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AN ADJUSTABLE SLIT ASSEMBLY

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AN ADJUSTABLE SLIT ASSEMBLY

By

J. J. Stoffels

Radiological Sciences Department
Environmental and Life Sciences Division

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AN ADJUSTABLE SLIT ASSEMBLY

James J. Stoffels

ABSTRACT

A slit assembly providing independently adjustable slit-width and position is described. Adjustment is made by bellows seals and commercial micrometer heads. The entire assembly is mounted on a 2 3/4 in. OD high-vacuum flange, with stainless steel being the only material exposed to vacuum. The design is applicable to any type of spectrometer requiring beam definition. Complete blueprints are included.

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AN ADJUSTABLE SLIT ASSEMBLY

James J. Stoffels

INTRODUCTION

A slit assembly has been designed which provides independent adjustment of the slit-width and position. Although intended for use on a mass spectrometer, it is generally applicable to other instruments to define beams of ions, elementary particles, photons, etc.

DISCUSSION

Slit assemblies that had been used at the foci of a three-stage mass spectrometer¹ consisted of a movable blade containing four fixed slits of different widths. The blade position was adjustable by an external micrometer head and a bellows seal. The design was such that the interior of the bellows, which is difficult to clean, was exposed to vacuum. Stainless-steel sliding surfaces were also in vacuum prohibiting the use of lubricants. As a result, galling and eventual freezing of the movable parts were experienced.

In reviewing the evident need for an improved adjustable slit design, the following criteria were laid down.

- The slit width should be continuously adjustable from zero to 1/8 in., with a length of 3/4 in.
- The slit position should be continuously adjustable over a range of 1/4 in.
- The design should be one-sided, i.e., the slit blades should not be independently mounted on opposite sides of a housing.
- To minimize cost, commercial micrometer heads should be used for adjustment.
- All parts exposed to vacuum should be of stainless steel or other ultrahigh-vacuum materials.

- For ease of cleaning, the exterior of the bellows should be on the vacuum side.
- Sliding surfaces should not be in vacuum so that lubricants can be used.
- To be compatible with existing equipment, the entire assembly should be mounted on a 2 3/4 in. OD high-vacuum flange.

RESULTS AND CONCLUSION

The slit assembly was designed (Figure 1) and all design criteria were met. The micrometer head in the foreground adjusts the slit width, and the micrometer to the rear adjusts the slit position without changing the width. Stainless steel is the only material exposed to vacuum. Oil-impregnated bronze bushings (not visible in Figure 1) on the atmosphere side provide good sliding surfaces while maintaining a close fit. The design is directly adaptable to other slit sizes and adjustment ranges. All other details are evident in the blueprints (Figures 2 and 3).

ACKNOWLEDGEMENT

I wish to thank G. D. McLaughlin, Battelle-Northwest Machinist, for helpful design suggestions.

REFERENCES

1. C. R. Lagergren, J. J. Stoffels, and G. L. Waldkoetter. "A Computer-Controlled Three-Stage Mass Spectrometer," ASTM E-14 Conference, Denver, Colorado, 1967.

FIGURE 1. *Slit Assembly*

FIGURE 3. *Adjustable Slit Details*

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