United States Patent

[111] 3,619,048

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[21] Appl. No. **849,852**
[22] Filed **Aug. 13, 1969**
[45] Patented **Nov. 9, 1971**

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[32] Priority **Aug. 13, 1968**
[33] **Germany**
[31] **P 17 97 080.8**

[54] **EPISCOPE**
7 Claims, 1 Drawing Fig.

[52] **U.S. Cl.** **353/61**
[51] **Int. Cl.** **G03b 21/16**
[50] **Field of Search** 353/65, 66, 67, 57, 60, 61, 43, 95, 96, 22–24

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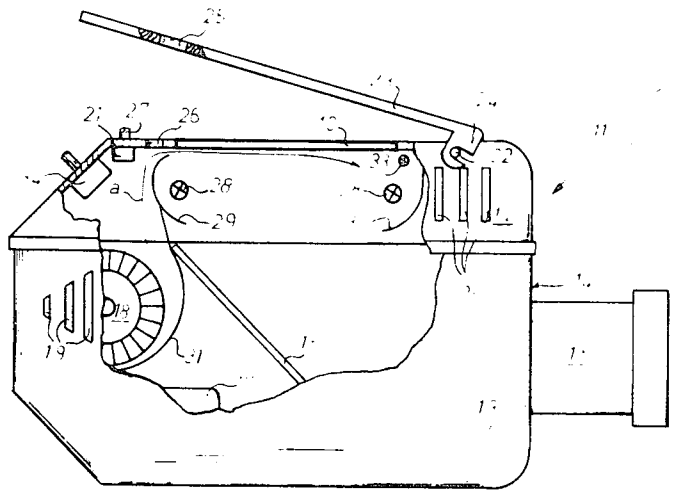
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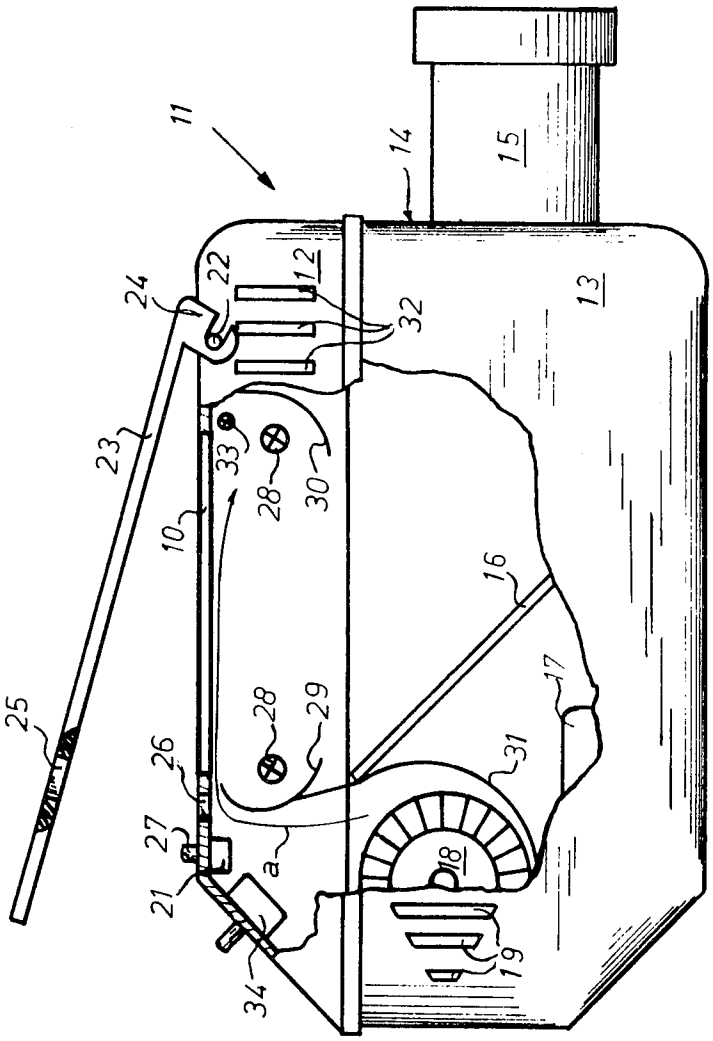
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ABSTRACT: An episcope with a housing having a top mounted object support and a hinged cover over the object support. A high-intensity low-voltage lighting system with associated reflectors transfers a clear brilliant image into a projection lens system. The object support is a heat-insulating glass plate. A high-volume fan in the housing together with inlet and outlet apertures in the housing wall and flow guides inside the housing maintain a boundary layer of cooling air flow across the underside of the object support. Controls for the high-intensity lighting system are interrelated with the object support area so projection lighting is on only when the cover is down or an object on the support engages a switch. A magnetic latch maintains the cover in its lowered position.



PATENTED NOV 9 1971

3,619,048



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EPISCOPE

BACKGROUND OF THE INVENTION

The present invention relates to an episcope comprising an object carrier or support, an artificial light source for projection, a mirror system, a lens and a cooling fan.

In known episcopes of this construction, the objects for projection are placed in an object carrier situated beneath or laterally of the individual parts required for the function of the instrument. Those episcopes have disadvantages, particularly in operation because of design and construction, and more specifically to correct positioning of objects for projection on the object carrier, since the latter is difficult to see. In previously known episcopes, it is difficult to bring the object rapidly into correct position for projection, resulting in the need for frequent readjustment, which is again difficult because the room in which episcopes are used must be in darkness.

SUMMARY OF THE INVENTION

According to the present invention the object support at the top of the housing consists of a glass or similar plate which is a poor heat conductor, and a flow of cooling air is delivered by a fan, the flow being guided along the underside of said plate, leaving the interior of the housing by means of exit apertures in the housing wall. As a result of this arrangement of the object carrier or support, it is fully in the field of view of the episcope operator, enabling the objects for projection to be rapidly and correctly positioned.

To enable high-power light sources to be used to produce a picture of maximum brightness and clarity on the screen while preventing any damage to the objects by excessive heat, the heat is carried away from critical areas by the cooling airflow. To produce the cooling air it is proposed to use a turbofan, which gives a much greater airflow capacity as compared with other fans of the same dimensions. This has a favorable effect on construction and cost.

A pivotally mounted removable pressure plate for flat projection objects in the form of sheets or the like may be arranged above the object support plate. In this way the object can be placed on the glass plate, be easily and clearly adjusted thereon, and secured by pressing down the pivotal pressure plate. An advantageous feature in view of the darkness of the room in which the episcope is used consists in retaining the pressure plate in the closed position on the glass plate by means of a magnetic fastening system. The object for projection is thus secured solely by the weight and attraction of the magnetic fastening system without any additional mechanical operation being required.

The operation of the episcope may be further simplified by providing the artificial light source circuit for the episcope with a pressure-operated switch whose contacts are closed by a switch member actuated by the pressure plate or by the object. This ensures that projection can begin immediately and without any further operation after the correctly positioned object has been pressed down.

To provide the episcope operator with sufficient light for operation without having to use extraneous light sources, the housing may contain not only the projection light source but also a low-power light source for permanent illumination which is advantageous particularly since the pressure plate is lifted and thus the glass plate is visible when objects are changed, and this allows sufficient light to emerge for at least the operator standing near the episcope to be able to see even though it is a very low-power lamp.

The mirrors can be advantageously disposed so that at least one acts as a guide plate for the airflow produced by the cooling air fan, thus saving material and labor by a suitable arrangement of the fan and mirrors.

It is an object of the invention to provide an episcope which accomplishes the above advantages, which can be operated rapidly and simply, prevents damage to the objects for projection, and which projects bright and clear pictures on the screen.

DRAWING

The present invention will now be described in greater detail by way of example with reference to the accompanying drawing, wherein the sole FIG. is a side elevation view partly in section of a preferred form of episcope.

DESCRIPTION

Referring to the drawing, the episcope includes a housing **11**, preferably made from plastic, divided into a top part **12** and a bottom part **13**. The two parts **12** and **13** have provision (not shown) enabling them to be detachably connected. At the front end **14** the housing **11** carries a lens system **15**. Located within bottom part **13** is an inclined mirror **16**. Behind and below the latter, is a transformer **17** for the lamp current and a motor driven fugal- or centrifugal fan **18**. Cooling air enters the turbofan through air inlet slots **19** in the housing wall near the intake opening of the turbo fan **18**.

The upper wall of top part **12** of housing **11** contains a glass plate **10** to support the objects which are to be projected, and a pressure-operated switch **21** is located adjacent the plate **10**. A pressure plate **23** is pivotally mounted as by pivot studs **22** at the sides of housing top part **12**. The size of the pressure plate **23** is preferably equal to and slightly overlaps that of the glass plate **10**. Pressure plate **23** is pivotally secured at one end by lugs **24** having forked ends which engage over the pivots **22**. They may be of slightly resilient construction so that pressure plate **23** can be easily and rapidly removed if necessary.

A permanent magnet **25** is located near the free end of the pressure plate **25** and may be used as shown. Secured on or in the top of the housing opposite the magnet is a small anchor plate **26** of magnetizable material, e.g., steel. These two parts form a magnetic fastening for the pressure plate **23**.

The pressure-operated switch **21** is situated in the overlap zone of the pressure plate **23** so that when the latter is swung down it actuates a switch pin **27** which closes the contacts of the switch **21**. Switch **21** is in the circuit of one or more low-voltage (e.g., 24 V.) quartz-halogen electric lamps **28**, associated with which are concave mirrors **29** and **30**. The lamps **28** are situated at least along two side edges of the glass plate **10** to give uniform illumination of the image area. With regard to the heat evolution and the switching on and off of the episcope, it has been found advantageous for projection to consist of at least two and preferably four quartz-halogen lamps with which concave mirrors are associated.

Previously known episcopes used large-sized illuminating lamps and to prevent too much heat development, use was restricted to rather weak lamps, having a low wattage. The result was a relatively dark and nonbrilliant picture on the screen.

The present invention produces clear, light and brilliant pictures in an inexpensive manner by using low-voltage lamps together with a stepdown transformer if necessary. Such lamps will develop heat but that is controlled by the fan blowing air to the most important location, i.e., where the object to be projected is placed, and by providing furthermore a heat-insulating glass plate for additional protection of the object. Heat development is minimized by switching on for projection and switching off for stops during projection.

The concave mirror **29** forms a terminal part of a guide plate **31** for the cooling airflow produced by the turbofan **18**. Plate **31** guides the cooling airflow from fan **18** towards the top part **12** of the housing behind mirror **29**. The air flows over the top of mirror **29** emerging through a nozzlelike wide slot between the top edge of the concave mirror **29** and the top wall of the housing **12** and directed in laminar flow pattern against and along the underside of the glass plate **10**. The other concave mirror **30** at the far end of the glass plate **10** deflects the flow of cooling air in a reverse and downward path from whence it flows into the other end of the housing and then emerges into the open through air exit slots **32** in the top part **12** of the housing.

A low-power incandescent lamp **33** is provided for continuous illumination to facilitate operation of the apparatus and is

switched on when the episcope is put into operation. A separate manuallyioperated switch 34 may be provided in parallel with the pressure-operated switch 21 in order to switch the lamps 28 on and off, when projecting and not projecting, respectively.

What is claimed and desired to be secured by Letters Patent is:

1. An episcope comprising: a housing enclosure with a top opening; means disposed at said opening for supporting an object to be projected comprising a heat insulating glass plate; a mirror system including a reflecting mirror and projecting light mirror means, said projection light mirror means having reflective and nonreflective surfaces; projection light means, including operating circuit means, disposed in said housing to provide illumination of an object on said object supporting means, said circuit means including a pressure switch with an operator to close the pressure switch to complete the circuit to the projection light means; said pressure switch operator being disposed adjacent said object supporting means and adapted to be operated by an object placed over said supporting means; an objective lens means at one side of said housing situated in the path of rays after they leave the reflecting mirror; a pivotally supported pressure plate disposed on said housing above said glass plate adapted to lay substantially parallel to said glass plate and hold an object to be projected against said glass plate; cooling air fan means mounted in said housing to provide an air stream into and through said housing; and flow path guide means for directing the cooling air stream flow upward within said housing to against and along the underside of said glass plate and out from said housing, said flow path guide means comprising at least the major portions of both said reflective and nonreflective surfaces of said projection light mirror means.

2. An episcope as claimed in claim 1, wherein said means pivotally supporting said pressure plate includes provision enabling quick disconnection of said pressure plate from said housing.

3. An episcope as claimed in claim 1, wherein magnetic fastening means disposed in said pressure plate and said housing structure provides retention force to maintain said pressure plate in closed condition.

4. An episcope as claimed in claim 1, wherein said projecting light means includes high intensity projection lamp means and a low-power auxiliary lamp means to provide low intensity illumination.

5. An episcope as defined in claim 1, wherein said projection light mirror means includes projection light mirrors extending across the housing and at least a portion of said concave mirrors constitutes a part of said flow path guide means.

6. An episcope as claimed in claim 5, wherein at least one said concave mirror extends laterally across said housing, adjacent and spaced slightly under the rear edge of said glass plate to provide a slotted nozzle, said fan means is located rearward of said at least one concave mirror and forces air through said nozzle, against and along the underside of said glass plate.

7. An episcope as claimed in claim 1, wherein said projection light mirror means includes concave projection light mirrors across the housing adjacent edges of said glass plate and said projection light means includes quartz-halogen lamps arranged in the focus of said concave mirrors for illumination of an object on said glass plate.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,619,048 Dated Nov. 9, 1971

Inventor(s) Heinz Engert et al

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 1, line 7, (second paragraph, second line), "in" should be --on--.
, line 46, "operation" should be --operations--.

Column 2, line 14, "fugal-" should be --turbo--.

Column 3, line 2, change "manuallyioperated" to --manually operated--.
, line 11, change "projecting" to --projection--.

Column 4, lines 10 and 11, (Cl. 4) change "projecting" to --projection--.
, line 15, (Cl. 5, second line) insert "concave" before --projection--.

Signed and sealed this 25th day of April 1972.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents

FORM PO-1050 (10-69)

USCOMM-DC 60376-P69
* U.S. GOVERNMENT PRINTING OFFICE : 1969 O—366-334