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HOLDING TOOL

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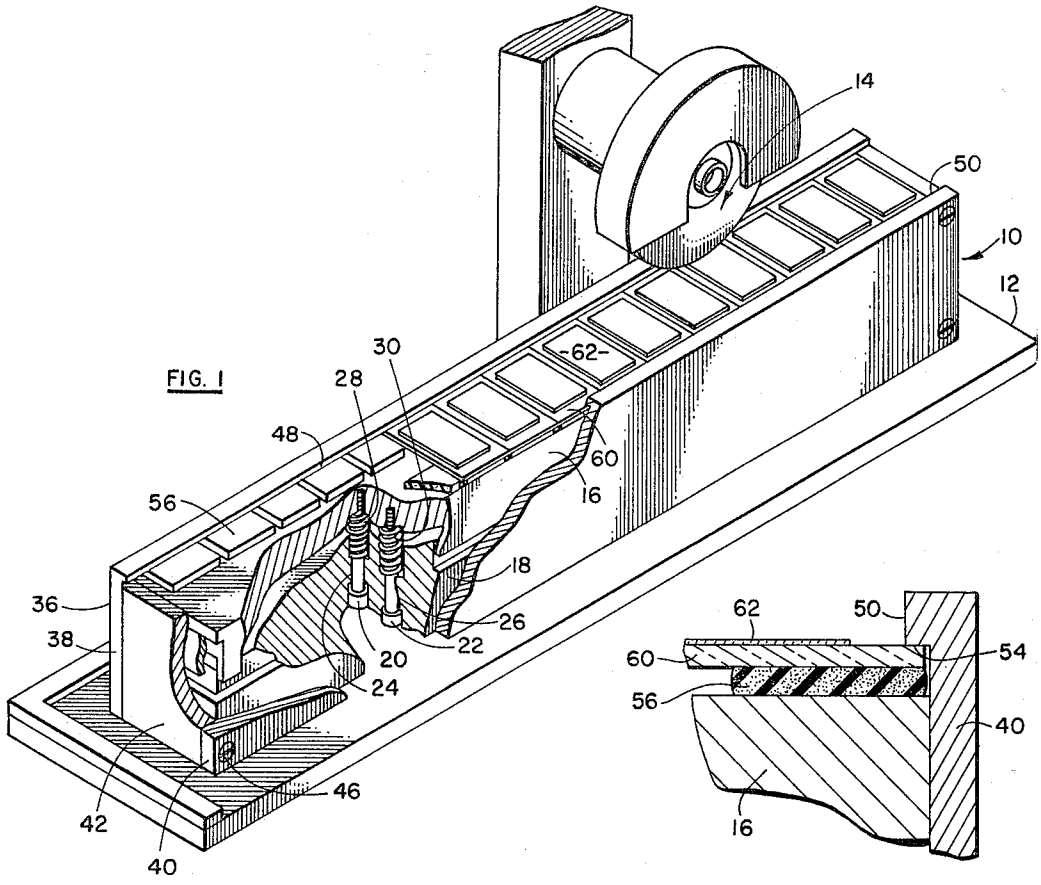


FIG. 1

FIG. 2

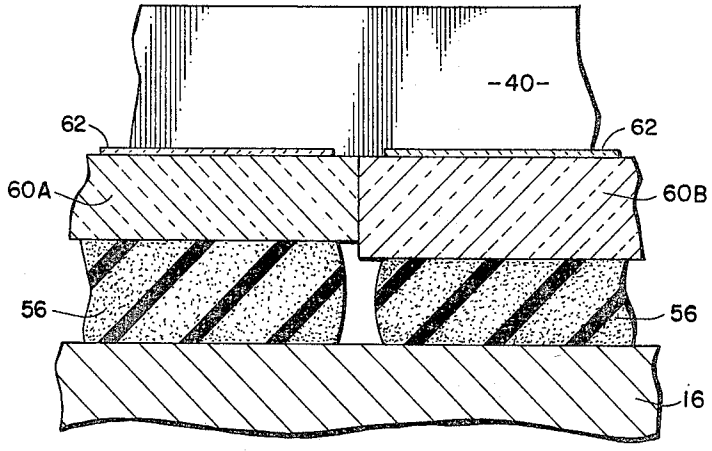


FIG. 3

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HOLDING TOOL

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The present invention relates to a holding tool and more particularly to a thin sectioning tool.

The technical and scientific proficiency of a materials laboratory is a measure of its capability for microscopic examination. Micorscopic examination to be both rapid and precise requires properly dimensioned specimens. For this reason, the rate of microscopic examination depends upon the ability of the laboratory to produce thin specimen sections.

Thin specimen sections are formed by securing a specimen chip to a commercially available glass slide and grinding the specimen in successive stages to the desired thickness. Small holders are used for the glass slides during the coarse and fine grinding stages. These holders are designed to retain several slides for the coarse grinding stages. However, the final grinding stage has been limited in the known art to a single slide because commercial glass slides vary considerably in thickness. While the fine grinding of a single specimen produces the desired thin section for microscopic examination, it substantially reduces the total production of thin specimen sections in the laboratory, and this directly affects the laboratory proficiency.

Accordingly, it is an object of the invention to provide a new and improved holding tool for thin sectioning.

Another object of the invention is to provide a thin sectioning tool for grinding slide mounted specimens to fine tolerances.

A further object is to provide a tool which compensates for the varying thicknesses of glass slides.

Further objects, features and the attending advantages of the invention will be apparent with regard to the following description read in connection with the accompanying drawings in which:

FIGURE 1 is a perspective view, partly broken away, of the thin sectioning tool of the invention in an operating position;

FIGURE 2 is a transverse cross section, partially shown, of the tool shown by FIGURE 1; and

FIGURE 3 is an enlarged longitudinal cross section, partially shown, of the tool shown by FIGURE 1.

Briefly, in accordance with the invention, a new and improved holding tool for thin sectioning is provided which assists in grinding one or more slide mounted specimens to fine tolerances by compensating for the varying thicknesses of the slides. The tool comprises spring-loaded first and second members, and an associated clamp means adapted to bear upon the specimen slides and retain the slides for thin sectioning.

Referring now to FIGURE 1, one embodiment of the thin sectioning tool **10** of our invention is shown positioned on a level magnetic chuck **12**. Magnetic chuck **12** is similar to those used with well-known precision surface grinders. The chuck **12** can exhibit longitudinal travel, transverse travel, and vertical travel; all with respect to a conventional grinding wheel or the like, such as diamond impregnated wheel **14**.

The thin sectioning tool **10** has opposed rectangular bars **16** and **18** which are suitably formed from a non-magnetic material such as aluminum and the like. The bars **16** and **18** are preferably connected by one or more fastening members, such as stripper bolts **20** and **22**. The

bolts **20** and **22** extend through respective apertures **24** and **26** in bar **18**, and threadably engage bar **16**.

Bars **16** and **18** are urged into the spaced-apart relationship shown by FIGURE 1 by suitable spring means. In the tool **10** as shown, compression springs **28** and **30** are positioned on the respective bolts **20** and **22** between bars **16** and **18**. The springs **28** and **30** resist clamping forces applied to the bars **16** and **18**, and tend to urge the bars to a maximum, spaced-apart relationship; the latter being limited by the bolts **20** and **22**.

A shell member **36** associated with the bars **16** and **18** can be assembled from side rails **38** and **40** which are secured to similar end plates **42** by removable fastening means, such as similar screws **46**. The side rails **38** and **40** are preferably formed from a magnetic material such as steel and the like. It is contemplated that the assembled shell member **36** can be formed from magnetic material. Shell member **36** can be suitably formed as a singular member; however, it is desirable to assemble the shell member as shown by FIGURE 1 since this construction facilitates positioning the member around the connected bars **16** and **18**.

The side rails **38** and **40** have inwardly extending flange portons **48** and **50**, respectively. Flange portions **48** and **50** can be integrally formed with the respective side rails as shown or separate members connected to the side rails. The flange **50** of side rail **40** is more clearly shown by FIGURE 2. Flanges **48** and **50** are carefully machined so that the distances from the base of shell member **36**, i.e. the surface nearest the magnetic chuck **12**, to the clamping surface **54** of each flange are dimensionally matched.

A resilient material such as rubber and the like is positioned on, and preferably secured to, the exposed surface of bar **16**. This resilient material, as shown by FIGURE 1, can be longitudinally and transversely spaced-apart resilient pads **56**. A singular pad of resilient material or several strips of resilient material can also be used, although the multiple pads **56** are preferred.

Operatively, the shell member **36** is removed from its normal position around the spring-loaded and spaced-apart bars **16** and **18**. Commercial glass slides **60** are positioned on the resilient pads **56** as shown by FIGURE 1. Each glass slide **60** has a specimen **62** suitably secured thereto in a well-known manner. Shell member **36** is then positioned around the bars **16** and **18** so that the clamping surface **54** of each flange **48** and **50** rests upon the associated ends of the glass slides **60** (see FIGURE 2).

The weight of the shell member **36** bears upon the glass slides **60** and partially depresses the resilient material of the pads **56**. However, the spring means associated with the bars **16** and **18**, e.g. compression springs **28** and **30**, resist this compressive load and maintain the base of the shell member **36** in an adjacent to but spaced apart relationship with respect to the magnetic chuck **12**.

When the magnetic chuck **12** is energized in a conventional manner, the resistance of the spring means is overcome and the base of the shell member bears upon the surface of the chuck. Since the flanges **48** and **50** are dimensionally matched, each glass slide **60** is also forced toward the magnetic chuck **12**. The slides **60** compress the resilient material of the pads **56** so that the specimen surfaces of each glass slide **60** are in a common plane.

The varying thicknesses of commercial glass slides are compensated by the thin sectioning tool **10** as more clearly shown by FIGURE 3. For example, the respective ends of a relatively thin glass slide **60A** and a relatively thick glass slide **60B** are pressed a proportionate distance into the associated resilient pads **56** by the side rail flange **40** when the magnetic chuck is energized. This orients the

glass slides 60A and 60B so that the specimens 62 have a common base plane, i.e. the plane defined by the specimen surfaces of each glass slide.

Grinding multiple specimens to a uniform thickness can thus be easily accomplished with an increased degree of accuracy by use of the thin sectioning tool.

As will be evidenced from the foregoing description, certain aspects of the invention are not limited to the particular details of construction illustrated, and it is contemplated that other modifications and applications will occur to those skilled in the art. It is, therefore, intended that the appended claims shall cover such modifications and applications that do not depart from the true spirit and scope of the invention.

Having described the invention, what is claimed is:

1. A holding tool for thin sectioning comprising:

(a) first and second movable members having opposed surfaces in a spaced-apart relationship,

(b) connector means joining said first and second members and limiting the spaced-apart relationship of said first and second members,

(c) spring means associated with said first and second members,

(d) said spring means moving at least one of said first and second members with respect to the other,

(e) resilient means carried by an exposed surface of said first member to receive at least one specimen slide,

(f) a movable shell member generally surrounding said first and second members,

(g) said shell member suitably formed from a magnetic material, and

(h) clamp means associated with said shell member to bear upon the specimen slide so that a magnetic means cooperating with the holding tool attracts said shell member and said clamp means to substantially overcome said spring means and depress the slide and said resilient means.

2. A thin sectioning tool for holding specimen slides comprising:

(a) first and second movable members having opposed surfaces in a spaced-apart relationship,

(b) at least one of said movable members formed from a nonmagnetic material,

(c) connector means joining said first and second members and limiting the spaced-apart relationship of said first and second members,

(d) compression spring means associated with said connector means and urging said first and second members into the spaced-apart relationship,

(e) resilient means carried by an exposed surface of said first member to receive at least one specimen slide,

(f) a shell member generally surrounding said spaced-apart first and second members,

(g) said shell member including opposed side rail members suitably formed from a magnetic material so that a magnetic means cooperating with the thin sectioning tool attracts said side rail members, and

(h) inwardly extending flange portions associated with said side rail members and dimensionally matched to bear upon the specimen slides and substantially overcome said spring means so that the slides are depressed into said resilient means and further depressed and retained by the attraction of the magnetic means on said shell member with the exposed slide surfaces in a common plane defined by said matched flange portions.

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