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(54) A PROBE HOLDER AND APPARATUS FOR ULTRASONIC TESTING OF WELD SEAMS IN LARGE TUBES WELDED BY THE SUBMERGED ARC PROCESS

(71) We, MANNESMANN AKTIENGESELLSCHAFT, a German body corporate, of Mannesmannufer 2, 4000 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 invention relates to ultrasonic probe holders for use in the ultrasonic testing of weld seams of large tubes welded by the submerged arc welding process and to apparatus incorporating such probe holders, the apparatus being of the kind wherein the probes, for longitudinal defect testing, are arranged in individually adjustable probe holders which are constructed as water chambers and are suspended in universal-joint fashion.

Hitherto it has been conventional to produce test pieces for setting up ultrasonic testing apparatus, these however have some disadvantages, the most important being their lack of precision, and the inadequate reproducibility when they are used. The construction of the probe holder also has an influence on reproducibility.

It is an aim of the present invention to construct a probe holder in such a manner as to allow reproducible setting up and testing with an apparatus of the kind referred to.

Accordingly the present invention provides an ultrasonic probe holder constructed as a water chamber with a detachable head plate fitted therein and with a frame arranged thereon, a clamping element for receiving a probe sleeve and an ultrasonic probe arranged in angularly adjustable manner on the frame.

The present invention also provides an apparatus for the ultrasonic testing of weld seams of tubes welded by a submerged arc process, wherein probes for longitudinal defect testing are arranged in individually adjustable probe holders, which probe holder are of the type defined above.

The probe holder according to the present invention has the advantages that it can receive the calibation standard and probe sleeve, and both the setting-up and the testing can be carried out with the apparatus. The probe housing sleeve is inserted in an adjustable-angle clamping element, so that the particular desired acoustic irradiation angle can be obtained over the entire angle range at the same irradiation point at the test surface, since the axis of the pivot point always remains the same with all likely acoustic irradiation angles. Ball rolling elements inserted in the head plate ensure a constant acoustic irradiation setting i.e. acoustic irradiation angle.

Preferably the insert element located in the head plate produces a water mushroom for improved coupling of the probe, while a tongue-like plastics material part integrated in the insert element wards off sound reflections from the inner surface of the housing of the probe holder.

An embodiment of the invention will now be described by way of example, with reference to the accompanying diagrammatic drawings, in which:

Figure 1 shows a cross-section through a probe holder according to the present invention in combination with a calibration standard and a probe sleeve;

Figure 2 shows a longitudinal section in view taken along the line A—A of Figure 1;

Figure 3 shows a cross-section and the front elevation of the calibration standard and probe sleeve.

With reference now to the drawings in detail Figure 1 shows a probe holder, arranged pivotably in a support 2 by means of

lateral journals 1, the probe holder comprising a head plate 3 connected with a frame 4, and a housing 5.

Arranged on the frame 4 is an adjustable-angle clamping element 6 for housing a probe sleeve 7. The probe sleeve 7 has a projection 8 with pins 9 which hold and fix the calibration standard 10.

The clamping element 6 can be adjusted angularly in a curved slot 11. The probe sleeve 7 receives both the standard 10 and also the probe 12 (see Figure 2).

Ball rolling elements 13 and an insert element 14 are arranged in the head plate 3.

In Figure 3 the standard 10 placed on the probe sleeve 7 is shown in section and in elevation.

In operation, using an ancillary device, the angle required for testing the workpiece is adjusted and fixed after removal of the head plate 3. A scale is provided to allow the angle set to be read off. When it is necessary to change probes, the clamping screw 15 in the lower portion of the probe sleeve is released, and the new probe 12, to be inserted, is introduced up to the projection 8 arranged within the probe sleeve 7 and fixed. This means that an identical forward distance is always guaranteed.

After the standard 10 has been positioned, the housing 5 is again screwed to the head plate 3. The probe cable is taken out of the housing 5 through a specially sealed bore in the housing wall. A sleeve likewise secured to the housing wall is provided with a flexible tube and rapid-action coupling to ensure that the complete holder can be changed quickly.

When fitted in the apparatus the support 2 has journals similar to the probe holder except that they are offset by 90°. The former journals are inserted in a fork in order to allow a full-universal-joint type of movement. Like the water connection, the electrical connection is made with the use of rapid-action couplings. The adjustable quantity of water entering the housing 5 with a slight positive pressure passes out through an insert element 14 located in the head plate 3, so that a water mushroom is formed for the purpose of coupling to the article tested.

WHAT WE CLAIM IS:—

1. An ultrasonic probe holder constructed as a water chamber with a detachable head plate fitted therein and with a frame arranged thereon, a clamping element for receiving a probe sleeve and an ultrasonic probe arranged in angularly adjustable manner on the frame.

2. A probe holder as claimed in Claim 1, in which the probe sleeve is so constructed to accommodate a calibration standard.

3. A probe holder as claimed in Claim 1 or 2, in which the frame is provided with a curved slot which extends through an angle of from $-5°$ to $+30°$.

4. A probe holder as claimed in any of claims 1 to 3 in which the probe sleeve is provided with a projection and has two journals.

5. A probe holder as claimed in any of claims 1 to 4, in which the head plate receives ball rolling elements and an insert element.

6. A probe holder substantially as herein described with reference to the accompanying drawings.

7. An apparatus for the ultrasonic testing of weld seams of tubes welded by a submerged arc process, wherein probes for longitudinal defect testing are arranged in individually adjustable probe holders, which probe holders are of the type claimed in any of claims 1 to 6.

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3 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 1

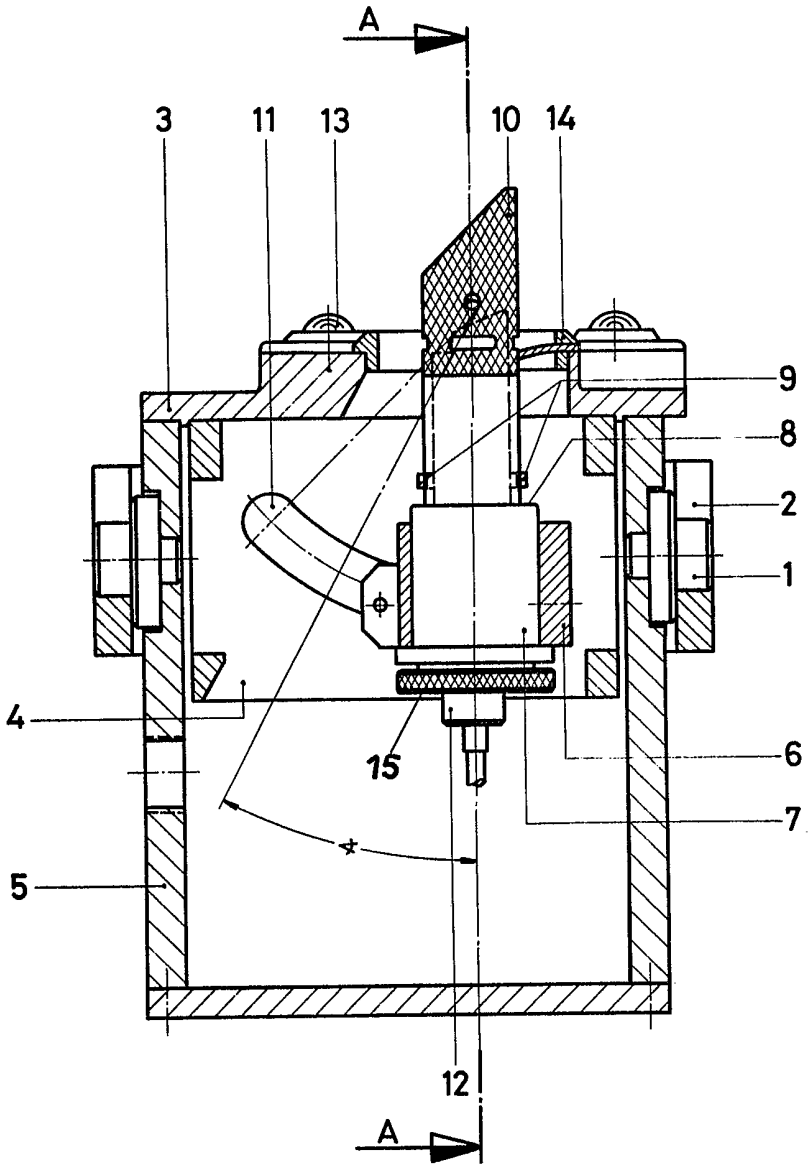

Fig. 1

A – A

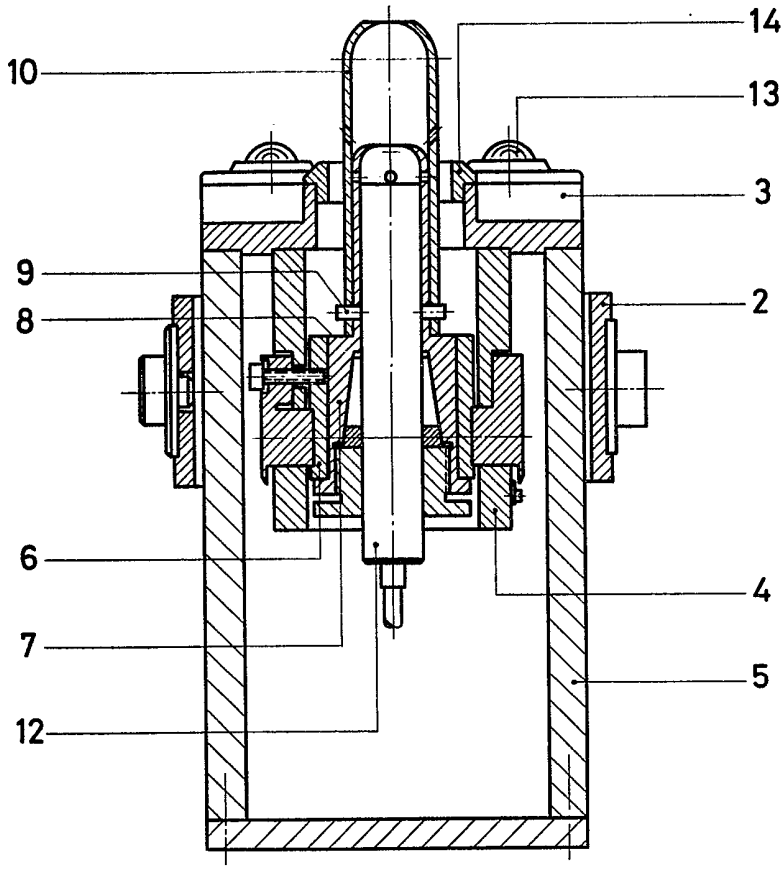

Fig. 2

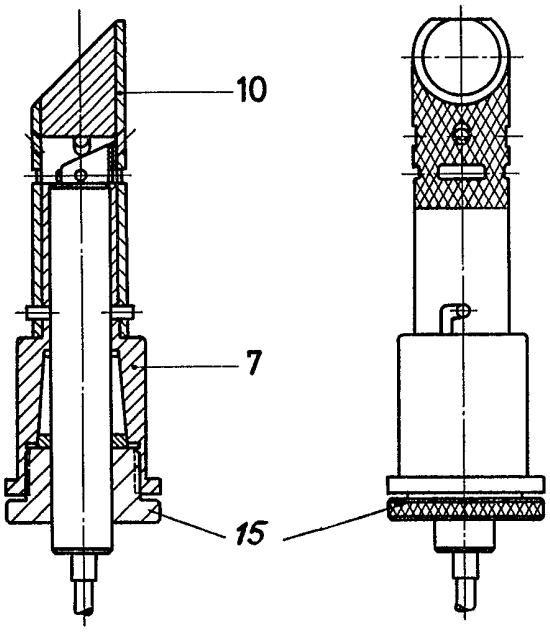

Fig. 3