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NASA TECH BRIEF

Automatic Sample Rotator for Metallographic Polishing

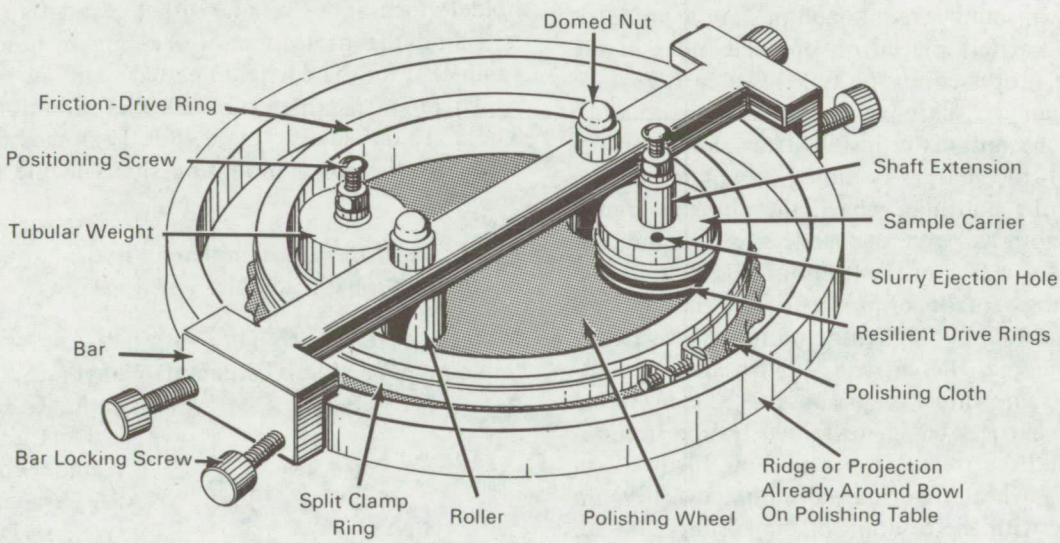

Figure 1

The problem:

Metallographic samples must be polished to provide a suitable surface finish for microscopic examination or photography of their surface details. Surface finishing as conventionally performed begins with mounting a sample in one end face of a cylindrical holder made of a suitable plastic, and the holder and sample are manually held in contact with the abrasive-covered surface of the rotating wheel of a polishing table until the sample acquires the desired metallographic surface. To obtain the required flatness, the sample must be counterrotated with respect to the rotation of the polishing wheel during polishing. As conventionally practiced, counterrotation of the samples is both a tedious and slow process. Although commercially available attachments eliminate such manual processing, these are both complicated and expensive. One such attachment is designed to fit only the manufacturer's special polishing tables and utilizes a pinion arbor and a large gear to rotate a multiple-sample carrier.

The solution:

A relatively simple, inexpensive device that can be attached to most metallographic-sample polishing tables has been designed. The device incorporates a ring which is mounted on the polishing wheel to frictionally drive one or two freely rotatable sample carriers. A bar bridged above the polishing wheel supports two rollers which in conjunction with the ring confines the rotating sample carriers to the desired surface region of the polishing wheel and effects automatic polishing of the samples, without attention by the operator, except for the addition of more polishing slurry from time to time. This depends on

(continued overleaf)

the speed of the polishing wheel, which should not be more than about 500 rpm.

How it's done:

Figure 1 shows the automatic sample rotator installed on a conventional polishing table. This table includes a flat disk or polishing wheel which is mounted for rotation in a horizontal plane on the spindle of a variable-speed motor. The exposed face of the wheel is covered with a polishing cloth adapted to carry a finely powdered abrasive with a water or oil base. The cloth is normally secured to the face of the wheel by means of a split ring which clamps the edge of the cloth to the periphery of the wheel. A conventional sample holder containing the sample to be polished is mounted in a specially designed carrier which is placed on the polishing cloth. As shown in the figure, two samples (contained in sample holders), mounted in carriers placed on opposite sides of the bar, may be processed at one time. The carriers have a reduced-diameter shaft extension on which a tubular weight may be optionally installed (as shown on the left side of the bar). Assuming counterclockwise rotation of the polishing wheel, the abrasive-loaded face of the cloth will urge the carriers against the rollers and the inner face of the friction-drive ring. When the drive rings (made of resilient material) on the carriers come into contact with the inner face of the friction-drive ring, the carriers will be caused to rotate in the same direction because of the frictional contact, the carriers being restrained by the friction-drive ring and the rollers from travelling further with the polishing wheel. The journal-mounted rollers do not interfere with the rotation of the carriers and act to hold the drive rings on the carriers in driving contact with the inner face of the friction-drive ring. This rotation of the carriers ensures that the sample faces will properly shift across the desired abrasive path during the polishing operation. A small hole in the carrier is provided to let out slurry that gets into the carrier. To release the sample, the lock nut is loosened and the positioning screw is tightened.

Component details of the automatic sample rotator are shown in figure 2. The sample holder (not shown) is mounted within a recess in the carrier containing a machined O-ring groove in which the O-ring is retained to provide a friction fit for the sample holder. The carrier is also provided with two external peripheral grooves for the resilient drive rings and with a threaded axial bore (not shown) in which the sample holder positioning screw (with locknut) is fitted for adjusting the projection of the sample holder (plus sample) from the carrier. The bar contains two bores which retain bearings for the roller mounting shafts. These are threaded to mate with the domed nuts used to secure the roller mounting shafts in the bearings.

Note:

This Tech Brief is complete in itself. No additional documentation is available.

Patent status:

No patent action is contemplated by NASA.

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