United States Patent

[11] 3,573,515

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[73] Assignee **United States Steel Corporation**

[54] **TRANSDUCER-HOLDING BLOCK ADAPTED TO BE MOUNTED WITHIN A LIQUID-FILLED WORK-ENGAGING ROLLER**
2 Claims, 5 Drawing Figs.

[52] **U.S. Cl.** **310/8.3,** 73/67.5, 310/8.9, 310/9.1
[51] **Int. Cl.** **H01v 7/00**
[50] **Field of Search** ..... 310/8.3, 8.9, 8.1, 8.7, 9.0, 9.4, 9.1; 340/10; 73/71.5, 67.5—67.9, (Inquired)

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ABSTRACT: A block for holding an ultrasonic transducer (piezoelectric crystal), adapted to be mounted interiorly of a hollow liquid-filled work-engaging roller, is carried on the roller shaft and has a cap removably secured thereto. The cap has a recess in its block-engaging face, dimensioned to accommodate the transducer. A seal between the engaging faces of the block and cap prevents the liquid with which the roller is filled from coming into contact with the transducer.

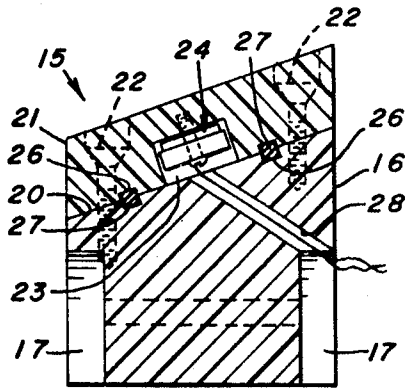


FIG. 1.

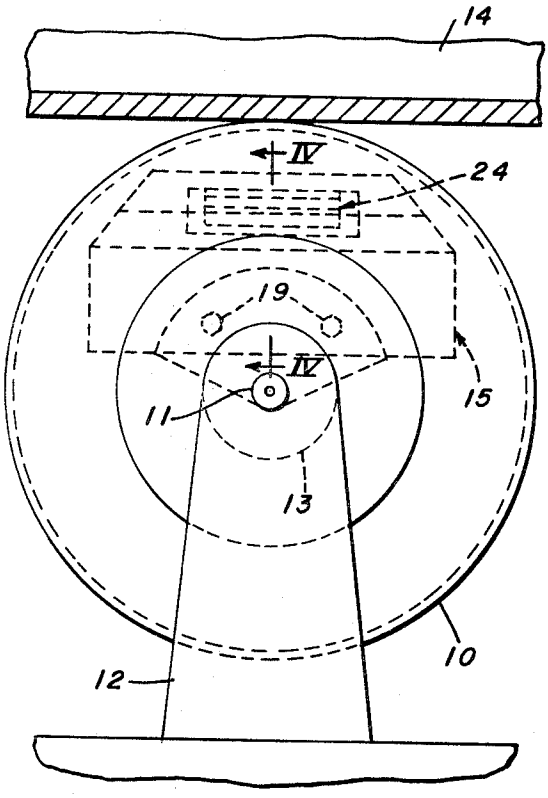


FIG. 2.

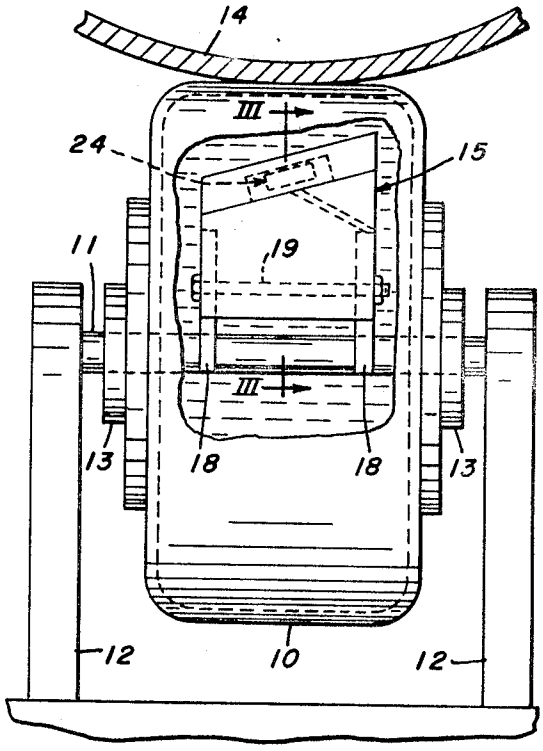


FIG. 3.

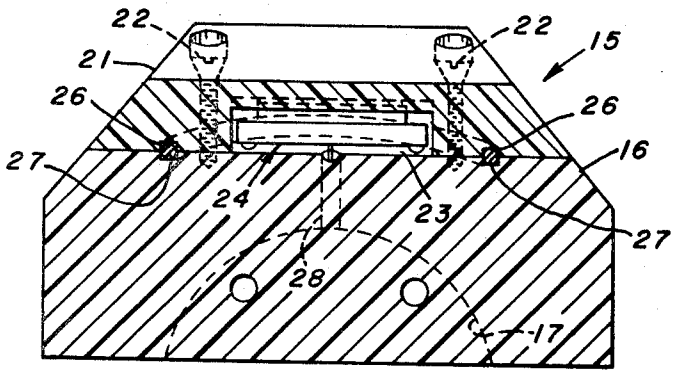


FIG. 4.

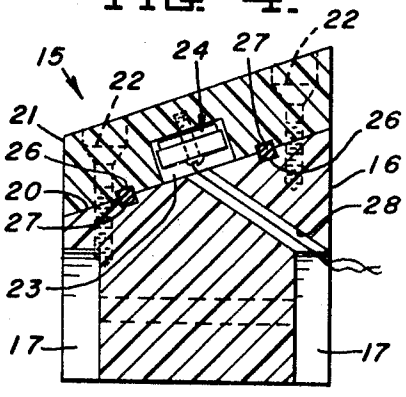
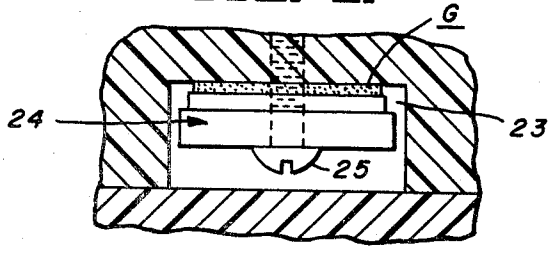


FIG. 5.



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TRANSDUCER-HOLDING BLOCK ADAPTED TO BE MOUNTED WITHIN A LIQUID-FILLED WORK-ENGAGING ROLLER

This invention relates to the mounting of transducers used for ultrasonic testing and, in particular, to a mounting adapted to be placed inside a hollow liquid-filled work-engaging roller.

BACKGROUND OF THE INVENTION

Transducer mountings of the general type indicated above are known. One example is that made by Sperry Products Division, Automation Industries, Inc. Difficulty has been experienced using these devices because of the tendency of the liquid (ethylene glycol) to dissolve the cement bonding the transducer to a block carried on the roller shaft. I have invented an improved transducer-mounting block which overcomes the aforementioned difficulty. My mounting block fully encloses the transducer and prevents contact therewith by the liquid filling the hollow roller.

BRIEF SUMMARY OF THE INVENTION

In a preferred embodiment, I provide a block of light material, e.g., Lucite synthetic plastic for mounting on the shaft of a hollow roller which is adapted to be filled with liquid and to engage the product to be tested. I also provide a removable cap to be secured to the block and form a recess or pocket in the under side of the cap adapted to accommodate the transducer. Cooperative sealing means closes the joint between cap and block entirely around the pocket. When the cap is secured on the block, the transducer is fully protected from contact by the liquid.

BRIEF DESCRIPTION OF THE DRAWINGS

A complete understanding of the invention may be obtained from the following detailed description and explanation which refer to the accompanying drawings illustrating the present preferred embodiment. In the drawings:

FIG. **1** is a side elevation of a conventional ultrasonic testing roller having my improved transducer-mounting block installed therein;

FIG. **2** is an end elevation thereof;

FIG. **3** and **4** are sectional views taken along the planes of lines III–III of FIG. **2** and IV–IV of FIG. **1**, respectively; and

FIG. **5** is an enlargement of a portion of FIG. **4**.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now in detail to the drawings and, for the present, to FIGS. **1** and **2** particularly, a hollow liquid-filled roller **10** is journaled on a fixed shaft **11** spanning standards **12**, by bearings **13**. Roller **10** is mounted so as to make rolling contact with a workpiece **14** (a length of pipe in the drawing) as it travels lengthwise along a predetermined path such as a roller conveyor. Except for my invention, devices such as roller **10** are known (as wheel search units) and are commercially available, being manufactured by Sperry Products Division of Automation Industries, Inc. one of which, suitable for my invention, is designated Sperry Style No. 50D263 Wheel Unit.

My invention is the transducer unit **15**, mounted on shaft **11** within the roller **10**, which is shown in greater detail in FIGS. **3**—**5**. This unit comprises a block **16** having its sides recessed as at **17** to accommodate spaced wing plates **18** welded onto shaft **11**, whereby the block may be secured to the shaft by through bolts **19**. The top face **20** of block **16** is at an oblique angle to the bottom and has fitted thereon a cap or cover **21** secured by screws **22**. The block **16** and cap **21** are conveniently formed from an acrylic resin such as Lucite plastic.

The undersurface of cap **21** which makes face to face contact with the top **20** of block **16** has a recess **23** formed therein of size and shape adapted to accommodate a transducer assembly **24** secured therein by screws **25** with a layer of sealant such as silicone grease G between the assembly and the bottom of the recess to prevent the entrapment of air. Sealing grooves **26** in the contacting faces of the block and cover extend around the recess **23** and an O-ring **27** seated therein prevents the access of the liquid-filling roller **10** to assembly **24**.

A passage **28** drilled into block **16** from one side thereof intersects top **20** within the area of recess **23** and permits leads from the assembly **24** to be taken out to the exterior of roller **10** through a suitable passage (not shown) in shaft **11**.

After the leads have been inserted through passage **28**, the outer end thereof is plugged with silicone rubber to exclude liquid.

It will be understood that my invention provides a transducer mounting for wheel search units having important advantages. In the first place, it is simple and inexpensive and may be manufactured by conventional machine practice. The principal advantage, however, is that my mounting wholly excludes the liquid filling the wheel or roller from damaging access to the transducer assembly.

I claim:

1. Ultrasonic testing apparatus comprising a fixed supporting shaft, a hollow ethylene-glycol filled work-engaging roller mounted on said shaft, radial wing plates secured to said shaft in spaced-apart relationship, a block between said wing plates extending radially from said shaft, means fastening said block to said wing plates, a cap removably secured on said block and adjacent the periphery of said roller, a recess in the underside of said cap, means sealing the joint between the cap and the block extending entirely around the area of the recess, a transducer, means for removably securing said transducer in said recess, and a lead-wire passage extending from the exterior of said block to a point within said area.

2. Apparatus according to claim **1** in which said sealing means includes a circular groove surrounding the recess on the mating face of said cap, a matching groove on the mating face of said block, and a sealing ring seated in said grooves which seals said recess when said cap is secured to said block; an acoustic coupling of silicone grease between said cap and said transducer; a silicone rubber plug sealing said lead-wire passage from said liquid, and said cap and said block are both composed of an acrylic resin.