INSTITUTE OF INTELLECTUAL PROPERTY RESEARCH & DEVELOPMENT

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NON-CONFIDENTIAL TECHNOLOGY SUMMARY

3-DIMENSIONAL STEREOMICROSCOPE ASSEMBLY WITH VARIABLE INTER OBJECTIVE DISTANCE

Background & Introduction:

Stereomicroscope is an optical microscope variant designed for low magnification observation of a sample using incident light illumination rather than transillumination. It uses two separate optical paths with two objectives and two eyepieces to provide slightly different viewing angles to the left and right eyes, in this way it produces a three dimensional visualization of the sample being examined.

Great working distance and depth of field are important qualities for this type of microscope. Both qualities are inversely correlated with resolution: the higher the resolution, the smaller the depth of field and working distance.

Existing surgical microscopes have two eye pieces with variable adjustable inter papillary distances (IPD). Normally, adjusting inter papillary distance (IPD) facilitates comfortable viewing with two eyes; these microscopes are referred to as stereomicroscopes. The main difference between conventional and stereomicroscope is that the conventional microscope observes the sample from a single direction, whereas the stereomicroscope observes the object from two significantly different angles, thereby providing two distinctly differing images needed for the stereomicroscopic vision.

However, the 3-D view is provided for a definite orientation of the sample. There is a certain disadvantage in viewing the same sample from different orientations without touching or re-orienting the sample. Therefore, it is advantageous to have a stereomicroscope with an increased depth of precision and the field of vision. This will increase precision in the work being performed; hence there is a need for a

stereomicroscope with a variable inter-objective distance to provide an increased field and depth of vision.

Overview

Objectives of the Proposed Technology are to develop a variable 3-D Stereomicroscope Assembly:

1. With a variable inter-objective distance to provide an increased field and depth of vision.

2. In which the telescoping arms works independently with each other to focus on target object.

3. With twin/two objectives for permitting light path to be perfectly and fully centered on the object for allowing an easy and efficient viewing of 3-D images of the target objects with greater depth of vision and with higher clarity of 3D images.

4. To provide 3-D view of the objects directly without using any computer program to process visual data.

5. To facilitate a convergence of light rays to ensure a simultaneous locking of views at different angles of the target.

6. To develop a variable 3-D stereomicroscope assembly with non-parallel optic axes.

7. To develop a variable 3-D stereomicroscope assembly in which, the inter-objective effective optical distance is variable.

Description:

Technology relates to a Three-Dimensional Stereomicroscope assemble with a variable inter-objective distance to provide an increased field and depth of vision.

The variable 3-D stereomicroscope assembly comprises

i. housing,

ii. a left eye piece assembled inside the housing for viewing a target object through a left eye,

iii. a right eye piece assembled inside the housing for viewing the target object through right eye,

iv. a pair of telescopic arms detachably mounted on the housing through a flexible sleeve,

v. an objective lens unit mounted above the pair of the telescopic arms for focusing a light reflected from target object, and

vi. a plurality of prisms and lens combination to enable a binocular vision through the left eye piece and the right eye piece.

The pair of telescopic arms are individually moved and rotated to focus on the target object. The objective lens unit includes a mechanical and an optical device unit for varying an inter-objective distance between a left optical path way and a right optical path way for focusing on the target object to increase a degree of 3-D vision.

The assembly also comprises a beam splitter and a zoom changer. The beam splitter is mounted below the left and right eye piece for differentiating between a left eye piece lens pathway and a right eye piece lens pathway. The zoom changer is coupled to the beam splitter for focusing on the target object.

The objective lens unit has two objective lenses such as a left objective lens and a right objective lens mounted along an axis of the left eye piece and the right eye piece. The objective lens unit includes at-least one primary mirror positioned in such a manner that a plane of the mirror is normal to an optic axis of the objective lens.

Advantages

- Existing surgical microscopes have two eye pieces with variable adjustable inter papillary distances (IPD). There is a certain disadvantage in viewing the same sample from different orientations without touching or re-orienting the sample. These problems are solved using proposed technology with a variable inter-objective distance to provide an increased field and depth of vision.
- Restricted image formation using conventional stereomicroscope is solved using proposed technology/device.
- Possibility to control (increase or decrease) the degree of depth perception or 3-D by simply increasing or decreasing the angle of convergence.
- Using this device, the industrial or medical or laboratory operations can be carried out easily and safely.

Detailed Description of the 3D Microscope Device:

The 3D stereomicroscope 200 comprises a housing 201, an eye piece unit 202 and an objective unit 203.

The eye piece unit 202 includes a left eye piece 205b assembled inside the housing 201 for left eye viewing of a target object 204 and a right eye piece 205a assembled inside the housing 201 for right eye viewing of a target object 204.

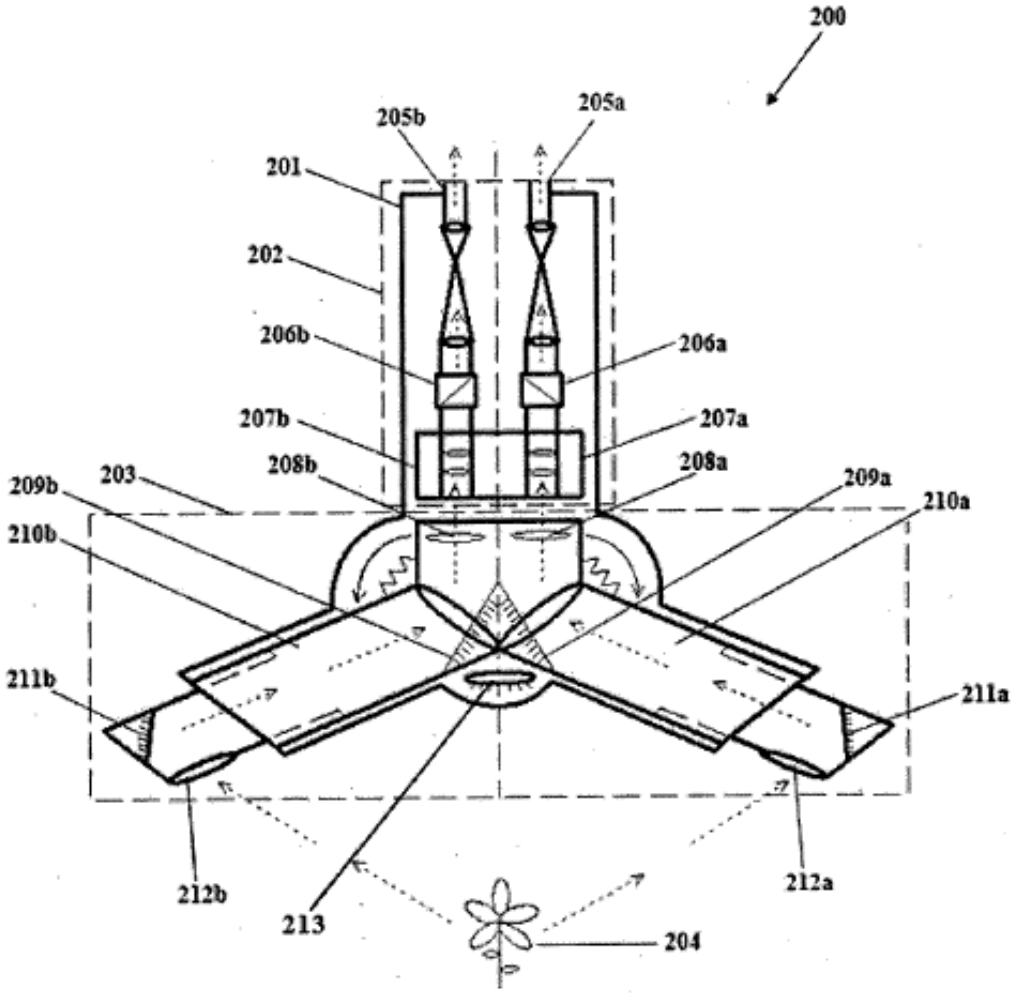

FIG. 2

Vertical cross sectional view of a 3D stereomicroscope assembly

A beam splitter arrangement 206 is mounted below the left eye piece 205b and the right eye piece 205a. The beam splitter arrangement includes a left beam splitter 206b and a right beam splitter 206a. A left zoom changer 207b and a right zoom changer 207a are operably coupled to the left and right beam splitters 206b, 206a.

The objective unit 203 includes a pair of objectives, a left objective 208b and a right objective 208a mounted along the axis of the left eye piece 205b and the right eye piece 205a and the objectives 208a, 208b are positioned independent of each other.

At each of the left objective 208b and the right objective 208a, at-least one primary mirror 209b for the left objective 208b and another primary mirror 209a for the right objective 208a is positioned such that the plane of the mirrors 209b, 209a is normal to the optic axis of the left objective 208b and the right objective 208a.

A pair of telescoping arms comprising a left telescoping arm 210b and a right telescoping arm 210a which are substantially perpendicular to the optic axis of each of the left objective 208b and the right objective 208a is provided. At least one focusing mirror 211 is mounted on the outermost section of each of the telescoping arms 210, along the same orientation as that of the primary mirrors 209a, 209b to reflect the beam received from the target object 204 onto the left eye piece 202b and the right eye piece 202a. An illumination source 213 is provided below the telescoping arms or arranged co-axially with the optical axis of the microscope. A plain polarized filter 212 is mounted on a slot provided on the outermost section of each of the telescoping arms 210.

Variable 3-D stereomicroscope assembly with a flexible fiber optic arm (fig 5)

The variable 3-D stereomicroscope 200 comprises a housing 201 which includes an eye piece unit and an objective unit. The eye piece unit includes a left eye piece 205b assembled inside the housing 201 for left eye viewing of a target object 204 and a right eye piece 205a assembled inside the housing 201 for right eye viewing of a target object 204.

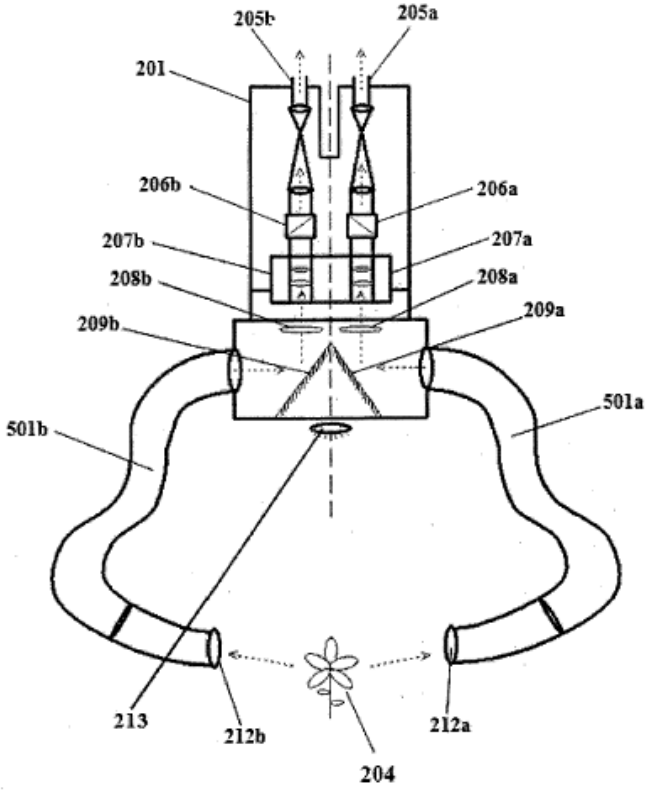

FIG. 5

Variable 3-D stereomicroscope assembly with a flexible fiber optic arm

A beam splitter arrangement 206 is mounted below the left eye piece 205b and the right eye piece 205a. The beam splitter arrangement includes a left beam splitter 206b and a right beam splitter 206a. A left zoom changer 207b and a right zoom changer 207a are operably coupled to the left and right beam splitters 206b, 206a.

The objective unit includes a pair of objectives such as a left objective 208b and a right objective 208a mounted along the axis of the left eye piece 205b and the right eye piece 205a and the objectives 208a, 208b are positioned independent of each other.

At each of the left objective 208b and the right objective 208a, at-least one primary mirror 209b for the left objective 208b and another primary mirror 209a for the right objective 208a is positioned such that the plane of the mirrors 209b, 209a is normal to the optic axis of the left objective 208b and the right objective 208a. Pair of flexible fiber optic arms comprising a left fiber optic arm 210b and a right fiber optic arm 210a which are substantially perpendicular to the optic axis of each of the left objective 208b and the right objective 208a are provided. An illumination source 213 is provided below the telescoping

arms. A plain polarized filter 212b and 212a are mounted on a slot provided on the outermost section of each of the left fiber optic arm 210b and right fiber optic arm 210a respectively.

The inter-objective distance of the variable 3-D stereomicroscope 200 is varied by having a mechanical and an optical device in the objectives of the housing of the stereomicroscope 200 to allow the variable 3-D stereomicroscope 200 to focus on the target object 204 with a greater degree of the 3-D vision.

The variable 3-D stereomicroscope assembly enables to adjust the degree of convergence to the minimum of 10 degrees to the maximum of 120 degrees of the objectives to vary the inter-optical distance to enhance the 3-D effect or depth perception.

Thus, the variable 3-D stereomicroscope assembly enable to adjust the degree of convergence of the objectives to a desired level and to vary the inter-optical distance of the left and right incident light beams easily, efficiently and accurately to enhance the 3-D effect or depth perception.

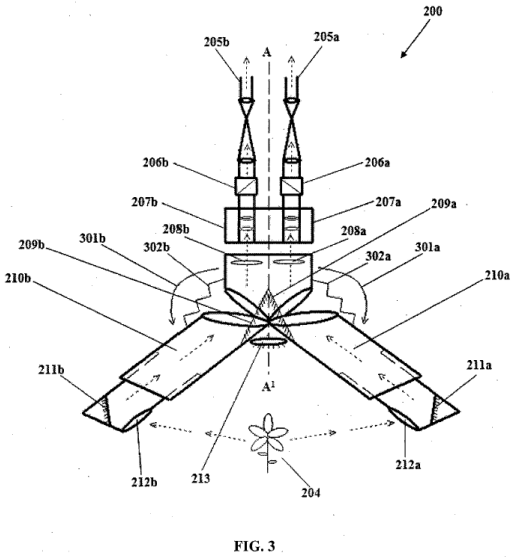

FIG. 3

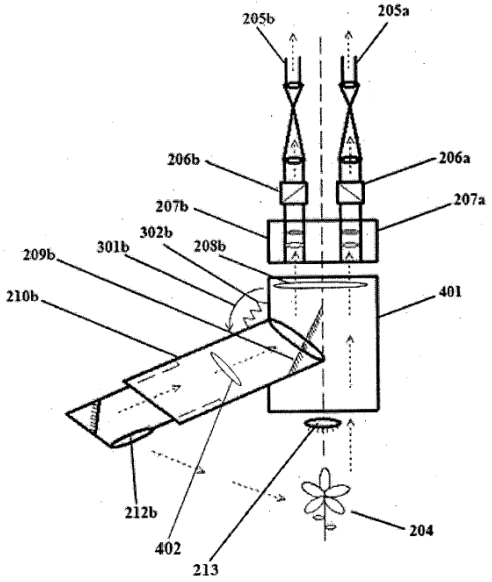

FIG. 4

Fig-3 **3D stereomicroscope assembly showing the hinge movement of the telescoping arm**

Fig-4 **3D stereomicroscope assembly showing a detachable adaptor with one telescoping arm**

Applications:

- Proposed Stereomicroscope device has immense practical applications in many industrial and medical or surgical or other areas offering increased depth of perception of the target object and offers increased field of vision.

Patent Status

- International Patent Application number PCT/IN2011/000141.
- EP, Australian and Israel Patent Pending.
- Indian Patent Pending.

Related Technology:

Dual objective 3-d stereomicroscope, patent application numbered PCT/IN2011/000147

Stereomicroscope with dual objective lens so that each of the objective lens is moved independent of each other about the axis of the stereomicroscope to increase the depth of perception of a target and to increase a field of vision of a target. The first objective lens and the second objective lens are moved synchronously or asynchronously without compromising on a target fixation.

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