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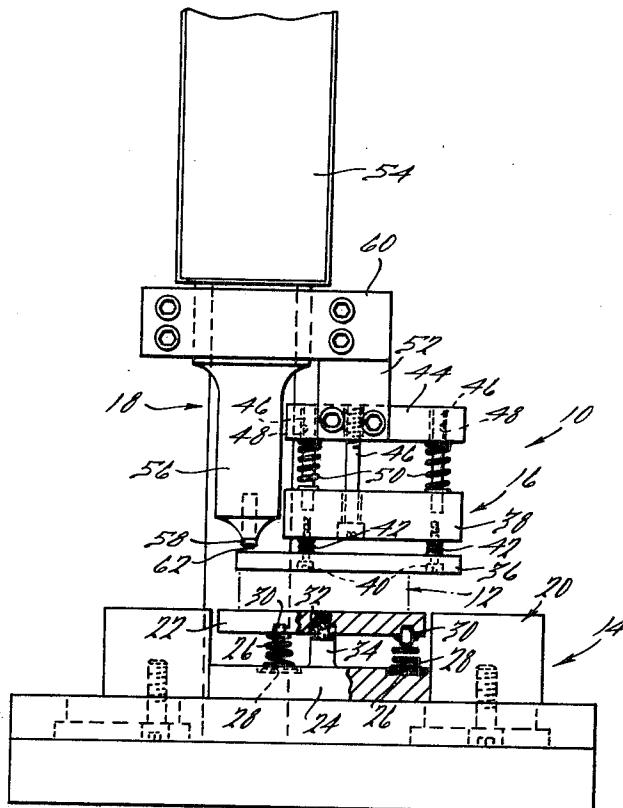
Primary Examiner—William B. Penn
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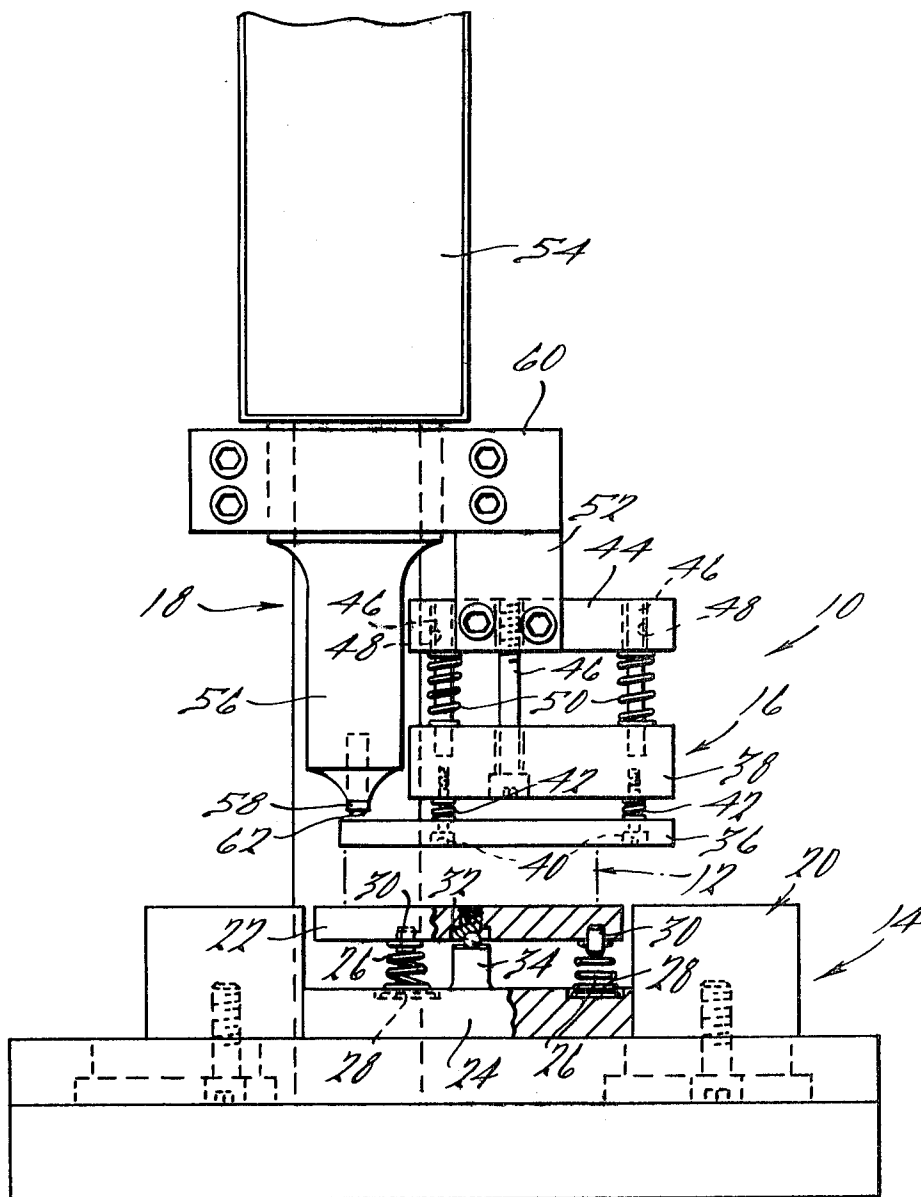
[54] **ULTRASONIC MARKING**
11 Claims, 3 Drawing Figs.

[52] U.S. Cl..... **101/3,**
101/407 BP
[51] Int. Cl..... **B44b 5/00**
[50] Field of Search..... **101/3, 4,**
368, DIG. 5, 297, 405, 406, 93 C, 1, 407

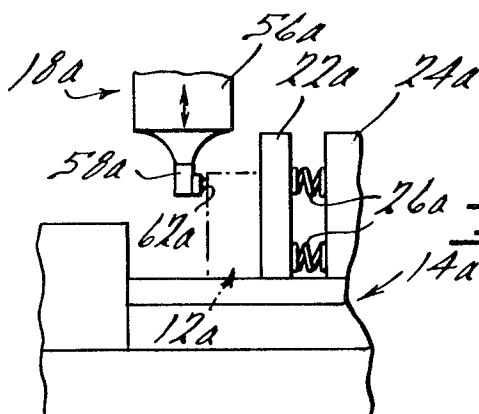
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ABSTRACT: Apparatus for marking identifying numbers and/or other indicia on parts by use of an ultrasonic transducer for driving stamp means generally against a part whereby the part will be marked with the desired numbers and/or indicia.





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II.2

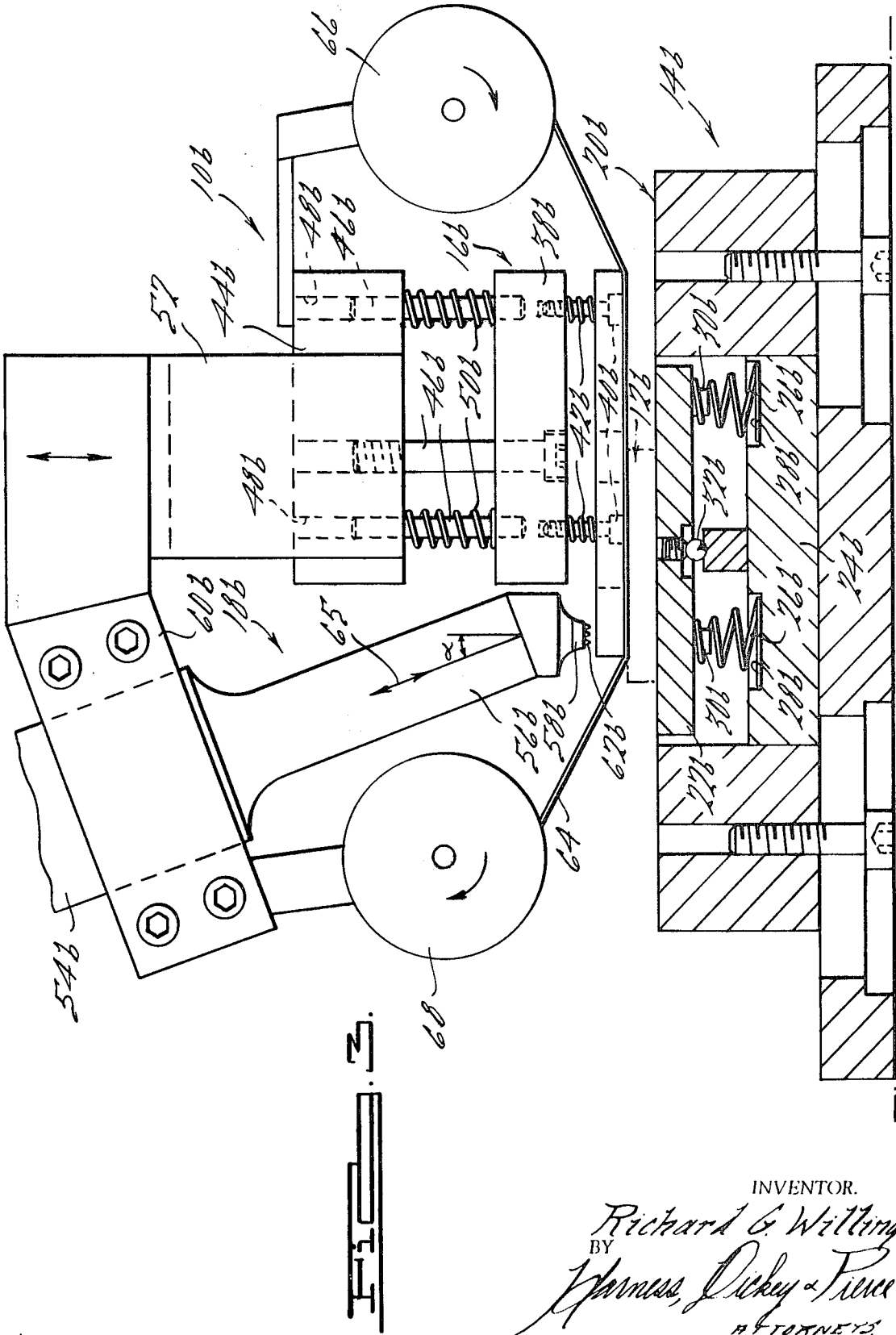
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ULTRASONIC MARKING

SUMMARY BACKGROUND OF THE INVENTION

The present invention relates to apparatus and method for ultrasonically marking parts.

Parts such as bearings are marked with identifying numbers and/or other indicia to provide an indication of size, type, etc. In the bearing industry, the practice is to mark the parts such as cups, cones or rings with numbers identifying the assembly. In many cases a single cup, cone or ring may be used in a variety of assemblies each requiring a different identifying part number. With prior marking practices it has been necessary to mark the parts prior to assembly; hence in order to maintain a stock of parts for different bearing assemblies, it has been necessary to maintain separate stocks of the same bearing part with different numbers to accommodate the different assemblies. In the present invention the marking can be accomplished with the bearing in an assembled condition. Therefore, it is an object of the present invention to provide novel apparatus for marking various parts.

It is another object of the present invention to provide novel apparatus for marking bearing parts.

It is still another object of the present invention to provide a novel apparatus utilizing ultrasonic means for marking various parts.

Other objects, features, and advantages of the present invention will become apparent from the subsequent description and the appended claims, taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a front elevational view, with some parts shown in section of apparatus for ultrasonically marking parts such as a bearing assembly;

FIG. 2 is a fragmentary elevational representation of a different form of ultrasonic marking apparatus; and

FIG. 3 is a front elevational view with some parts shown in section still a different form of apparatus for ultrasonically marking parts.

Looking now to FIG. 1, a marking assembly is generally indicated by the numeral 10 and is adapted to mark parts such as a bearing assembly 12 (shown in phantom). The assembly 10 includes a support table assembly 14, a securing plate assembly 16 and an ultrasonic marking assembly 18. The support assembly 14 includes a base subassembly 20. A support plate 22 is mounted in a recess to a base plate 24 by means of a plurality of spring members 26, which have one end located in grooves 28 in the base plate 24 and have their opposite ends engaging dowels 30 in the support plate 22.

The support plate 22 is pivotally supported at its center upon a ball member 32 located upon a spindle 34 extending from base plate 24. With the assembly thus shown, the support plate 22 is resiliently held and free to move to desired positions whereby proper alignment can be obtained.

In operation the bearing assembly 12 is located upon and clamped to support plate 22 by the securing assembly 16. The assembly 16 includes an alignment adjustment plate 36 which is adapted to engage the upper surface of the bearing assembly 12 whereby the assembly 12 is clamped against the support plate 22. Alignment plate 36 has a suitable slot or opening 37 adapted to provide access to a selected portion of the part to be marked and the plate 36 is held to a second alignment plate 38 by a plurality of capscrews 40 and is normally resiliently urged away therefrom by means of springs 42 located around the screws 40. Thus the plate 36 is resiliently secured for axial, vertical up and down motion relative to the second alignment plate 38. The second alignment plate 38 is in turn similarly connected to a guide plate 44 by means of a centrally located capscrew. A plurality of guide pins 46 are held to the alignment plate 38 and extend through openings 48 in the guide plate 44. A plurality of springs 50 are located on each of the guide pins 46 and are biased to urge the second alignment plate 38 vertically downwardly away from the guide plate 44. The guide plate 44 is in turn secured to the ultrasonic marking assembly 18 by means of the plate 52. The ultrasonic marking

assembly 18 includes a transducer 54, which is connected to a horn 56 which has attached thereto a marking stamp 58. The ultrasonic transducer assembly 18, as noted, is connected to the guide plate 44 via the plate 52 and a securing plate 60. Thus, as the transducer assembly 18 is moved vertically downwardly to engage the upper surface of the bearing assembly 12, which is to be marked, first the alignment plate 36 is moved downwardly to engage the upper surface of the bearing assembly 12. Upon further movement the springs 42 are compressed whereby the bearing assembly 12 is held resiliently in place. At the same time since the second alignment plate 38 is resiliently connected to the guide plate 44, as the guide plate 44 is moved downwardly springs 50 will be compressed. Thus in the apparatus as shown, the bearing assembly 12 will be resiliently clamped. At the same time, of course, the bearing assembly 12 can pivot into proper alignment by virtue of the resilient pivot support of the support plate 22.

The ultrasonic transducer assembly 18 is moved downwardly to a position where the stamp 58 engages the upper surface of the bearing assembly 12 to be marked; the transducer 54 can then be energized whereby the horn 56 will be actuated rapidly driving the marker 58. The marker 58 is provided on its lowermost surface with protuberances 62 which can be identification numbers and/or other identifying indicia. As the marking stamp 58 is vibrated by virtue of the apparatus note, the information contained on the marking stamp 58 via the protuberances 62 will be etched or otherwise marked into the surface of the bearing assembly 12.

A modified form of the apparatus of FIG. 1 is shown in FIG. 2. In the description of that apparatus, components which are similar to components shown in FIG. 1 will be given the same numerical designation with the addition of the letter postscript "a". Thus the transducer assembly 18a has a stamp marker 58a secured to the bottom portion of the horn 56a; the stamp 58a however, is supported such that its protuberances 62a extend horizontally rather than vertically as in FIG. 1. The bearing assembly 12a is supported in an upright position on a support subassembly 14a and is supported against a support plate 22a which is resiliently connected to a base plate 24a by a plurality of springs 26a. Thus, in operation, the ultrasonic marking assembly 18a is first moved horizontally until the marking stamp 58a engages the surface of the bearing assembly 12a to be marked; next the transducer and associated horn 56a are energized and the markings or indicia contained by the protuberance 60a are etched into the surface of the bearing assembly 12a. Note and this differs from the form shown in FIG. 1 in that in FIG. 1 the motion of the protuberances 62 is normal to the surface to be etched or marked. In FIG. 2 the protuberances 62a are moved in a direction parallel to the surface to be marked and hence etching in FIG. 2 takes place with more of a scrubbing action rather than an impact action.

FIG. 3 shown apparatus in which the marking takes place by a combination of scrubbing and impact. In FIG. 3 components similar to like components shown in FIG. 1 are given the same numerical designations with the addition of the letter postscript "b". The apparatus of FIG. 3 differs from that of FIG. 1 in that the marking stamp 58b has its protuberances 62b located at an angle alpha relative to the direction of oscillation of the stamp 58b as provided by the horn 56b and transducer 54b. Thus, the protuberances 62b are oscillated generally in the direction of the arrows 65 and hence will provide a combination of impact and scrubbing action along the surface of the bearing assembly 12b. The apparatus of FIG. 3 differs in another manner in that abrasive tape 64, supported by reels 66 and 68, is provided to engage the surface of the bearing assembly 12b to be marked; hence the protuberances 62b engage the tape 64 which is then pressed into engagement with the surface of the bearing assembly 12b to be marked and the etching or marking is provided by virtue of the tape 64 rather than by the direct contact of the protuberances 62b.

The ultrasonic apparatus, i.e. transducer 54, 54a 54b and horn 56, 56a, 56b generally can satisfactorily operate at high

frequencies which are in the ultrasonic range; these high frequencies are generally in excess of 18,000 cycles per second.

In the embodiment shown in FIGS. 1 and 2, the protuberances 62 and 62a can be formed of a hardened material which is harder than the surface to be etched; for example the material could be a carbide or similar hard material. Alternatively, the protuberances 62 and 62a could be made of a hard, fine abrasive coating such as diamond dust or particles.

With reference to the embodiment shown in FIG. 3, the tape 54 could be abrasive coated tape; alternatively, a plastic tape could be utilized with the heat generated by the stamp bonding a plastic mark to the part being etched. Still over forms of a coated tape could be utilized with the tape having a die or chemical etchant thereon.

Thus with the apparatus as shown and described, the bearing assemblies can be marked in their assembled condition. It should be understood that while the apparatus is shown and described in conjunction with the marking of bearing assemblies and while it has considerable advantage in this application. It also has advantages in other applications as well.

While it will be apparent that the preferred embodiment of the invention disclosed is well calculated to fulfill the objects above stated, it will be appreciated that the invention is susceptible to modification variation and change without departing from the proper scope or fair meaning of the invention.

What is claimed is:

1. Apparatus for marking a workpiece comprising: high frequency means for providing displacement at a high frequency, stamp means having a preselected mark formed therein and connected to said high frequency means and engageable with the workpiece for forming said preselected mark onto the workpiece as a result of the high frequency displacement, support means for resiliently supporting the workpiece relative to said stamp means, said support means comprising a support assembly and a securing assembly, said support assembly including a base plate, a support plate having a first outer surface adapted to contact a first surface of the workpiece, and first spring means for resiliently connecting said support plate to said base plate; said securing assembly including a guide plate connected to said high frequency means,

an alignment plate having a second outer surface of the workpiece, and second spring means for resiliently connecting said alignment plate to said guide plate; whereby the workpiece is adapted to be compressively retained between said first and second outer surfaces and resiliently aligned relative to said stamp means.

2. The apparatus of claim 1 with said stamp means supported for movement normal to the plane of the surface of the workpiece to be marked.

3. The apparatus of claim 1 with said stamp means supported for movement in a direction parallel to the plane of the surface of the workpiece to be marked.

4. The apparatus of claim 1 with said stamp means supported for movement in a direction which is at an angle less than 90° and greater than 0° relative to the surface to be marked.

5. The apparatus of claim 1 with said stamp means comprising a marking stamp having said preselected mark formed of a hardened material for direct engagement with the surface to be marked.

6. The apparatus of claim 1 with said stamp means comprising a flexible member having a treated surface adapted to engage the workpiece and a marking stamp having said preselected mark and engageable with the flexible member of forming said preselected mark by means of said treated surface.

7. The apparatus of claim 1 with said flexible member being a tape.

8. The apparatus of claim 1 with said high frequency means being operable in the ultrasonic range.

9. The apparatus of claim 2 further comprising guide means disposed between said guide plate and said alignment plate for selectively aligning said second outer surface relative to the movement of said stamp means, and with said high frequency means being operable in the ultrasonic range.

10. The apparatus of claim 3 with said high frequency means being operable in the ultrasonic range.

11. The apparatus of claim 4 further comprising guide means disposed between said guide plate and said alignment plate for selectively aligning said second outer surface relative to the movement of said stamp means, with said high frequency means being operable in the ultrasonic range.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,626,843

Dated December 14, 1971

Inventor(s) Richard G. Willing

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 1, line 37, after "section" insert --of--.

Column 2, line 48, reads as "12a, Note and this differs" should be --12a. Note that this differs--.

Column 2, line 54, after Figure 3 "shown" should be --shows--.

Column 2, line 63, after "54b" there should be a period --. --.

Column 2, line 71, after the word marked, "ans" should be --and--.

Column 2, line 74, after "54a" there should be a comma --, --.

Column 3, line 13, "over" should be --other--.

Column 4, line 1, claim 1, after the word "surface" insert --opposing said first outer surface and adapted to contact a second surface--.

Signed and sealed this 30th day of May 1972.

(SEAL)

Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents