April 25, 1944. L. MARTON 2,347,328

ELECTRON MICROSCOPE

Filed June 30, 1942

FIG. 1.

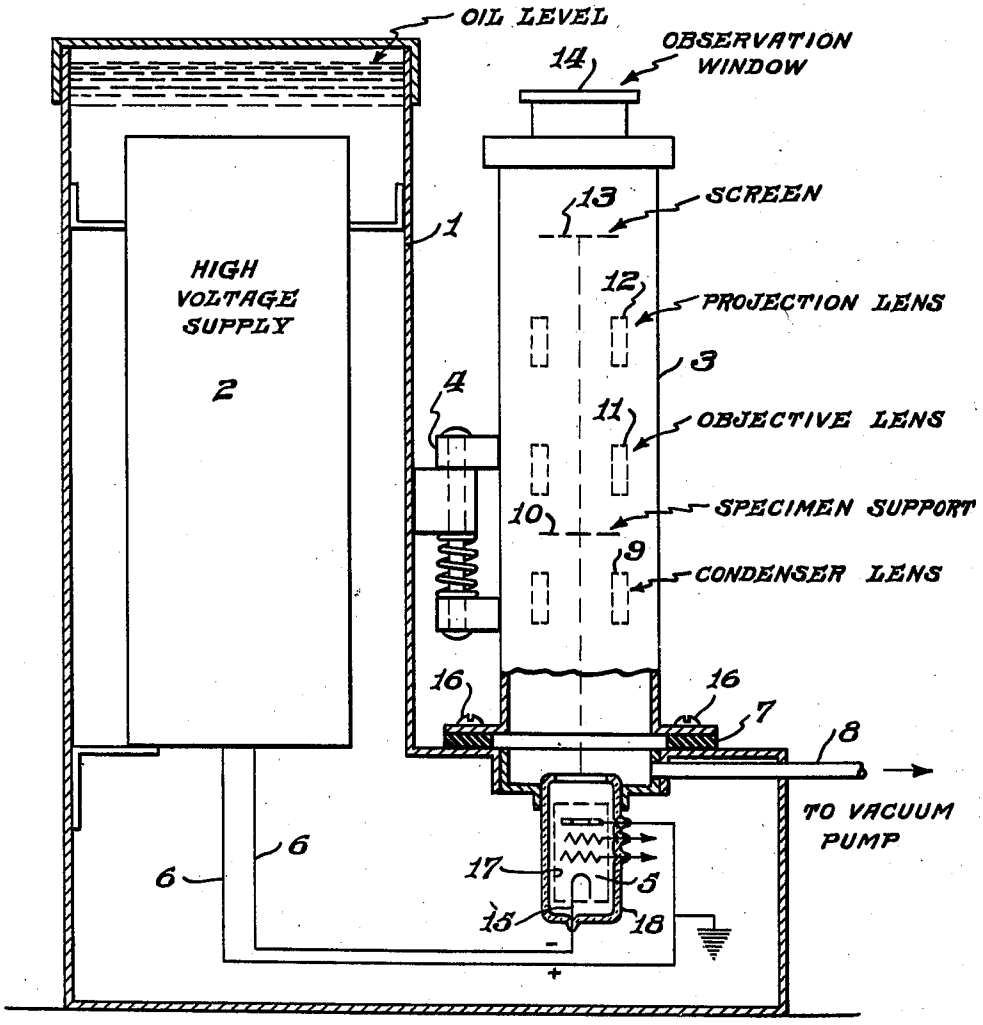
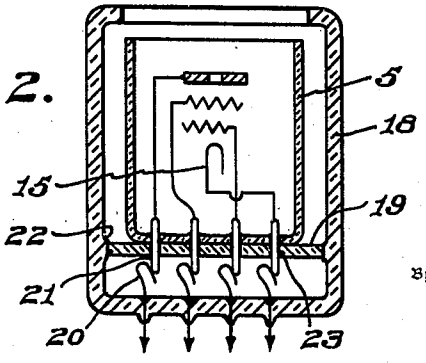


FIG. 2.



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ELECTRON MICROSCOPE

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11 Claims. (Cl. 250—49.5)

This invention relates generally to electron image apparatus, and particularly to a simplified and highly efficient structure for an improved electron microscope.

Heretofore it has been customary to support the electron gun of an electron microscope in the upper portion of the microscope assembly. Due to the high voltages necessary for the generation of high speed electrons, the power supply for the electron gun has also been mounted in the upper portion of the microscope assembly. Since the customary lens system is of rather large dimensions, the complete microscope assembly has been higher than is desirable under some conditions. This invention contemplates the use of an electron gun mounted below the microscope barrel, and a power supply structure mounted parallel to and supporting the microscope lens barrel. This improved construction permits a reduction in the height of a standard microscope by at least one-third, and is readily adaptable to simple replacement of the electron gun or any of the electrodes therein. The construction also permits easy removal of the microscope lens barrel for purposes of cleaning and adjustment, and in addition provides a horizontal observation window for the microscope screen which is extremely desirable.

An object of the invention is to provide an improved means for mounting the electron gun and lens barrel of an electron microscope. Another object is to provide an improved assembly for an electron microscope to reduce the overall height of the complete microscope assembly. Another object is to provide an improved structure for an electron microscope to permit the easy replacement of the electron gun or its component parts. Still another object is to provide an improved means for supporting the lens barrel of an electron microscope in order that it may be easily demounted from the complete assembly for cleaning purposes.

The invention will be described by reference to the drawing of which Fig. 1 is an elevational view of one embodiment thereof, and Fig. 2 is an elevational view of the electron gun assembly.

Referring to Fig. 1, a cylindrical structure 1, having an L shaped cross section, contains a suitable high voltage power supply 2 which is completely immersed in oil. Connections from the power supply 2 to an electron gun 5 are also completely immersed in oil and, therefore, protected against voltage break-down under the high voltages involved. The electron gun 5 preferably includes replaceable electrodes, or a replaceable electrode assembly, shown within the dashed lines 17, in order that the unit may be replaced when the cathode 15 is damaged or becomes inefficient. The electron gun 5 is supported so that the electron beam may be directed vertically. A cylindrical microscope lens barrel 3, having an observation window 14, a fluorescent screen 13, a projection lens 12, an objective lens 11, a specimen support 10, and a condenser lens 9 mounted therein, and disposed in axial relation with the vertical electron beam, is supported above the electron gun 5 by means of a hinged support 4 connecting the upper portion of the cylindrical chamber 1 and the lens barrel 3. Obviously, a suitable mounting bracket may be substituted for the hinge 4 for supporting the lens barrel 3.

Provision is made for securing the lens barrel 3 to the flat top of the lower portion of the cylindrical chamber 1 by means of, for example, the bolts 16 and a vacuum seal 7. An evacuating pipe 8 is provided for the lens barrel 3 and the electron gun 5, and is connected to a suitable vacuum pumping system for evacuation of the electron gun and microscope lens barrel.

It should be understood that the particular arrangement and design of the microscope electrical elements is not a part of this invention. The structure disclosed herein may, of course, be readily adapted to use with other types of electron image apparatus such as, for example, a scanning microscope. Also the particular means for providing replacement of the electron gun 5 is not a part of this invention. Such replacement may be accomplished by any well-known means, for example, as described in Fig. 2, since the electron gun outer shell 18 provides a fixed oil seal for the cylindrical chamber 1.

Fig. 2 illustrates one arrangement for providing a replaceable electron gun. The removable gun assembly, shown in Fig. 1 within the dash lines 17, includes an insulating shell 5 open at one end, having the electron gun electrodes rigidly supported therein, and terminated in contact pins 21, arranged to provide for proper alignment. A socket assembly supported in the outer shell 18, for example, by the projections 22, includes the spring contacts 20 disposed in operable relation to the holes 23 in an insulated support 19. The arrangement of the holes 23 corresponds to the arrangement of the contact pins 21. Electrical connections to the contacts 20 are brought out through the outer shell 18 and suitably connected to the power supply 2.

I claim as my invention:

1. Supporting structure for an electron image device including a power supply, an electron gun, electron focusing means and electron image means, comprising an oil-tight tank having a vertical portion for said power supply and a horizontal portion enclosing said electron gun, a housing for said focusing and image means, hinge means attached to said tank and supporting said housing at an angle with said horizontal portion, vacuum sealing means disposed between the lower end of said housing and said horizontal portion of said tank, and evacuating means common to said housing and said electron gun.

2. An electron imaging device including a base structure including two portions forming an L-shape cross section, a high voltage supply housed in one portion of said structure, an electron gun housed in the other normally disposed portion, and an electron imaging system mounted on said base structure at an angle thereto and in operable relation to said gun.

3. A device of the type described in claim 1 including means in the upper end of said housing for viewing said electron image means.

4. Supporting structure for an electron image device including a power supply, an electron gun, electron focusing means and electron image means, comprising a hollow tank of L-shaped cross-section, means for supporting said power supply in one portion of said tank, means for supporting said electron gun in the other normally disposed portion of said tank, a housing for said focusing and image means, hinge means attached to said first portion of said tank and supporting said housing at an angle with said other portion of said tank, and vacuum sealing means disposed between the lower end of said housing and said other portion of said tank.

5. A device of the type described in claim 4 including means in the upper end of said housing remote from said other portion of said tank for viewing said electron image means.

6. A device of the type described in claim 1 including means securing said housing to said horizontal tank portion.

7. A device of the type described in claim 4 including means securing said housing to said other tank portion.

8. A device of the type described in claim 1 including means accessible within and sealed from the interior of said oil-tight tank for replacing the components of said electron gun.

9. A device of the type described in claim 4 including means accessible within and sealed from the interior of said hollow tank for replacing the components of said electron gun.

10. A device of the type described in claim 1 including means axially aligned with said operative housing axis accessible within and sealed from the interior of said oil-tight tank for replacing the components of said electron gun.

11. A device of the type described in claim 4 including means axially aligned with said operative housing axis accessible within and sealed from the interior of said hollow tank for replacing the components of said electron gun.

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