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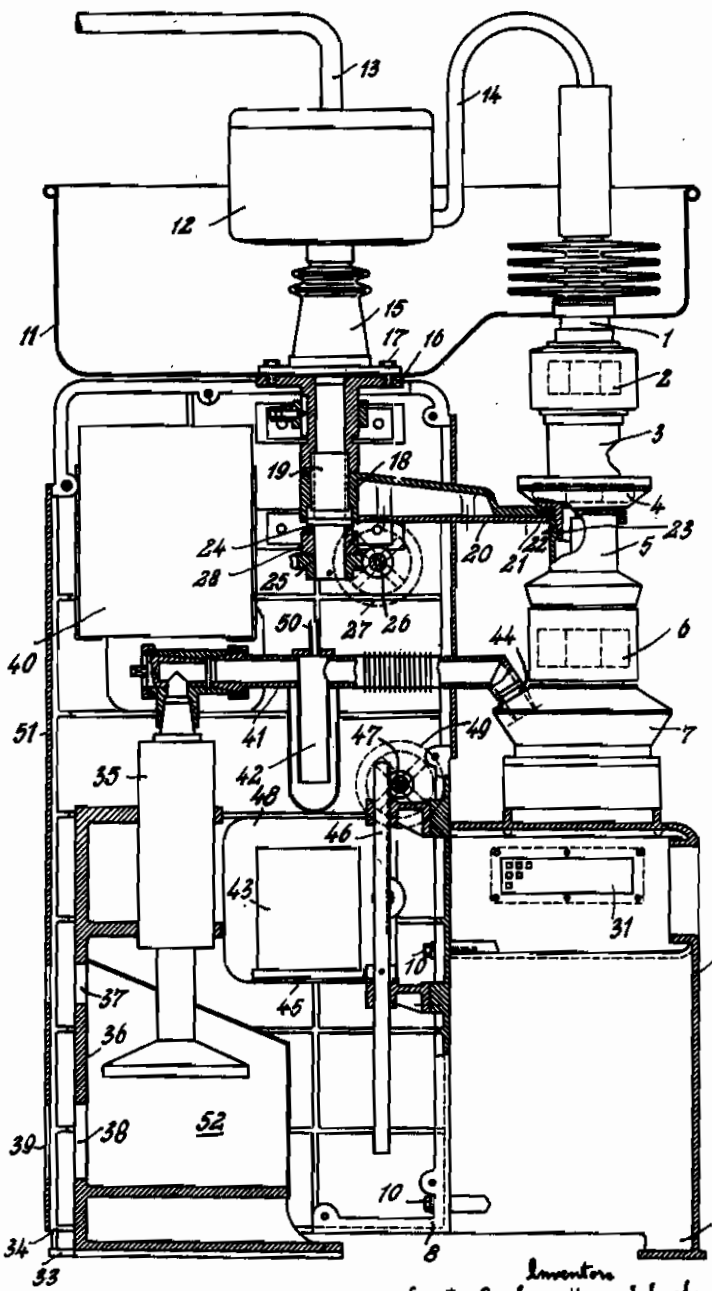

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ALIEN PROPERTY CUSTODIAN

ELECTRONIC MICROSCOPE

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This invention relates to improvements in electronic microscopes, and more particularly to a support therefor designed in the form of a hollow body.

To operate electronic microscopes a large number of individual parts, such as, for instance, a vacuum pump with a cooling trap, a vacuum testing device and various electric control apparatus are required. These individual parts of the electronic microscope have hitherto been separately mounted.

The object of the present invention is to simplify the total construction of an electronic microscope in such a manner as to facilitate the operation and control thereof. To this end, a hollow body in which are arranged the individual parts required for the operation of the microscope serves according to the invention as a support for the electronic microscope. Consequently, the hollow body is preferably so designed that the vacuum pump, the vacuum testing apparatus, the cooling trap and their accessories as well as the electric control devices are mounted in the hollow body itself. If arrangements in which vertical electronic microscopes are employed, the hollow body serving as a support for the microscope is preferably provided with a horizontal bearing surface for the lower part of the electronic microscope. In this case it is advisable to place the switch box for the reception of the electric control devices beneath this bearing surface, since these electric control devices necessary for operating the microscope may thus be arranged as close as possible to the place of the observer. On a part of the hollow body placed behind the electronic microscope are secured according to the invention the high-voltage parts of the microscope enclosed in a ground tank. In this part of the hollow body serving as a support for the microscope, may be arranged a preliminary vacuum tank cooperating with the vacuum pump. To prevent vibrations of the electronic microscope caused during the operation by the vacuum pump, the latter is not firmly secured to the hollow body of the electronic microscope. To this end, the rear wall of the hollow body may easily be removed and the separate support for the pump, arranged on the foundation, may be inserted through the opening which thus results. The cooling trap allotted to the vacuum pump and the corresponding cooling agent tank are also arranged according to the invention in the hollow body serving as a support for the electronic microscope. To facilitate the replacement of the cooling agent for the cooling trap, the cooling agent tank may be so arranged that it may be moved by means of a mechanic drive in the upward and downward direction inside the hollow body.

The electronic microscopes consist, as a rule, of a considerable number of individual parts which, for instance, carry the electron emitting source, the condenser coil, the part enclosing the object to be magnified, the magnifying lenses and the like. The individual parts are so assembled as to form a pressure-tight tank which is connected to a vacuum pump during the operation of the microscope. It is occasionally necessary in such apparatus to control individual parts of the microscope or to remove the same and replace them by new ones.

To this end, a device is employed according to the invention which permits after the disengagement of two parts of the electronic microscope a rotation of a part in a direction perpendicular to the axis of the electronic microscope. The rotary device is secured to the hollow body serving as a support for the microscope. By rotating one part of the electronic microscope it is easily possible to control the interior of the microscope. It is also thus possible by suitably selecting the point at which the electronic microscope is subdivided with the aid of the rotary device to remove certain individual parts of the microscope without interfering with the other parts of the microscope. In such electronic microscopes whose individual parts are assembled with the aid of sealing cones or rubber rings provided with cap screws to form a vacuum-tight tank the rotary device is preferably so designed as to permit both a rotation and an axial displacement of the two parts of the electronic microscope to be brought out of engagement with each other. The electronic microscope may be subdivided into two parts with the aid of the novel rotary device, for instance, by disengaging the sealing cones at a certain point, in which case one part is first moved in the upward and axial direction with the aid of the rotary device away from the other part to such an extent that the relatively long sealing cones no longer interfere with the rotation.

The rotary device secured to the hollow body serving as a support for the microscope cooperates with the upper part of the microscope. Consequently, when dissembling the microscope, the lower part remains then firmly secured to the foundation for the hollow body, whereas the upper part of the microscope moves as described above first in the upward direction as a result of the axial movement and is then rotated, thereby rendering it accessible for inspection. The ro-

tary device may be designed in various ways. A particularly simple arrangement is obtained, for instance, by providing the rotary device with a spindle drive to be adjusted by a hand wheel or the like and secured to the hollow body serving as a support for the microscope. With the aid of this spindle drive, the upper part of the microscope may be moved in the axial direction away from the lower part by means of a swivel arm; after which the rotation may be carried out by hand without employing special auxiliary means. The casing protecting the high-voltage parts of the electronic microscope may be assembled with the rotary device itself. In this case it is preferable to apply the current supply conductor to such a point as to cause it to move as little as possible during the rotation described above. A particularly favorable attachment of the current supply conductors is obtained if the conductors at the point of attachment lie coaxially with respect to the axis of the spindle.

In the accompanying drawing is shown as an embodiment a vertical sectional view of a vertical electronic microscope in diagrammatic form. Referring to the drawing, 1 denotes the electron emitting source. 2 the condenser coil. The electron stream passes through the part 3 enclosing the object to be magnified, through the objective lens 4, a part 5 provided with inspection windows for observing the intermediate image, and then through the projection lens 6 to the lower part 7 for the reception of the main inspection windows and the fluorescent screen or the photographic plate. As a support for the electronic microscope serves a hollow body consisting of the two parts 8 and 9. These two parts are firmly held together in the manner shown by screws 10. The part 8 is secured to the lower part 7 of the electronic microscope by screws. 11 denotes a ground tank enclosing the high-voltage parts of the electronic microscope. In this ground tank is arranged the battery casing 12 to which the current supply conductors 13 are connected. The conductor 14 leads from the battery casing 12 to the electron emitting source 1. The battery casing is secured to an insulating body 15 attached to a holder 16 by means of screws 17. The holder 16 forms together with the swivel arm 18 the device for axially displacing and rotating the upper part of the electronic microscope. To this end, the hub 18 of the swivel arm is provided with an internal thread cooperating with a spindle 19 having a corresponding thread. The spindle is driven by means of the worm gear 25, 26. The worm wheel 26 is rotated by a hand wheel 27 secured exteriorly of the hollow body serving as a support for the microscope. The spindle bears through a ball collar thrust-bearing 24 against a holder 28. The swivel arm 16 is secured to the holder 20 by means of screws, the holder being provided at its outer end with a bore in which fits the part 5 of the electronic microscope. With the aid of the lifting and rotating device shown, the upper part of the electronic microscope containing the electron emitting source, the condenser coil, the objective enclosing the object to be magnified and the objective coil may be separated from the lower part. The two sealing cones 22 and 23 of the parts 4 and 5 may be brought out of engagement with each other. To this end, the nut 21 is turned in the downward direction so that it presses against the upper end of the sealing cone 22, thereby bringing the cones out of engagement. As soon as the cones have been disengaged by the nut 21, the swivel arm 18, 20 is displaced in the upward direction by rotating the hand wheel 27. During this rotation the entire upper part of the electronic microscope is separated from the lower part in the axial direction. As soon as the upper part of the electronic microscope has been displaced in the axial direction to such an extent that the lower end of the cone 23 lies above the upper end of the cone 22 (a further movement of the lifting device in the axial direction being prevented by a stop) the upper part of the electronic microscope may be rotated from its normal operating position perpendicularly to the axis. In the arrangement shown also the holder 16, the ground tank 11 and the high-voltage parts contained therein are axially displaced.

The hollow body 8, 9 serving as a support for the microscope is also employed for the reception of the additional devices necessary for the operation of the microscope. Thus, for instance, at the upper end of the part 9 of the hollow body lying in the immediate neighborhood of the seat of the observer is arranged a switch box 31 for the reception of the electric control devices required for the operation of the electronic microscope. The part 9 is provided with a foot 32 and the part 8 of the hollow body with two feet 33. When the rear wall 51 of the part 8 is removed, the vacuum pump 35 is placed in the hollow body and is secured to a separate support 36, the heat (Bunsen burner) being supplied to the pump 35 through the openings 38 and 39 of the support 36 and the rear wall 51. The waste gas of the burner leaves the heating chamber 52 through the passage 37. 40 designates the preliminary vacuum tank arranged in the upper part of the hollow body serving as a support for the electronic microscope. In the suction conduit 41 of the pump is arranged a cooling trap 42. The cooling tank cooperating with the cooling trap 42 is designated by the reference numeral 43. The suction conduit is secured to the lower part 7 of the electronic microscope with the aid of the conduit connection 44. In order to enable an easy replacement of the cooling agent of the cooling trap 42 contained in the tank 43, the latter is placed on a plate 45 which may be moved in the upward and downward direction by means of a rack and pin drive 46, 47. 48 denotes a lateral opening provided in the part 8 of the hollow body. During the operation of the microscope the cooling tank 43 is raised by means of the hand wheel 49 through the rack and pin drive 46, 47 till the cooling trap 42 immerses in the cooling agent. 50 denotes a vacuum testing device connected to the suction conduit.

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