Feb. 4, 1969 J. GUERNET 3,426,193

APPARATUS FOR INSERTING A CONSTANTLY ORIENTED SPECIMEN CHAMBER IN A MICROANALYSER

Filed Jan. 19, 1965 Sheet 1 of 2

Fig. 1

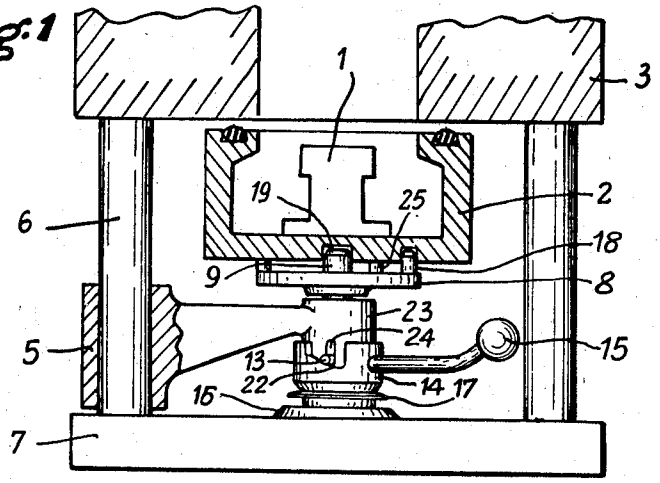
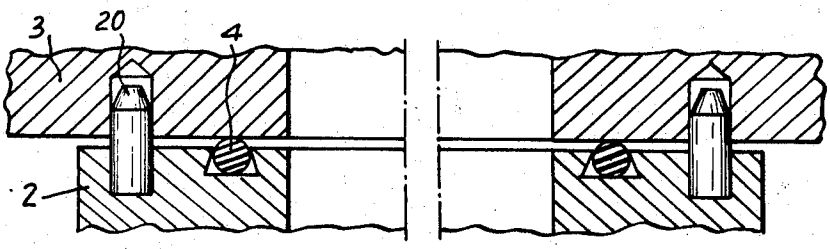


Fig. 2



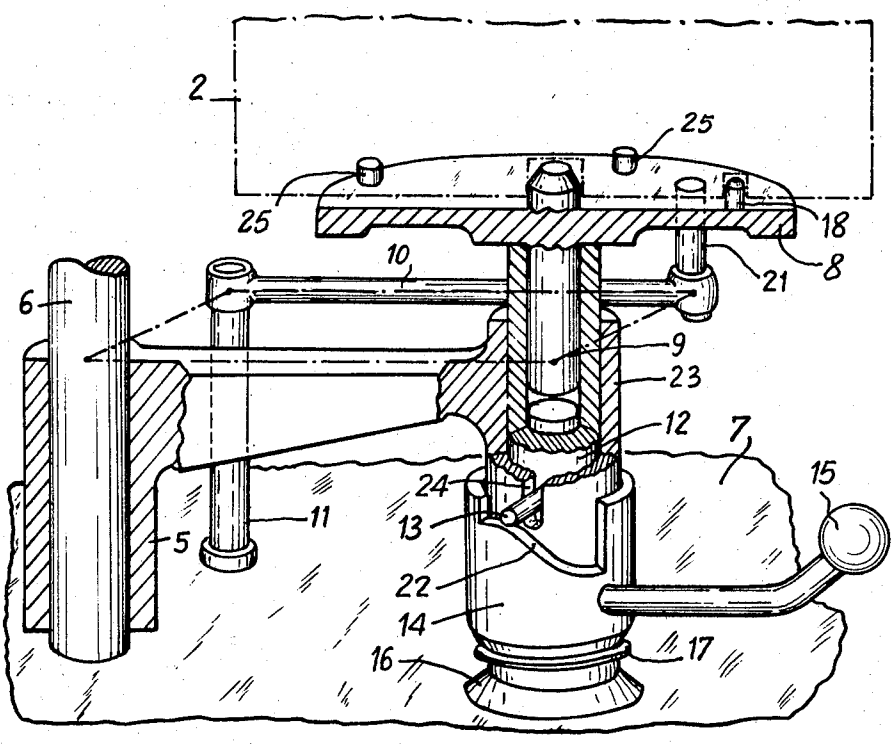
Inventor
Jacques Guernet
By Cushman, Darby & Cushman
attorneys

Feb. 4, 1969 J. GUERNET 3,426,193

APPARATUS FOR INSERTING A CONSTANTLY ORIENTED SPECIMEN CHAMBER IN A MICROANALYSER

Filed Jan. 19, 1965 Sheet 2 of 2

Fig. 3



Inventor
Jacques Guernet
By Cushman, Darby & Cushman
Attorneys

United States Patent Office 3,426,193
Patented Feb. 4, 1969

3,426,193

APPARATUS FOR INSERTING A CONSTANTLY ORIENTED SPECIMEN CHAMBER IN A MICRO-ANALYSER

Jacques Guernet, Courbevoie, France, assignor to Compagnie d'Applications Mecaniques à l'Electronique, au Cinema et à l'Atomistique, a corporation of France

Filed Jan. 19, 1965, Ser. No. 426,588
Claims priority, application France, Jan. 21, 1964, 960,995
U.S. Cl. 250—49.5 5 Claims
Int. Cl. H01j 37/26

ABSTRACT OF THE DISCLOSURE

An arrangement for inserting a specimen chamber in or removing it from an electron beam microanalyser comprising a first arm supported for pivoting about and being translated along an axis parallel to the axis of the microanalyser, a support mounted in said arm slidably along a direction parallel to the axis of the microanalyser for supporting the specimen chamber and a further arm pivotally mounted about an axis parallel to the last mentioned axes and carrying a finger engaging the support for determining with the first arm two opposite sides of a parallelogram so as to keep constant the orientation of the support.

The present invention relates to microanalysers and more particularly to an arrangement for inserting in or removing from a microanalyser the specimen chamber, i.e. the enclosure in which the specimen is located.

In microanalysers, the surface of a sample is scanned by an electron beam. This operation takes place in vacuum and it is advantageous to provide a removable specimen chamber which can be, as a whole, inserted in, or removed from the microanalyser. The arrangement has to meet a number of requirements: it has to be easy to handle, it must provide easy access to the sample and to the body of the analyser, it has to be provided with a closing system which ensures a seal for the vacuum, and it must permit easy and accurate positioning of the chamber in a horizontal plane.

It is an object of the invention to provide a specimen chamber arrangement for a microanalyser which meets the above requirements.

According to the invention there is provided an arrangement for inserting a specimen chamber in, or removing it from an electron optical analyser, said arrangement comprising a support supporting said chamber, said support being mounted for pivoting about and being translated along an axis parallel to the axis of said analyser, means being provided for keeping contsant the orientation of said chamber in a plane while it is being pivoted.

For a better understanding of the invention and to show how the same may be carried into effect, reference will be made to the drawings accompanying the following description and in which:

FIG. 1 is a schematic view in partial section of one embodiment of the invention;

FIG. 2 shows, at an enlarged scale and in section in a plane different from that of FIG. 1, a detail of the embodiment shown in that figure; and

FIG. 3 is a partially exploded view of the same arrangement.

FIG. 1 shows the table or stage 1 of a microanalyser on which the specimen to be analysed is mounted. The table is placed in a metal enclosure or specimen chamber 2, which is kept under vacuum during use. Chamber

2 can be separated from the body 3 of the microanalyser.

Chamber 2 includes, as shown in FIG. 2, a ring joint 4 and two cylindro-conical guiding fingers 20, which engage corresponding cavities in body 3 as shown in FIG. 2.

Body 3 of the analyser is supported by four columns 6 which rest on a sole 7.

A console 5 is, by means of a sleeve incorporated in its end, slidably mounted on one of columns 6 and can swing about it. The free end of console 5 is built as a cylindrical sleeve 23 into which is mounted a coaxial slider 12. A pivot 9, solid with a plate 8, is pivotally mounted in slider 12.

The orientation of plate 8 in a horizontal plane is kept constant by means of a finger 21, which engages a hole, formed in plate 8, and whose opposite end pivots in one end of a rod 10, whose other end is pivotally mounted on a pivot 11 fixed to sole 7. The arm of console 5 and rod 10 form the two opposite sides of a parallelogram, the axes of column 6, of pivot 11, of finger 21 and of plate 8 defining, in the horizontal plane defined by these sides, the four corners of the parallelogram.

The top side of plate 8 carries three projections 25 for supporting enclosure 2 in a horizontal plane. In addition, it is provided with an axial centring finger with a frusto-conical end which engages a central bore 19 in the base of enclosure 2, and a further finger 18 which fixes the orientation of enclosure 2 with substantial accuracy.

Sleeve 23 is provided with two vertical, symmetrical slots through which extends a pin 13 fixed to slider 12. The ends of pin 13 cooperate with camming surfaces 22, shaped as portions of a helix, formed in a sleeve 14 surrounding the lower part of sleeve 23. Sleeve 14 carries a lever 15, which can be actuated by the operator.

Sleeve 14 rests on an elastic metal washer 17, carried by sleeve 23, and designed to limit the vertical stress that can be applied to plate 8 through the camming surfaces 22, pin 13 and slider 12, when lever 15 is being actuated.

When the analyser is in the working position, sleeve 23 rests on a truncated cone 16, which forms projection on sole 7.

In the removal position of the enclosure 2, console 5 rests on sole 7 and sleeve 23 is clear with respect to said sole.

The operation of the described arrangement, which is a particular example of realisation of the invention, is as follows, assuming that initially the analyser is open, the removable enclosure 2 being in its forward position.

In this position, the sleeve of console 5 rests on sole 7 and carries the whole of the mobile system.

Pin 13 rests on the lower end of surfaces 22. Enclosure 2 rests on the three projections 25 of plate 8 and its position in the horizontal plane is defined by pivot 9 and finger 18.

In order to bring enclosure 2 to the operating position, the operator rotates the mobile assembly about column 6. The parallelogram, defined by the arm of console 5 and by rod 10, distorts while leaving plate 8 within its plane. Sleeve 23 runs against the truncated cone 16. The operator has then to push upwardly the mobile system to bring sleeve 23 to rest on the truncated cone 16. At this instant, console 5 is slightly clear of sole 7 and the weight of the mobile assembly is carried by base 16. A vertical force can then be applied along the analyser axis, while the reaction is directly absorbed by sole 7.

The rotary displacement of the mobile assembly is so limited by the contact of console 5 with rod 10, that the axis of sleeve 23 substantially coincides with the analyser axis.

The operator then actuates lever 15 and sleeve 14 presses against washer 17. Should some foreign body

happen to be present between enclosure **2** and body **3** of the analyser, washer **17** would somewhat damp the vertical stress to which the mobile assembly would be subjected.

While sleeve **14** is rotated, the camming surfaces **22** raise pin **13** and slider **12**. Plate **8**, which was resting against sleeve **23**, is then raised by slider **12**. Enclosure **2** is raised with plate **8** and the guiding fingers **20** engage the corresponding cavities in body **3**, thus ensuring an accurate positioning of enclosure **2**. Ring seal **4** comes into contact with body **3**, the pressure exerted on seal **4** being uniformly distributed due to the vertical thrust along the axis of enclosure **2**. Ring seal **4** ensures the necessary tightness to permit evacuation of the analyser, which is to be operated under vacuum. When the pressure drops inside the analyser, the atmospreric pressure acts on enclosure **2**, thus raising it and squeezing seal **4** until close contact is obtained between the opposite metal surfaces of body **3** and enclosure **2**, so ensuring a seal for a high vacuum.

The removal of the sample holder enclosure is effected in the same manner, the steps of the operation taking place in the reverse order.

Admitting air in the analyser allows enclosure **2** to be lowered on plate **8** due to its own weight and the action of the ring joint **4**. Rotating lever **15** lowers slider **12** and plate **8**, while seal **4** becomes completely clear of body **3** and positioning fingers **20** disengage therefrom.

The operator can then pull the mobile assembly towards him. Sleeve **23** is moved away from plate **16**. Console **5** then rests on sole **7** and pivots about column **6**. During the rotation, plate **8** and enclosure **2** have a circular motion of translation in the horizontal plane by virtue of the parallelogram formed by the arms of console **5** and rod **10**.

The specimen chamber arrangement according to the invention possesses several advantages.

It provides a total clearance, at the sealing joint, between the lower side of the analyser and the upper side of the specimen chamber, thus ensuring easy access to the body of the analyser and to the sample under examination. The movable assembly is axially supported, the stresses being thus better distributed during the closing operation.

An approximate centring of the sample chamber is ensured due to the fact that the displacement of the movable assembly is limited by the parallelogram system. An accurate centring of the sample chamber is ensured by two locating fingers. Also, the sample chamber is constantly kept in the same horizontal plane.

Of course, the invention is not limited to the embodiment described and shown which has been given solely by way of example.

What I claim is:

1. An arrangement for inserting a specimen chamber in or removing it from an electron beam microanalyser system having an axis, said arrangement comprising: an arm having a first and a second end; first means for supporting said arm, at said first end, pivotally about and slidably along a further axis, parallel to said axis and at a distance from said axis equal to the length of said arm; a support for supporting said chamber; second means for mounting said support at said second end of said arm slidably along a direction parallel to said axes; third means for keeping constant the orientation of said support in a plane normal to said axes during the rotation of said arm; and fourth means for pivoting said arm about said further axis and for displacing said arm and said support in a direction parallel to said axes; said third means comprising a further arm having a first and a second end and the same length as said arm, fifth means for supporting said further arm, at said first end thereof, pivotally about an axis parallel to said axes and a finger carried by said second end of said further arm and engaging said support at a distance from said second end of said arm equal to the distance between said firsts ends respectively of said arm and said further arm.

2. An arrangement as claimed in claim **1**, wherein said support is a table, said second means comprise a slider slidably mounted at said second end of said arm, said slider having a first and a second end, said first end of said slider engaging said table, and said fourth means comprise camming means associated with said second end of said slider for the displacement of said slider and said arm parallel to said axes and a lever associated with said camming means for pivoting said arm about said further axis and for controlling said camming means.

3. An arrangement as claimed in claim **2**, wherein said first means comprise: a base; and a first column mounted on said base, said column extending along said further axis and said first end of said arm being pivotally and slidably mounted on said first column.

4. An arrangement as claimed in claim **3**, wherein said fifth means comprise a further column parallel to said first column and mounted on said base.

5. An arrangement for inserting a specimem chamber in or removing it from an electron beam micronanalyser system, said system having an opening, said opening having an axis, said arrangement comprising: a base; a first column mounted on said base, said column being parallel to said axis and at a predetermined distance from said axis; an arm having two ends and a length equal to said predetermined distance, one of said ends being pivotally and slidably mounted on said first column; a table supporting said chamber; a slider mounted in said second end of said arm slidably along a direction parallel to said axis, said slider having a first and a second end, said first end engaging said table; camming means associated with said second end of said slider for the displacement thereof parallel to said axis; a lever associated with said camming means for pivoting said arm about said first column and for controlling said camming means; a further column parallel to said first column and mounted on said base; a further arm having a first and a second end and the same length as said arm, said first end of said further arm being pivotally supported about said further column; a finger carried by said second end of said further arm and engaging said table at a distance from the axis of said slider equal to the distance between said column and said further column for preventing any change in the orientation of said table in a plane normal to said axis during the rotation of said arm; said chamber having an open top and means for providing a seal between said open top and said opening upon translation of said chamber along said direction; and a projection on said base, coaxial with said opening, said projection having sloping edges.

References Cited

UNITED STATES PATENTS

3,107,297	10/1963	Wittry	250—49.5
3,191,028	6/1965	Crewe	250—49.5

WILLIAM F. LINDQUIST *Primary Examiner.*