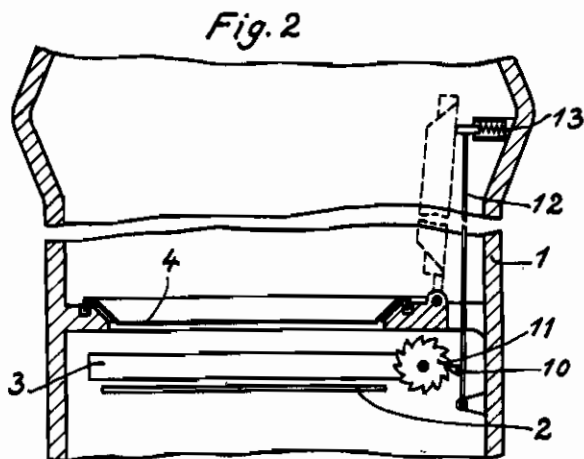
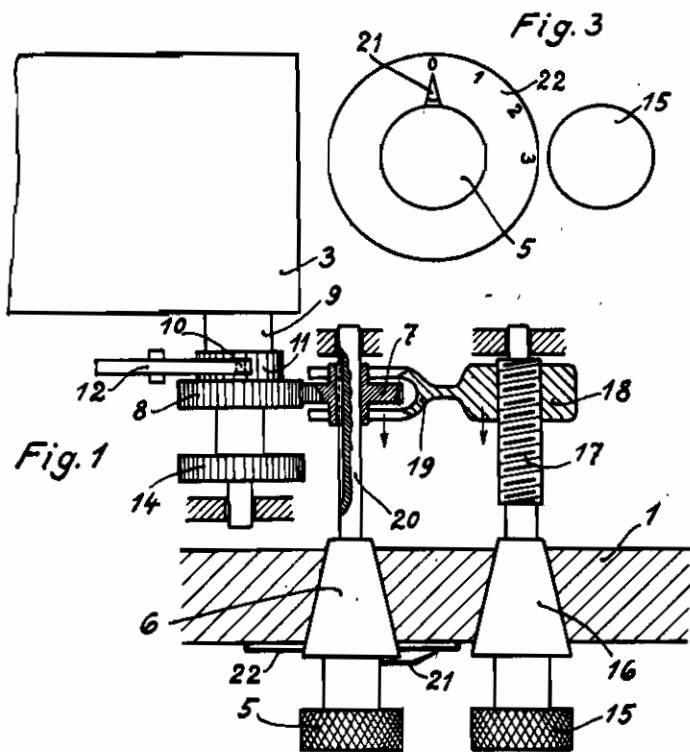


PUBLISHED  
JUNE 8, 1943.  
BY A. P. C.

H. O. MÜLLER  
APPARATUS FOR TAKING PICTURES OF THE  
IMAGES PRODUCED BY THE ELECTRON  
OPTIC APPARATUS  
Filed Jan. 28, 1941

Serial No.  
376,310



Inventor:  
Heing Otto Müller  
by *[Signature]*

# ALIEN PROPERTY CUSTODIAN

## APPARATUS FOR TAKING PICTURES OF THE IMAGES PRODUCED BY THE ELECTRON OPTIC APPARATUS

Heinz Otto Müller, Berlin-Spandau, Germany;  
vested in the Alien Property Custodian

Application filed January 28, 1941

This invention relates to an apparatus for taking pictures of the images produced by the electron optic apparatus.

In electron optic apparatus, particularly in electronic microscopes, devices are necessary, by means of which pictures of the images produced by the apparatus may be taken. It is, for instance, known in the art to arrange the photographic plate in electronic microscopes in such a manner as to be exposed to the electron rays.

The object of the present invention is to provide a means, whereby the entire surface of the photographic plate is uniformly influenced by the electron rays for a time capable of being adjusted accurately. A fluorescent screen which may be removed from the path of rays by rotation has hitherto been employed in electronic microscopes as a means for influencing the photographic plate. This method has the disadvantage in that the photographic plate is not uniformly influenced by the fluorescent screen. The parts of the photographic plate which lie nearer the pivot of the screen are exposed for a shorter time. Furthermore, it is not possible to attain a sufficiently accurate adjustment of the exposure time, since the shutter is hand-operated. This is particularly the case when employing highly sensitive plates. In this case shorter exposure times must be then chosen, which can no longer be maintained in such a simple manner by hand. When moving the fluorescent screen away from a path of rays, serving to determine the exposure time vibrations which impair the production of a sharp image may easily be set up.

The above-mentioned drawbacks are removed according to the invention by means of a known shutter arranged within the vacuum vessel in the path of the electron rays and which may be set as to the exposure time and released with the aid of actuating means passing through the vacuum wall. In this manner it is possible to uniformly influence the entire surface of the photographic plate by means of the electron rays for a time capable of being accurately adjusted. Besides also high sensitive plates may readily be employed which have the advantage that the sharpness of the image is improved owing to the shorter exposure times which may be chosen. In the apparatus according to the invention a mechanical shutter is employed in the vacuum chamber, the shutter being operated preferably exteriorly of the vacuum vessel with the aid of actuating means cooperating with sealing cones. A slit shutter or also a central metal shutter may be used. In order to release the shutter a mech-

anism is employed to advantage which is actuated with the aid of the fluorescent screen. The releasing device is, for instance, so designed that the fluorescent screen actuates the releaser after the screen has been moved away from the path of rays by rotation. To facilitate the adjustment a pointer and a scale are allotted according to the invention to the actuating means serving to adjust the exposure time and which is arranged exteriorly of the vacuum vessel.

In the accompanying drawings is shown an embodiment of the invention in diagrammatic form, in which

Fig. 1 is a top view of a slit shutter and its actuating means;

Fig. 2 is a sectional view of the part of an electronic microscope in which the shutter is mounted, and

Fig. 3 is a view of the control knobs.

Referring to the drawings, 1 denotes the vacuum wall of the electronic microscope. 2 is a photographic plate, 3 a slit shutter and 4 a fluorescent screen on which the image produced by a microscope may be viewed before taking a picture thereof. To wind up the slit shutter 3 a knob 5 is employed whose axis passes through the vacuum wall 1 with the aid of a sealing cone 6. The rotation which is effected according to the direction as indicated by the arrow is transmitted to the shaft 9 of the slit shutter through the gears 7 and 8. To prevent the slit shutter from running down before a predetermined time elapses a pawl 10 is employed which cooperates with a ratchet wheel 11.

The release of the shutter is effected by means of the fluorescent screen 4 which may be rotated in the position shown in dotted lines by means of a sealing cone not shown in Fig. 2 which is operated exteriorly of the vacuum vessel. In the end position the fluorescent screen 4 presses against the lever 12 to which is secured the pawl 10. The pawl 10 is, consequently, pressed away from the ratchet wheel 11 so that the slit shutter 3 runs down. 13 denotes a holding spring of the lever 12 which presses before the release takes place the pawl 10 against the ratchet wheel 11 when winding up the slit shutter 3.

To adjust the exposure time also the knob 5 is employed. If the exposure time is to be adjusted the gear 7 is brought into engagement with the gear 14 which is secured to the shaft 9 of the slit shutter. The displacement of the gear 7 is effected with the aid of a knob 15 which drives a worm 17 having a great pitch. The worm wheel 18 cooperating with the worm 17

moves when actuated a forked lever 18 in the downward direction as indicated by the arrow so that the gear 7 slidably mounted on the shaft 20 moves also in the same direction till it meshes with the gear 14. In this position the exposure time may now be adjusted by rotating the knob 5. To facilitate the adjustment of the exposure time a pointer 21 and a scale 22 are allotted to the knob 5 as will be seen from Fig. 3.

As already mentioned above the release is effected with the aid of the fluorescent screen 4 within the sluicing device for the reception of the photographic material. Such a release prevents the production of faulty pictures which have hitherto been caused by the fact that the collapsible screen when releasing the shutter covers the plate as well as by the fact that the microscope is caused to vibrate when the screen comes into engagement with the vessel wall.

These difficulties are avoided by the apparatus according to the invention, since in this case the fluorescent screen is operatively connected with the shutter.

5 Instead of a slit shutter also a central metal shutter may be employed which is set and released, for instance, by rotating the screen. Such a central metal shutter may be arranged in the electronic microscope, for instance, be-  
10 neath the projection lens. Also in this case two cones are used to actuate the shutter, one of which serving to adjust the exposure time and the other to set and release the shutter. The apparatus according to the invention may be em-  
15 ployed in electronic microscopes, mass spectrographs as well as in all other electronic apparatus in which simple devices are required to produce pictures.

HEINZ OTTO MÜLLER.