June 3, 1947. P. C. SMITH ET AL 2,421,722

SPECIMEN HOLDER ASSEMBLY

Filed Dec. 30, 1944

Fig. 1.

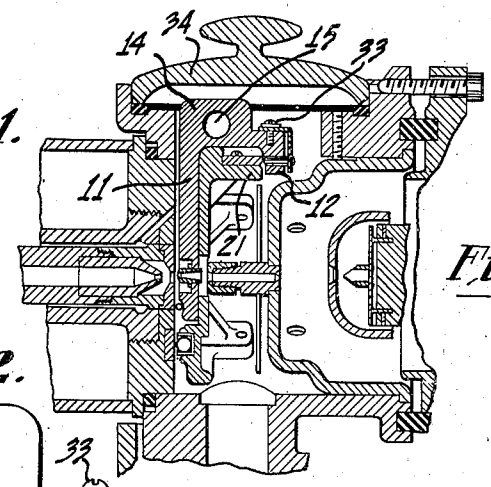


Fig. 2.

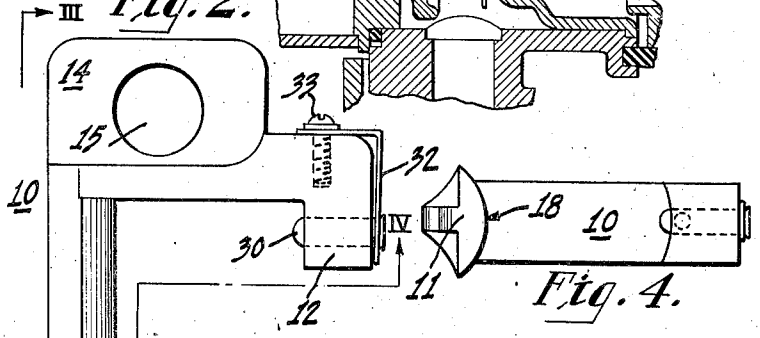


Fig. 3.

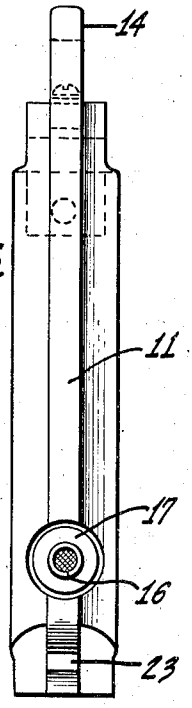


Fig. 4.

Fig. 5.

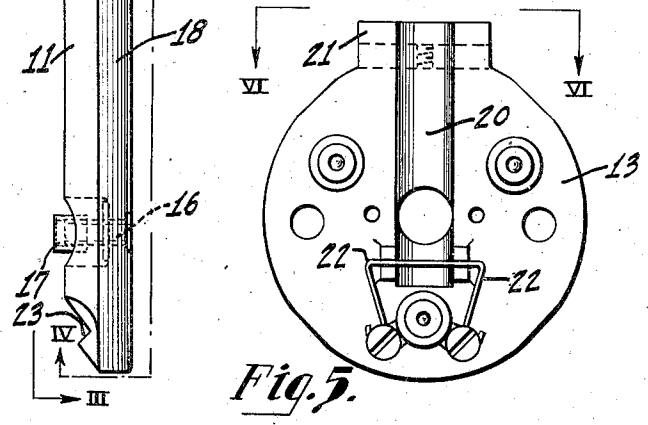


Fig. 6.

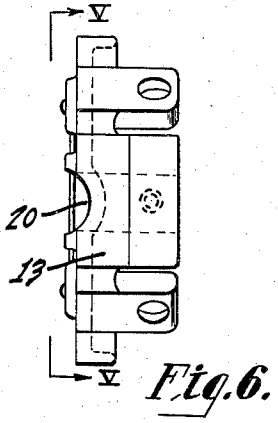
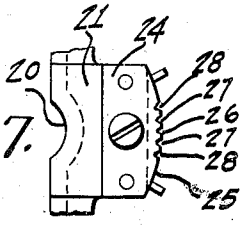


Fig. 7.



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SPECIMEN HOLDER ASSEMBLY

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7 Claims. (Cl. 250—49.5)

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The present invention relates to electron microscopes and more particularly to an improvement in specimen holders.

Some of the objects of the present invention are: to provide an improved specimen holder; to provide a novel stage and specimen holder assembly; to provide a mounting for a specimen holder wherein provision is made for tilting the specimen holder to obtain stereoscopic effects; to provide a readily demountable specimen holder; to provide a specimen chamber, specimen holder, and stage assembly wherein the holder is readily accessible for changing specimens or adjusting to a selected position with reference to the axis of the column; to provide means whereby a specimen holder can be swung about its longitudinal axis through a predetermined angle to permit portions of the front and one side of the specimen to be viewed or photographed; and to provide other improvements as will hereinafter appear.

In the accompanying drawings, Fig. 1 represents a transverse section of the object or specimen chamber of an electron microscope showing a specimen holder and stage assembly embodying one form of the present invention; Fig. 2 represents a side elevation of one form of specimen holder of the present invention; Fig. 3 represents a front elevation of the same; Fig. 4 represents a bottom plan on line 4—4 of Fig. 2; Fig. 5 represents a rear elevation of the microscope stage with the specimen holder removed; Fig. 6 represents a plan of the stage with the specimen holder removed; and Fig. 7 represents a detail of the stage indent portion of the stage from which the specimen holder is suspended and angularly positioned.

Referring to the drawings, one form of the specimen holder of the invention comprises a body 10 having a relatively long elongated leg 11 at one end and a relatively short leg 12 at the other end, the two legs paralleling each other and forming with the body a seat to receive a portion of the stage 13 as will be later explained. The body 10 also includes a relatively thin handle 14 having a hole 15 to receive a finger or suitable tool for lifting the holder. A through hole 16 traverses the leg 11 and serves to mount the specimen unit 17. The face 18 of the leg 11 is arcuate in cross-section in order to provide for an angular swing of the leg 11 about its longitudinal axis.

For mounting the holder upon the stage 13 in a rigid and stable manner, the rear face of the stage 13 is formed with a diametrically disposed groove 20 of arcuate cross-section complemental to the arcuate face 18 of the leg 11. A flange 21

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extends outwardly from the stage a distance substantially equal to the width of the seat, heretofore referred to as formed by the legs 11 and 12. Thus, the holder can be interfit with the stage by sliding the leg 11 inwardly along the groove 20 until the body part seats upon the edge portion of the stage and the short leg 12 abuts the outer face of the flange 21.

In order to anchor the specimen end of the holder, a spring 22 of generally U-shape is carried by the stage 13 and is arranged in the path of the end of the leg 11 in such a manner that the bringing of the holder into position causes its tapered end to expand the spring 22 and snap it into a notch 23 in the leg 11 to thereby lock the parts together with such a degree of resilience that the leg 11 can be turned to any one of several angular positions. When the holder is thus suspended from the edge of the stage and gripped by the flexible spring interlock, the specimen is then located and held in coincidence with the longitudinal or beam axis of the microscope.

As a further means of interlocking the holder to the stage, an indent plate 24 is mounted as an insert upon the flange 21 and has an outer curved face 25 concentric with respect to the stage groove 20 and provided, in the present instance, with five notches, one 26 at the center corresponding to the normal viewing position of the holder, namely when the holder locates the axis of the specimen unit coincident with the axis of the column, and two, 27 and 28, at each side of the center corresponding respectively to asymmetrical viewing position of the holder. A latching pin 30 is mounted for sliding movement transversely of the short leg 12 in such a position as to engage any one of the notches 26, 27 and 28, according to the selected position of the holder, and is of greater length than the width of the leg 12. The outer projecting end of the pin 30 is reduced in diameter to enter a hole in a strip spring 32 which is secured to the leg 12 by a screw 33. Thus, the pressure of the spring 32 on the shoulder of the pin 30 holds the latter firmly in any selected notch but can readily yield to unlatch the holder from the indent plate 24 under a manual turning of the holder. For normal or symmetrical viewing of the specimen, the pin 30 is latched in the notch 26, but for stereoscopic viewing the holder may be turned through an angle determined by two positions at either side of the notch 26, and so locked in notch 27 for a small angular turn or in notch 28 for a larger angular turn. In this manner the specimen can be viewed or photographed at a selected angle to

one side of the center position and then at the corresponding angle at the opposite side of this center position.

By the present novel construction, the holder has its adjusting handle **14** located in close proximity to the access opening **33** which communicates with the specimen chamber and is normally sealed by the closure **34** under atmospheric pressure. By breaking the vacuum in the specimen chamber the closure **34** can be removed and the specimen holder then adjusted to a selected position or removed to change specimens.

We claim as our invention:

1. In an electron microscope of the type having a column with its axis alined with the electron beam of an electron gun, the combination of a stage having an opening arranged in coincidence with said axis, said stage having an arcuate groove therein, a specimen holder slidably mounted in said groove and normally positioning a specimen opposite said stage opening, said holder having a face complementally curved both to ride linearly in said groove and to turn angularly about its longitudinal axis, and means to anchor said holder in assembled position and also in an angular position.

2. In an electron microscope of the type having a column with its axis alined with the electron beam of an electron gun, the combination of a stage having an opening arranged in coincidence with said axis, said stage having an arcuate groove therein, a specimen holder slidably mounted in said groove and normally positioning a specimen opposite said stage opening, said holder having a face complementally curved both to ride linearly in said groove and to turn angularly about its longitudinal axis, and yielding means for removably attaching one end of said holder to said stage.

3. In an electron microscope of the type having a column with its axis alined with the electron beam of an electron gun, the combination of a stage having an opening arranged in coincidence with said axis, said stage having an arcuate groove therein, a specimen holder slidably mounted in said groove and normally positioning a specimen opposite said stage opening, said holder having a face complementally curved both to ride linearly in said groove and to turn angularly about its longitudinal axis, yielding means for removably attaching one end of said holder to said stage, and means for latching the opposite end of said holder to said stage in any one of a number of holder angular positions.

4. In an electron microscope of the type having a column with its axis alined with the electron beam of an electron gun, the combination of a stage having an opening arranged in coincidence with said axis, a specimen holder comprising a body having two legs spaced apart to form a seat to receive the rim of said stage, one of said legs in assembled condition locating a specimen in alinement with said stage opening, an indent plate carried by said stage having notches juxtaposed to the other leg, and a spring pressed pin in said last mentioned leg for latching engagement with an opposite notch.

5. In an electron microscope of the type having a column with its axis alined with the electron beam of an electron gun, the combination of a stage having an opening arranged in coincidence with said axis, a specimen holder comprising a body having a long leg and a short leg spaced apart to straddle a portion of said stage to suspend said holder slidably upon said stage, said long leg in assembled condition locating a specimen in alinement with said stage opening, means permitting said holder to turn relative to said stage about said long leg as an axis, and means between said short leg and said stage for latching said holder in any one of a number of positions.

6. In an electron microscope of the type having a column with its axis alined with the electron beam of an electron gun, the combination of a stage having an opening arranged in coincidence with said axis, a specimen holder slidably mounted on said stage and normally positioning a specimen opposite said stage opening, and juxtaposed curved contacting surfaces between said holder and said stage, whereby said holder can be turned to obtain stereoscopic views of said specimen.

7. In an electron microscope of the type having a column with its axis alined with the electron beam of an electron gun, the combination of a stage having an opening arranged in coincidence with said axis, a specimen holder slidably mounted on said stage and normally positioning a specimen opposite said stage opening, juxtaposed curved contacting surfaces between said holder and said stage, whereby said holder can be turned to obtain stereoscopic views of said specimen, and spring means for connecting said holder with said stage.

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