July 18, 1961 H. G. SIMENS 2,992,726

SPECIMEN HOLDER FOR RADIOACTIVE SAMPLES

Filed July 10, 1959

FIG_1

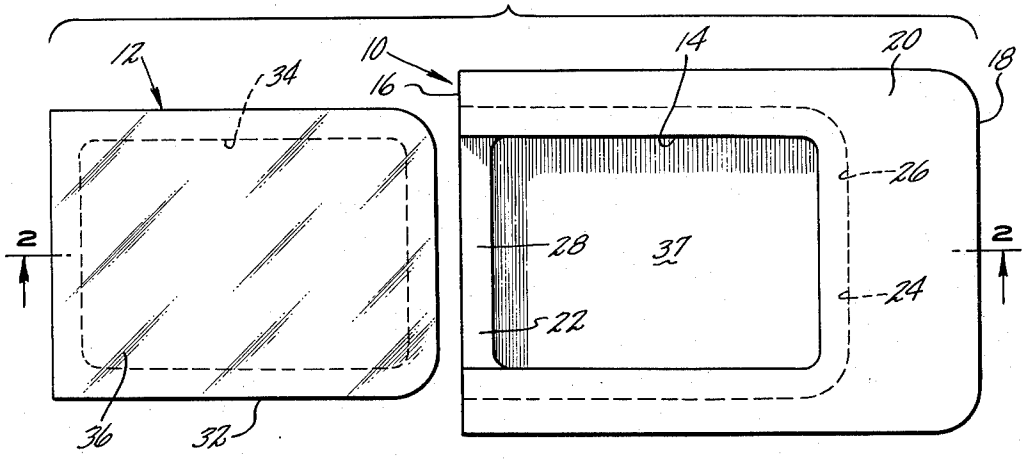


FIG_2

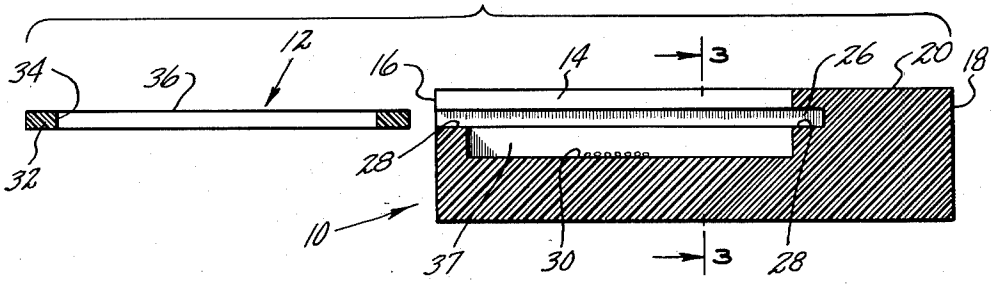


FIG_3

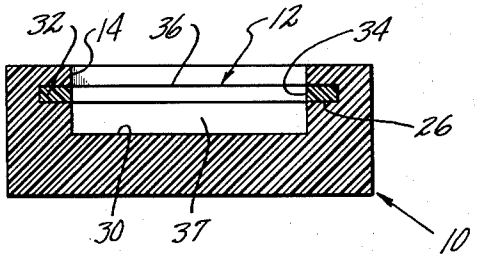
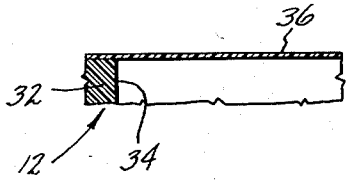


FIG_4



INVENTOR
HUGO G. SIMENS
BY M. B. Tasker
ATTORNEY

United States Patent Office 2,992,726 Patented July 18, 1961

2,992,726

SPECIMEN HOLDER FOR RADIOACTIVE SAMPLES

Hugo G. Simens, San Leandro, Calif., assignor to United Aircraft Corporation, East Hartford, Conn., a corporation of Delaware

Filed July 10, 1959, Ser. No. 826,210
5 Claims. (Cl. 206—1)

This invention relates to specimen holders for radioactive samples.

The use of highly radioactive specimens in the X-ray spectograph presents serious handling problems. One of the most acute hazards of radioactivity is air-borne contamination from powders and dusts. Heretofore the specimen has been enclosed in a plastic boat by gluing a piece of one-quarter mil Mylar film to the top exposed surfaces of the plastic which extend around the periphery of the boat. This procedure of containment has two disadvantages. First, attachment of Mylar to an open-top sample holder requires close physical handling. If the sample emits penetrating radiation, the person preparing the specimen is exposed to the radiation from the specimen and may receive an above-tolerance radiation exposure. Second, the specimens rest on the bottom of the specimen holder and particularly, if they are small volume samples, such as powder, they are one-half inch or more from the primary X-ray source. For long wave length secondary X-ray emissions, this extra one-half inch added to the minimum air path in the goniometer may seriously reduce the detected intensity.

It is an object of this invention to provide a new and improved sample holder which overcomes these difficulties.

More specifically, it is an object of this invention to provide a sample holder which may be loaded and unloaded remotely.

Another object of the invention is to provide a sample holder of minimum depth, insuring the best possible intensity from long wave length secondary X-ray emissions.

A further object of this invention is to provide a new and improved hermetically sealed sample holder capable of containing radioactive powders and dusts.

A yet further object of this invention is to provide a new and improved sample holder which is capable of safely containing liquid samples.

A still further object is generally to improve sample holders for radioactive specimens.

These and other objects and advantages of the sample holder of this invention will be pointed out or will become obvious from the following detailed description of a preferred embodiment of the invention shown in the accompanying drawing. In this drawing:

FIG. 1 is a plan view of the specimen holder of this invention with its cover removed;

FIG. 2 is a view taken on line 2—2 of FIG. 1;

FIG. 3 is a view taken on line 3—3 of FIG. 2 with the cover in place; and

FIG. 4 is a sectional detail of the cover.

The specimen holder of this invention consists of two parts—a base generally indicated at 10 and a cover generally indicated at 12. The base consists of a substantially rectangular block of Lucite or other suitable material which is not readily broken down by prolonged bombardment from radioactive material. Base 10 has a depth of approximately one-half inch or less, the drawing being approximately at a scale of 1″=½″. The base has a shallow well 14 in its top surface which is located closer to the left end 16 than it is to the right-hand end 18. This leaves a solid portion 20 at the right-hand end of the base which can be used for clamping the base to a suitable surface during loading which it may be necessary to accomplish remotely. The base 10 is also provided with a transverse blind slot 22 which extends from the left-hand end 16 to a point 24 beyond the well, the dimensions of the slot being such that a groove 26 is provided all the way around the periphery of the well 14.

It will be noted that the groove 26 provides a bottom peripheral ledge 28 which forms the bottom of the slot and extends on all sides about the well 14. It will also be noted that the slot 22 is located a substantial distance below the top of the base so that the ledge 28 is relatively close to the bottom 30 of the well which forms the specimen supporting area. The distance may vary. If the samples to be inspected are a powder or a dust, the spacing between the ledge 28 and the bottom 30 can, of course, be less than if a larger diameter particle is to be examined. The spacing shown of approximately one-eighth inch is suitable for most specimens encountered.

The cover consists of a frame 32 enclosing an opening 34 which is substantially commensurate with the well 14. The frame 32, which also is of Lucite, is substantially of the dimensions of the slot 22, so that when the cover is inserted fully into the slot the opening 34 registers with the well 14 and the frame 32 registers with the narrow ledge 28. A thin film of Mylar 36 is adhesively secured to the top flat face of the frame 32 by means of a suitable plastic cement. This Mylar film is preferably not over .00025 inch in thickness. This film must be kept extremely thin where the specimens are alpha, beta or beta-gamma emitters. The thickness of the cover 12 and the depth of groove 26 are such that a close-sliding fit of the cover in the groove is obtained so that the specimen chamber 37 beneath the cover is hermetically sealed.

It is also possible by wetting the bottom flat surface of frame 32 with plastic cement to obtain a seal adequate to contain radioactive liquids in the specimen compartment 37.

In order to facilitate the removal of the cover from the base, the material of the base above the ledge 28 at the left-hand end 16 of the base, may be cut away leaving the end of the cover frame exposed between the grooves 26 at the sides of the base.

From the above description of a preferred embodiment of the invention, it will be evident that by clamping the base 10 firmly to a supporting surface the radioactive samples may be inserted into the chamber 37 and the cover 12 may be slid into position to seal the chamber from a remote point using techniques which are well-known in this art.

It will also be noted that the depth of the holder is at a minimum for insuring the best possible intensity from long wave length secondary X-ray emissions. It will further be evident that by wetting the bottom surfaces of the cover frame with plastic cement it is possible to seal the compartment so that radioactive liquids can be contained in the specimen holder.

While only one embodiment of the invention has been disclosed herein, it will be evident that various changes can be made in the construction and arrangements of the parts within the scope of the invention.

I claim:

1. A radioactive specimen holder comprising a low and flat base member having a flat bottom and consisting of a block of material which is not readily broken down by prolonged bombardment from radioactive material, said base member having a shallow well in its top surface, the bottom of said well forming a flat specimen-supporting area parallel with the bottom of said base member, said base member having a blind slot slightly wider than said well which extends transversely from one end face of said base member toward the other end to a point slightly beyond said well, the bottom surface of said slot forming a ledge extending completely around the periphery of said well, and a cover member slidably receivable in said slot comprising a frame having an opening substan-

tially commensurate with the cross-sectional area of said well and a tight closure for said opening having a minimum of radiation absorption comprising a flat film of transparent material secured to said frame over said frame opening and slidably receivable in said slot with said frame.

2. A radioactive specimen holder comprising a low and flat base member consisting of a block of material which is not readily broken down by prolonged bombardment from radioactive material, said base member having a shallow well in its top surface, the bottom of said well forming a specimen-supporting area, said base member having a blind slot slightly wider than said well which extends transversely from one end face of said base member toward the other end to a point slightly beyond said well, the bottom surface of said slot forming a ledge extending completely around the periphery of said well a short distance above the bottom of said well, and a cover for the portion of said well below said ledge comprising a cover frame slidably received in said slot and resting on said ledge having an opening substantially commensurate with the cross-sectional area of said well and having a tight closure for said opening comprising a thin transparent flat film cemented to one face thereof, said film being of such thinness that it will permit transmission through it of radiation from alpha, beta or beta-gamma emitters resting on said specimen supporting area.

3. A radioactive specimen holder comprising a low and flat base member consising of a massive block of material which is not readily broken down by prolonged bombardment from radioactive material, said base member having a flat bottom surface on which it is adapted to rest and a flat top surface generally parallel with said bottom surface, said base member having a shallow well in its top surface, the bottom of said well forming a flat specimen-supporting area parallel with the bottom of said base member, said base member having a blind slot slightly wider than said well which extends transversely from one end wall of said base member toward the other end to a location slightly beyond said well, the bottom surface of said slot forming a ledge extending completely about the periphery of said well in a plane parallel with the bottom thereof and located a short distance above the bottom surface of said well, and a cover for the portion of said well below said ledge comprising a frame member slidably receivable in said slot, said frame enclosing an opening substantially commensurate with the cross-sectional area of said well opening, a flat film of transparent material secured to the upper surface of said cover frame and stretched taut over said frame opening having a minimum of radiation absorption, and a coating of adhesive material on the bottom surface of said frame forming a hermetical seal between said cover frame and said ledge.

4. A radioactive specimen holder comprising a low rectangular base member consisting of a block of material which is not readily broken down by prolonged bombardment from radioactive material, said base member having a shallow well in its top surface adjacent one end, the portion of said base between said well and the other end of said base serving as a holding area to be clamped to a supporting surface, the bottom of said well forming a specimen-supporting area, located in the upper half of the vertical dimension of said base, said base member having a blind slot slightly wider than said well which extends transversely from said one end of said base member toward said other end to a location slightly beyond said well, the bottom surface of said slot forming a ledge extending uninterruptedly about said well on four sides, means forming a closure for the portion of said well below said ledge comprising a cover slidable into said slot, said cover comprising a frame defining an opening substantially commensurate with the cross section of said well and having a film of transparent material secured to its upper surface having a minimum of radiation absorption, and a coating of adhesive on the lower surface of said frame forming a hermetical seal with said ledge.

5. A radioactive specimen holder comprising a low rectangular base member consisting of a block of material which is not readily broken down by prolonged bombardment from radioactive material, said base member having a shallow well in its top surface adjacent one end, the portion of said base between said well and the other end of said base serving as a holding area to be clamped to a supporting surface, the bottom of said well forming a specimen-supporting area, said base member having a blind slot slightly wider than said well which extends transversely from said one end of said base member toward said other end to a location slightly beyond said well, the bottom surface of said slot forming a ledge extending uninterruptedly about said well on four sides near the bottom of said well, means forming a closure for the portion of said well below said ledge comprising a cover slidable into said slot, said cover comprising a frame defining an opening substantially commensurate with the cross section of said well and having a flat film of transparent material secured to its upper surface having a minimum of radiation absorption, a coating of adhesive on the lower surface of said frame forming a hermetical seal with said ledge, said base member having a portion above said ledge removed at said one end exposing a portion of the corresponding end of said frame to facilitate insertion and removal thereof.

References Cited in the file of this patent

UNITED STATES PATENTS

134,912	McCreary	Jan. 14, 1873
1,866,224	Punte	July 5, 1932
1,974,996	Punte	Sept. 25, 1934
2,313,428	Glenn	Mar. 9, 1943
2,395,701	Weiss	Feb. 26, 1946
2,478,470	Eastman et al.	Aug. 9, 1949
2,613,859	Boudreau	Oct. 14, 1952
2,748,975	Jacobson	June 5, 1956
2,860,254	Hendee	Nov. 11, 1958

FOREIGN PATENTS

1,037,860	France	May 6, 1953