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(54) **MAGNIFYING OBSERVATION APPARATUS**

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(52) **U.S. Cl.** **359/810**; 348/E7.087; 359/385; 359/798; 359/800; 359/802

(58) **Field of Classification Search** ..... None
See application file for complete search history.

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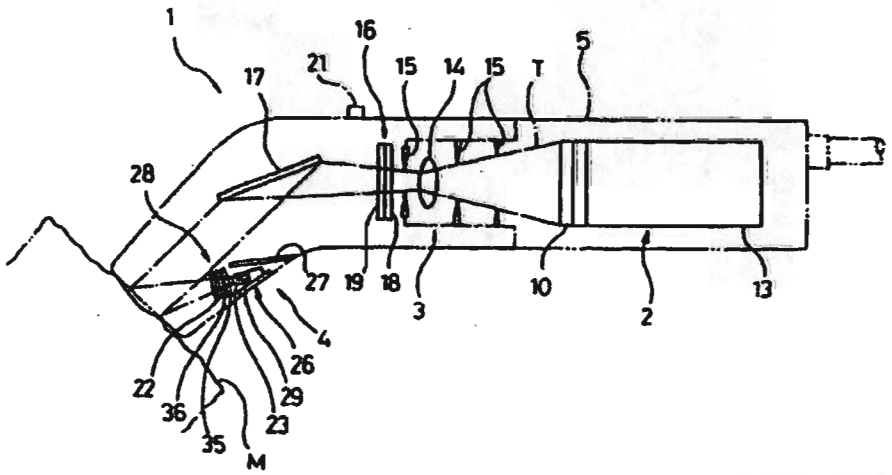
(57) **ABSTRACT**

The present invention relates to a magnifying observation apparatus of a video type in which an image of an object to be observed which has been picked up by an image pick-up apparatus incorporating an imaging device therein is reproduced on a monitor display and observed. It is an object of the invention to attain a compact structure of the entire system so as to permit easy observation in a simple manner. According to the present invention, in order to achieve such object, not only the imaging device but also a control circuit unit for the imaging device, an optical system for focusing the image of the object to be observed on the imaging device, and a light-source lamp for lighting the object to be observed, are incorporated in the image pick-up apparatus.



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EX PARTE REEXAMINATION CERTIFICATE ISSUED UNDER 35 U.S.C. 307

THE PATENT IS HEREBY AMENDED AS INDICATED BELOW.

Matter enclosed in heavy brackets [ ] appeared in the patent, but has been deleted and is no longer a part of the patent; matter printed in italics indicates additions made to the patent.

AS A RESULT OF REEXAMINATION, IT HAS BEEN DETERMINED THAT:

The patentability of claim 6 is confirmed.

Claims **1, 7, 11, 16, 19, 23** and **28** are determined to be patentable as amended.

New claims **33–50** are added and determined to be patentable.

Claims **2–5, 8–10, 12–15, 17–18, 20–22, 24–27** and **29–32** were not reexamined.

1. A magnifying observation apparatus for reproducing an image of an object to be observed which has been picked up by an image pick-up apparatus onto a monitor display and observing it, said image pick-up apparatus having a structure with a case of an essentially one-handed [grapsable] *graspable* size, said case having [a] *an uncovered* viewing hole formed therein and encasing therein at least an imaging device, a control circuit unit for the imaging device, an optical system for focusing the image of the object to be observed on the imaging device, and a light-source lamp [encases] *encased* by the casing for lighting the object to be observed through the viewing hole.

7. A magnifying observation apparatus that includes an image pick-up apparatus for reproducing, onto a monitor display, an image of an object located proximate the image pick-up apparatus which has been picked up by an image pick-up apparatus the image pick-up apparatus including a casing having [a] *an uncovered* viewing hole formed therein and further including at least an imaging device, a control circuit unit for the imaging device, an optical system for focusing the image of [an] *the* object [to] located proximate the viewing hole on the imaging device, and a light-source lamp for lighting the object to be observed, wherein said light-source lamp is formed as a lamp unit comprising a plurality of lamps arranged in a predetermined state on a board in such a manner that the entire lamp unit can be mounted to and removed from said image pick-up apparatus.

11. A magnifying observation apparatus that includes an image pick-up apparatus for reproducing an image of an object located proximate the image pick-up apparatus onto a monitor display, said image pick-up apparatus comprising a casing having [a] *an uncovered* viewing hole, the casing enclosing at least an imaging device, a control circuit unit for processing a signal received from the imaging device and emitting a video signal, an optical system for focusing the image of [an] *the* object located proximate the viewing hole on the imaging device, and a light-source for lighting the object to be observed.

16. A magnifying observation apparatus that includes an image pick-up apparatus for reproducing an image of an object located proximate to *the* image pick-up apparatus

onto a monitor display, said image pick-up apparatus comprising a casing *having an uncovered viewing hole*, the casing enclosing at least an imaging device, a control circuit unit for the imaging device, an optical system for focusing the image of [an] *the* object onto the imaging device, and a light-source lamp means for lighting the object to be observed.

19. A magnifying observation apparatus according to claim **16**, [further comprising a viewing hole formed in the casing and] wherein said optical system focuses the image of an object located proximate the viewing hole on the imaging device.

23. A magnifying observation apparatus that includes an image pick-up apparatus for reproducing an image of an object located proximate the image pick-up apparatus onto a monitor display, said image pick-up apparatus comprising a casing having [a] *an uncovered* viewing hole, the casing enclosing at least an imaging device, a control circuit unit for the imaging device, an optical system for focusing the image of [an] *the* object located proximate the viewing hole on the imaging device, the optical system comprising an objective lens that is movable to adjust magnification.

28. A magnifying observation apparatus that includes an image pick-up apparatus for reproducting an image of an object located proximate the image pick-up apparatus onto a monitor display, said image pick-up apparatus comprising a casing having [a] *an uncovered* viewing hole, an imaging device that is movable in relation to the viewing hole, the observation apparatus further comprising a control circuit unit for the imaging device, an optical system located in the image pick-up apparatus for focusing the image of [an] *the* object located proximate the viewing hole, the optical system comprising an objective lens that is movable to adjust magnification.

33. A magnifying observation apparatus according to claim 1, wherein the control circuit unit controls the imaging device, and

wherein the optical system focuses the image of the object to be observed on the imaging device and magnifies the image, while the image pick-up apparatus is maintained at a predetermined fixed distance from the object to be observed.

34. A magnifying observation apparatus according to claim 1, wherein the light-source lamp is formed as a lamp unit comprising a plurality of lamps arranged in a predetermined state on a board in such a manner that the whole of the lamp unit can be mounted to said image pick-up apparatus.

35. A magnifying observation apparatus according to claim 1, wherein the viewing hole defines a geometric center, wherein the optical system defines an optical axis, and wherein the geometric center of the viewing hole and the optical axis of the optical system are collinear.

36. A magnifying observation apparatus according to claim 1, wherein the imaging device captures color images and sends the color images to the monitor display.

37. A magnifying observation apparatus according to claim 1, wherein the light-source lamp is formed as a lamp unit comprising a plurality of lamps mounted on a common board, wherein the common board is formed with a power supply circuit for supplying power to the plurality of lamps, and wherein each one of the plurality of lamps illuminates in response to electrical current.

38. A magnifying observation apparatus according to claim 1, wherein the optical system includes a lens having a diameter and wherein the lens is spaced apart from the viewing hole by a distance greater than the diameter of the lens.

39. A magnifying observation apparatus according to claim 1, wherein the optical system defines an optical axis and wherein the light-source lamp comprises lamps mounted at an angle to the optical axis.

40. A magnifying observation apparatus according to claim 1, wherein the light-source lamp comprises a plurality of light elements mounted on a single circuit board.

41. A magnifying observation apparatus according to claim 1, wherein the optical system and the light-source lamp are exposed through the viewing hole to environmental conditions outside of the casing.

42. A magnifying observation apparatus according to claim 6, wherein the image pick-up apparatus has a case configured to be held and used by one hand and defines a viewing hole,

wherein the control circuit unit controls the imaging device, and

wherein the optical system focuses the image of the object to be observed on the imaging device and magnifies the image, while the image pick-up apparatus is maintained at a predetermined fixed distance from the object to be observed.

43. A magnifying observation apparatus according to claim 7, wherein the casing is configured to be held and used by one hand,

wherein the control circuit unit controls the imaging device, and

wherein the optical system is configured to focus the image of the object on the imaging device and magnify the image, while the image pick-up apparatus is maintained at a predetemined fixed distance from the object.

44. A magnifying observation apparatus according to claim 11, wherein the casing is configured to be held and used by one hand,

wherein the control circuit unit controls the imaging device, and

wherein the optical system focuses the image of the object on the imaging device and magnifies the image, while the image pick-up apparatus is maintained at a predetermined fixed distance from the object.

45. A magnifying observation apparatus according to claim 16, wherein the casing is configured to be held and used by one hand,

wherein the control circuit unit contols the imaging device, and

wherein the optical system focuses the image of the object onto the imaging device and magnifies the image, while the image pick-up apparatus is maintained at a predetermined fixed distance from the object.

46. A magnifying observation apparatus according to claim 23, wherein the casing is configured to be held and used by one hand,

wherein the control circuit unit controls the imaging device, and

wherein the optical system focuses the image of the object on the imaging device and magnifies the image, while the image pick-up apparatus is maintained at a predetermined fixed distance from the object.

47. A magnifying observation apparatus according to claim 28, wherein the casing is configured to be held and used by one hand,

wherein the control circuit unit controls the imaging device, and

wherein the optical system focuses the image of the object on the imaging device and magnifies the image, while the image pick-up apparatus is maintained at a predetermined fixed distance from the object.

48. A magnifying observation apparatus according to claim 33, wherein the predetermined fixed distance is the distance between an outer edge of the viewing hole and the object to be observed.

49. A magnifying observation apparatus according to claim 1, wherein the viewing hole defines a plane and wherein the optical system is configured to focus on the plane so as to focus on the object when the object is abutted against the viewing hole.

50. A magnifying observation apparatus according to claim 1, wherein the control circuit unit controls the imaging device, and

wherein the optical system focuses the image of the object to be observed on the imaging device and magnifies the image, while the imaging device is maintained at a predetermined fixed distance from the object to be observed.

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