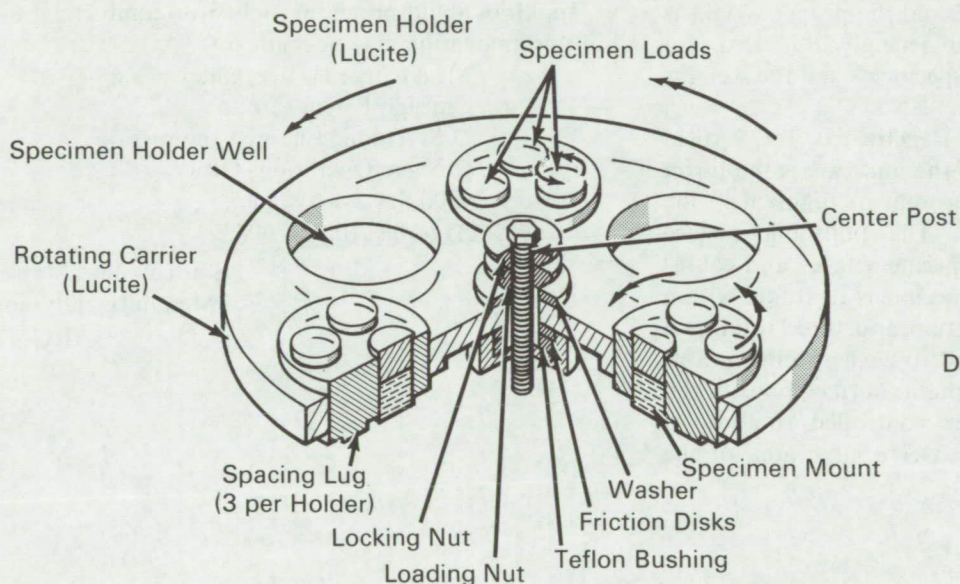


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Metallographic Holding Fixture Permits Polishing of Soft Metals on Vibratory Lapping Machine



NOTE: Double Arrow Lines Denote Direction of Rotation

The problem:

To prevent specimen smearing during grinding and polishing operations performed on a vibratory lapping machine. Rotary impulse grinding and polishing machines cause smearing of soft metallographic specimens, such as uranium, when the specimens are individually loaded on the machine bowl. The specimen load, which is necessary to produce adequate contact force between the specimens and the polishing surface, and which furnishes sufficient inertia to effect slippage between these surfaces, is so large that smearing of the polished surface results. Also, single-specimen mounts tend to overtake one another and to gather at the periphery of the bowl, wearing the polishing surface along a narrow band and decreasing the rate of metal removal.

The solution:

A circular fixture which mounts several specimens within a single turret and therefore requires less specimen load than was previously necessary. Each specimen is loaded individually with a weight small enough to prevent smearing but large enough to promote polishing. The inertia of the entire turret is imparted to each specimen to produce the desired rubbing effect since the specimens are yoked together through the turret body.

How it's done:

The fixture consists of a disk shaped lucite turret containing six equally spaced holes for specimen holders, and a lucite bowl which replaces the stainless steel bowl normally used on the vibratory unit. A lucite cylindrical specimen holder fits inside each of

(continued overleaf)

the six holes in the turret. The six holders are free to rotate and slide axially within their respective turret recesses. Each holder contains three equally spaced holes, each of which accommodates a specimen and its loading weight. The specimens and weights are free to rotate and to slide axially within the holders.

A circular polishing cloth is fastened to the bottom of the bowl. The turret is then center mounted on an axis extending through the center of the bowl so the turret may rotate about the axis without touching the polishing medium. An adjustable snubbing device connected to the axis and to the turret allows the rotation of the turret to be restrained or braked. The six specimen holders are inserted in the turret recesses so the three spacer lugs on the bottom of each holder rest on the polishing medium. Specimens are then dropped face down into the holder recesses so they rest on the polishing surface, and the proper weight is placed on each specimen. Ethylene glycol is used as a liquid interface between the specimens and the weights and along the holder recess walls.

When the vibratory unit is activated, the vertical and rotational movement of the unit causes the turret to rotate. As the snubbing unit is tightened, the turret rotation is reduced. The polishing surface therefore rubs against the specimen faces and causes the holders and individual specimens to rotate within their recesses. A rubbing action and three rotational movements are thus imparted to each specimen. Soft specimens attain a very acceptable surface finish when this fixture is used, and the controlled rotation of the specimens spreads wear over a large area of the polishing medium.

Notes:

1. The springs within the vibratory unit may be changed to reduce the vertical component of motion and thus eliminate the tendency for specimens to bounce on the polishing surface.
2. Variations of this fixture, without the center mounting feature, may be used for the preliminary grinding of specimens in addition to the final polishing operation described.
3. Inquiries concerning this innovation may be directed to:

Office of Industrial Cooperation
Argonne National Laboratory
9700 S. Cass Avenue
Argonne, Illinois 60439
Reference: B66-10562

Patent status:

Inquiries about obtaining rights for commercial use of this innovation may be made to:

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