cutting devices. These cutting devices are guided by means of slides 10 on inclined slide-ways 9 and each consists of a transmission gear 11 with electric motor 13, and a tool holder 12 with cutting knives 12¹.

Should it be required, the translatory drive and the electric motor form a compact unit, and the slides carrying these units are hydraulically, mechanically or electrically movable on the slideway at an angle of 45° to the vertical.

The method of operation is as follows:

The pipe bend 4, coming in glowing condition out of the pipe bend press (not shown) is manually or mechanically taken up and laid into the die 2 arranged in the machine frame 1. For the hot calibration the two part die 2 is closed by a known means. During the calibration, the trimming devices 5 travel under the action of the hydraulic cylinders 7 and separate the overhanging ends 4¹ of the pipe bend 4, whereby a true and ready pipe bend 4 is obtained and needs no further working operation.

If the pipe bend edges need to be further treated, then simultaneously with the return travel of the two separating devices 5, there is a forwards movement of the cutting devices, which means that the slides 10 with the items mounted thereon, that is to say the components 11, 12, 12¹ and 13, are moved in the direction of the pipe bend. Rotation of the tool holder 12 will cause the two cutting knives 12¹ to engage with the ends of the pipe bend 4 and carry out a further treatment.

The above described apparatus now makes it possible that, with a single machine, a pipe bend with a temperature of 700 to 900 degrees Celsius taken out and hot calibrated can be cut to desired dimensions and prepared for the carrying out of a good welding seam.

The advantages as compared with the known art is to be seen that the pipe bends, which are hot calibrated in the die and simultaneously chamfered at both ends, have a dimensional correctness which hitherto only could be achieved with costly subsequent operations.

In the example a pipe bend of 90° is shown. However, bends having an angle upwards of 15° may be machined on suitably adapted apparatus.

WHAT WE CLAIM IS:—

1. An apparatus for machining a pipe bend blank, said apparatus comprising a frame, a die set for receiving and not calibrating a pipe bend blank mounted on the frame, and four machining tools mounted on said frame which are movable with respect to the die set, two of said machining tools disposed above and to the side of the die set being formed by motor-

driven trimming means which are displaceable by means of pressure cylinders in a direction for effecting a trimming movement transversely of the ends of the pipe bend, and two machining tools being arranged beneath and to the side of the die set and being formed by motor-driven chamfering tools which are displaceable on inclined slideways along the longitudinal axis of the pipe ends respectively, whereby following the trimming to size of the pipe bend actuation of the chamfering tools effects chamfering of the pipe ends.

2. An apparatus as claimed in claim 1, wherein each chamfering tool comprises a cutting tool holder which is driven through a transmission gear and supports at least two cutting knives which are directed towards the pipe bend, the transmission and an electric motor connected thereto being mounted as a compact unit on a slide which is displaceable on the slideway by hydraulic, mechanical or electric devices.

3. An apparatus as claimed in claim 1 or 2, wherein all four machining tools are arranged so as to be movable at an angle of 45° to the vertical.

4. An apparatus substantially as described with reference to the accompanying drawing.

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COMPLETE SPECIFICATION

1 SHEET

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

