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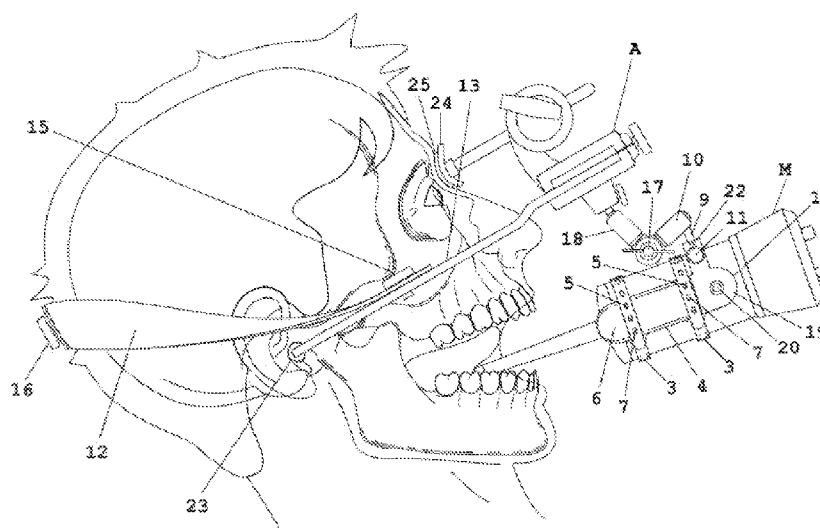
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(54) Title: UNIVERSAL EXTRA-ORAL SUPPORT ACCESSORY FOR PORTABLE MICROSCOPES

FIG. 7



(57) Abstract: The present invention refers to an extra-oral accessory for fastening around the head for sustaining of SDF (Sidestream Dark Field), IDF (Incident Dark Field) or similar portable microscopes for capture of videos of the sublingual microcirculation, hands free by the health professional, providing video capture stability and control of the contact pressure of the camera edge on the organ, comprising flat support(1), which configures a seat for housing of the sublingual microscope (M), provided with two adjustable locking straps (3), which enclose the outer perimeter of the sublingual microscope (M) and are locked by pins (5), with the referred sustaining assembly (1) and the microscope (M) locked to a facial arc apparatus (A) from its articulated arms (10), comprised by an adjustable cranial strap (12) fastened to the facial arc apparatus (A) from the rods (13) of the ears, which can involve the head of the patient to be monitored.

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UNIVERSAL EXTRA-ORAL SUPPORT ACCESSORY FOR PORTABLE MICROSCOPES

[001] The present invention refers to an arrangement introduced in extra-oral sustaining accessory, which provides video capture stability and control of the contact pressure of the camera edge on the organ, for devices of capture of videos of the sublingual microcirculation.

[002] The present invention comprises means for stabilization, support and locking in a non-invasive way of the equipment, such as a portable microscope of capture of image of the sublingual microcirculation, by a flat support to be coupled to a facial arc apparatus, and the referred support is provided with adjustable locking straps, which involve the body of the SDF (Sidestream Dark Field), IDF (Incident Dark Field) or similar equipment that may appear, making this accessory universal for acquiring videos of the sublingual microcirculation.

[003] The present invention also comprises an adjustable strap coupled to the facial arc from the rods with its autoclavable ears, for firm fastening of the assembly around the head, which actuates together with the silicone nose support, preventing the motion of the assembly during microscope monitoring data read and capture.

[004] The accessory adapted for the facial arc apparatus enables the physician or responsible to perform hands-free operation of the equipment, capture of video with precise result and without data loss or changes, as the equipment is firmly fastened around the patient's head, for accurate read of the sublingual microcirculation.

DESCRIPTION OF THE STATE OF THE ART

[005] In the current state of the art, several arrangements are known and applied for capture of videos for medical treatments, such as in portable manual microscopes for capture of sublingual microcirculation movies.

[006] The microcirculation is comprised by blood vessels with diameters less than 100 micrometers (μm), and plays a crucial role in the physiological

processes for oxygenation of organs and nutrition changes in human beings. In a severe systemic disease (e.g. sepsis), the microcirculation dysfunction precedes the macro-circulation dysfunction to all the organs of the human body. Monitoring the microcirculation is very useful and the patient can be medicated in advance, in case of identification of microcirculation dysfunction.

[007] To monitor the microcirculation in human beings, the area most studied globally is the sublingual one, as it is very easy to be accessed and the procedure is not invasive. This monitoring is performed by healthcare professionals (physicians, nurses and researchers) in the bedside of patients, by using manual portable microscopes for capture of sublingual microcirculation videos, which are transmitted and converted, in real time, to a display monitor, connected to a computer running software specific for microcirculation video analysis (as shown in figure 2).

[008] The expression 'artifact' refers to a results that do not manifest the natural phenomena being researched and that can be classified as pressure, lighting, focus, content and of focus.

[009] Using videos of manual microscopes (HVM - Handheld vital microscopes) to evaluate the microcirculation function requires artifact-free measurements. Thus, the disposable edge of the camera that captures the microcirculation movie shall touch the tissue surface with the specific sensitivity required.

[0010] The microscope (HVM) is sensitive to motion and pressure artifacts during the movie capture, as the system requires contact between the camera edge and the tissue to be analyzed, and also enlarges the microcirculation movie more than 300X. When the portable microscope is handled by the examiner, a simple tremor of the hands generates a change of stability in the movie capture and of the sublingual blood microcirculation flow, thus compromising the monitoring data. Once the microcirculation is just below the microscope, the excess pressure applied on the area may enable achieving wrong diagnostic of low blood flow (INCE.C 2018) and the research becomes unreliable (De Backer 2007). The risk of achieving biased results is high when they depend on the researcher's ability to handling the HVM without artifacts.

[0011] The achievement of movies of better quality with HVM requires substantial training of the operator, who must know the best practices to optimizing comfort and usability (Massey 2016).

[0012] Today, the microscopes (HVM - Hand-held vital microscopes) most used are known as "SDF". Sidestream Dark Field or "IDF", Incident Dark Field.

OBJECTIVES OF THE INVENTION

[0013] To solve the awkwardness of the current technique, the present invention enables the hands-free use of the HVM, i.e. the handheld vital microscope, which exhibits a constructive arrangement applied on universal hands-free extra-oral support accessory, which releases the researcher's hands from holding the handheld microscope in the capture of live sublingual microcirculation videos. This provides to the professional in charge the necessary independence to monitoring and capturing sublingual microcirculation videos without using the hands to hold the SDF (Sidestream Dark Field), IDF (**Incident Dark Field**) or similar handheld microscope in the sublingual area that best represents the microcirculation desired. It performs the monitoring exam of the sublingual microcirculation after fastening the "Hands-Free" HVM with options for adjustments around the patient's head and search for the exact position of the microscope on the microcirculation desired, generating the control required for stability of the video captured and the contact pressure of the camera edge on the organ.

This provides better safety in the data for microcirculation flow analysis, also enabling an analysis of the same circulation for several minutes, or within the desired period, eliminating known obstacles and biases of the state of the art.

[0014] The present invention is comprised by a flat support provided with adjustable fastening straps, which support and receive the body of a handheld microscope to obtaining sublingual microcirculation movies, and such flat support is fastened to the articulated arms of a facial arc apparatus. A second mean to locking the assembly is made by an adjustable cranial strap, which projects from the rods of the ears of the facial arc apparatus, which actuates together with the nose support provided by a silicone damper.

A major benefit of the present invention refers to the fact that the flat support and the respective adjustable locking straps offer sustaining and fixation of the handheld microscope camera, and once selected the read position by the professional, the actuation of the locking means of the articulated arms in the facial arc apparatus ensures that the microscope does not move for an accurate read of the monitoring data desired, thus not compromising or changing the data.

[0015] Furthermore, the existence of a cranial strap coupled to the ears' rods, together with the silicone nose support of the facial arc apparatus provides more secure fastening and locking of the head assembly. The patient can move the head without changing the sublingual microcirculation movie. This safety prevents undesired motions and consequent loss or compromise of the monitoring data of the sublingual region or specific mouth area of interest to the examiner.

DESCRIPTION OF DRAWINGS

[0016] The object of the present invention will be described in more details by using the attached figures, in which:

[0017] Figure 1 is a perspective view that exhibits the form of utilization of a microscope for capture of sublingual image in accordance with the state of the art;

[0018] Figure 2 is a schematic view of a microscope for capture of sublingual image used for that purpose and coupled to a display monitor and computer, in accordance with the state of the art;

[0019] Figure 3 is a side exploded view of the extra-oral support accessory of the present invention, which can be coupled to a facial arc apparatus for sustaining a sublingual microscope;

[0020] Figure 4 is a side view of the extra-oral support accessory, coupled to a set of articulated arms of the facial arc apparatus, with the microscope fastened by the locking straps, in use and read position;

[0021] Figure 5 is a front view of the extra-oral accessory showing the section A-A indicated in Figure 4;

[0022] Figure 6 is an exploded perspective view of a facial arc apparatus, known in the state of the art, exhibiting the extra-oral accessory for support of sublingual microscope and the cranial strap for fastening the ear rods of the facial arc apparatus;

[0023] Figure 7 is a schematic side view exhibiting the extra-oral support accessory in work position, with the sublingual microscope connected to it and fastened by the locking straps, with the facial arc apparatus supported on the patient's head, and the assembly fastened by the adjustable cranial strap; and

[0024] Figure 8 is schematic view of a microscope for capture of sublingual image used for that purpose, coupled to the extra-oral accessory and connected to a display monitor and computer.

DETAILED DESCRIPTION OF THE INVENTION

[0025] According to Figure 3, the present invention comprises an extra-oral accessory with a flat support (1), preferably of elliptical shape, provided with central concave recess (2), which configures a seat for housing a sublingual microscope (M).

[0026] This support (1) is provided with two locking straps (3), which project from the lower side (4) of the support (1), with enough length to involve the whole outer perimeter of the microscope (M) and reach the locking pins (5), which project from the flat surface (6) of the support.

[0027] The locking straps (3) have certain elasticity and are provided with a sequence of holes (7), which fit on the locking pins (5) and fasten the microscope (M) on the support (1), being configured as fastening clamps.

[0028] As shown in Figures 3 to 5, the support (1) receives a perpendicular adapter (19) fastened by a screw (20) to the hole (21); this perpendicular adapter (9) has a rectangular seat (8) with lateral opening (22), which receives and houses the cylindrical shaft (9) of a lower articulated arm (10) of a facial arc apparatus (A), which shaft (9) has flattened tip containing a pass-through transversal screw with handle (11).

[0029] The fixation of the flattened tip to the cylindrical shaft (9) is made by the tightening handle (11), which secures transversally to the opening of the

rectangular seat (8) of the perpendicular adapter (19) fastened on the flat surface (6) of the support (1).

[0030] Also as shown in Figure 3, the extra-oral accessory has a second fastening man, comprised by adjustable cranial strap (12), fastened to the facial arc apparatus (A) from the rods (13) of the ears (23), and such rods (13) have holes (14) that receive securing screws (15), aggregating this cranial strap (12) to the structure of the facial arc apparatus (A).

[0031] The cranial strap (12) is adjustable and provided with a rotary element (16) for adjusting the tension around the patient's head . Thus, it provides secure fastening and locking of the facial arc apparatus (A) together with the nose support (24), coated with a silicone damper layer (25), reducing the possibility of motion of the assembly and eventual monitoring data loss by the sublingual microscope (M).

[0032] As best shown in Figures 7 and 8, once the microscope (M) is fastened to the support (1) by the locking straps (3) and pins (5), and with the assembly linked to the facial arc apparatus (A) by fixation of the shaft (9) of the lower articulated arm (10) to the support (1), the data read position is selected in the sublingual region of the patient and the locking mean (17) of the lower (10) and upper (18) articulated arms is actuated, locking the assembly position. Complementary, the cranial strap (12) has its tension adjusted from the rotary element (16), promoting firm fastening of the whole assembly around the patient's head together with the nose support (24) coated with silicone (25).

CLAIM

1) "UNIVERSAL EXTRA-ORAL SUPPORT ACCESSORY FOR PORTABLE MICROSCOPES VIDEO'S CAPTURE OF THE SUBLINGUAL MICROCIRCULATION WITH SIMULTANEOUS CONTROL OF PRESSURE CONTACT AND STABILITY", comprising a facial arc (A) characterized for receiving a flat support (1), preferably of elliptical shape, provided with central concave recess (2), which configures a seat for housing a sublingual microscope (M), which is accommodated on that central concave recess (2) of the support (1); this support (1) is provided with two locking straps (3), which project from the lower side (4) of the support (1), involving the outer perimeter of the sublingual microscope body (M), and these locking straps (3) have enough length to involve the whole outer perimeter of the microscope (M) and reach the locking pins (5) that project from the flat surface (6) of the support (1); the locking straps (3) have certain elasticity and are provided with a sequence of holes (7), which fit on the locking pins (5) and fasten the microscope (M) on the support (1); the support (1) receives a perpendicular adapter (19) fastened by a screw (20) to the hole (21); this perpendicular adapter (19) has a rectangular seat (8) with lateral opening (22), which receives and houses the cylindrical shaft (9) of a lower articulated arm (10) of a facial arc apparatus (A), which shaft (9) has flattened tip containing a pass-through transversal screw with handle (11); the fixation of the flattened tip to the cylindrical shaft (9) is made by the tightening handle (11), which secures transversally to the opening of the rectangular seat (8) of the perpendicular adapter (19) fastened on the flat surface (6) of the support (1); the extra-oral accessory has a second fastening man, comprised by adjustable cranial strap (12), fastened to the facial arc apparatus (A) from the rods (13) of the ears, and such rods (13) have holes (14) that receive securing screws (15), aggregating this cranial strap (12) to the structure of the facial arc apparatus (A), and the cranial strap (12) is adjustable and provided with a rotary element (16) for adjusting the tension around the patient's head, which actuates together with the nose support (24), coated with a silicone damper layer (25); once the microscope (M) is fastened to the support (1) by the locking straps (3) and pins (5), and with the

assembly linked to the facial arc apparatus (A) by fixation of the shaft (9) of the lower articulated arm (10) to the support (1), the data read position is selected in the sublingual region of the patient and the locking mean (17) of the lower (10) and upper (18) articulated arms is actuated, locking the assembly position.

FIG. 1
(State of the art)

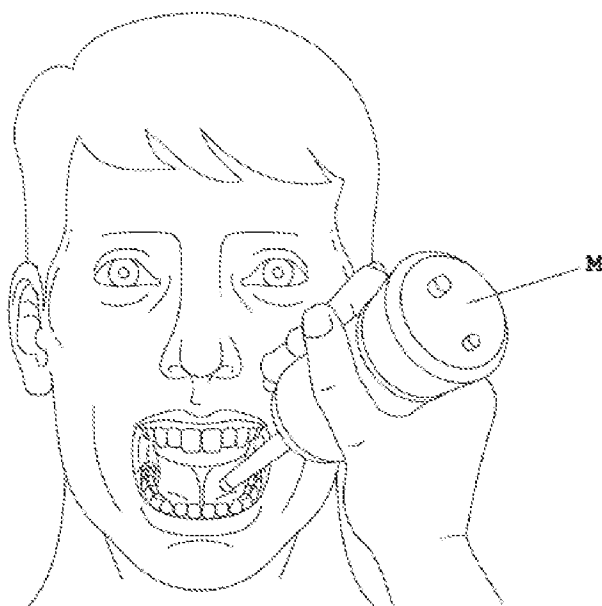
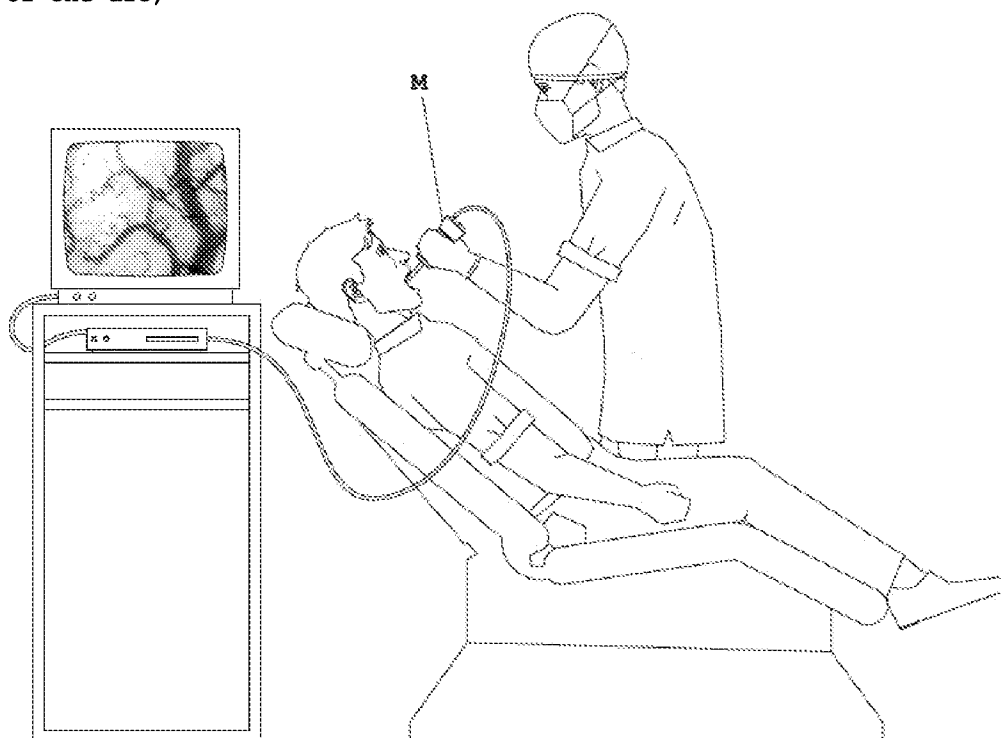


FIG. 2
(State of the art)



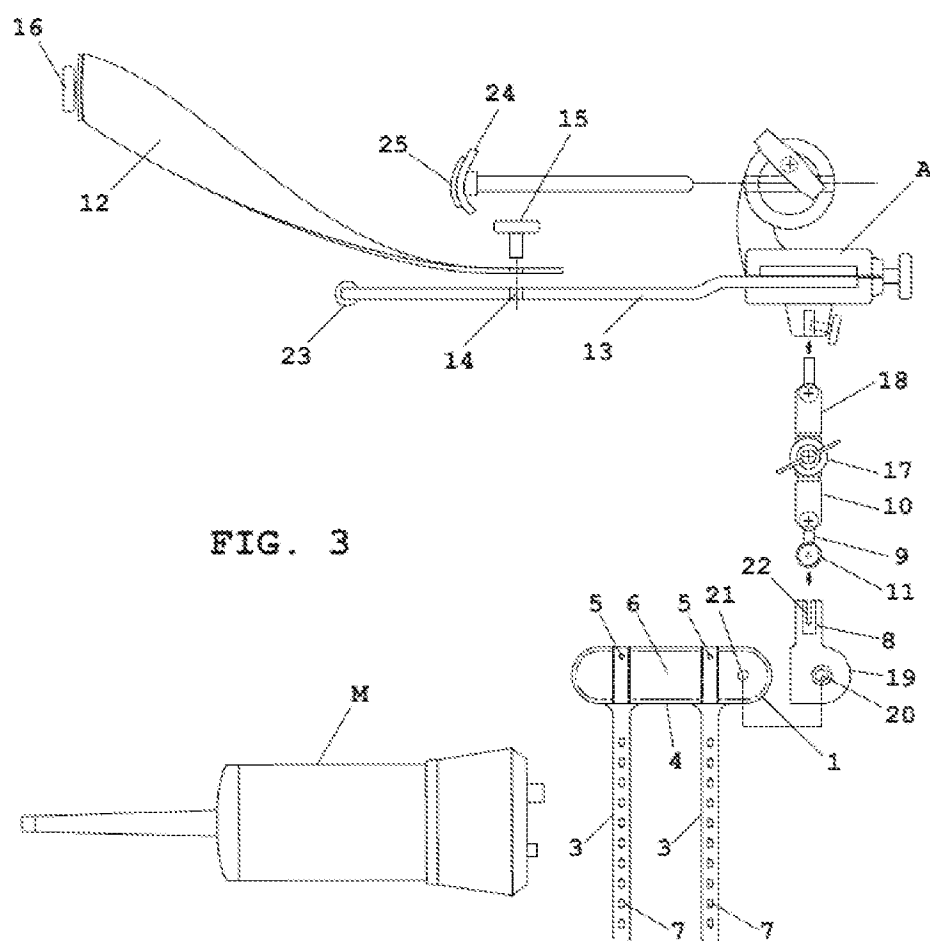


FIG. 3

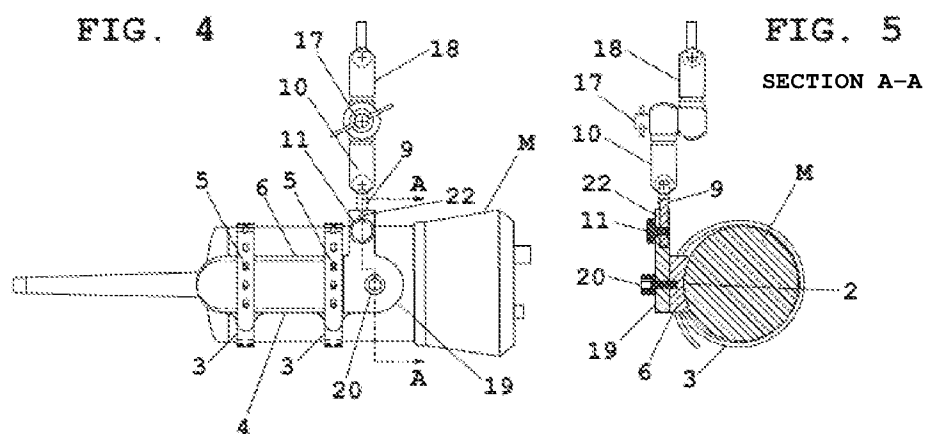


FIG. 4

FIG. 5

SECTION A-A

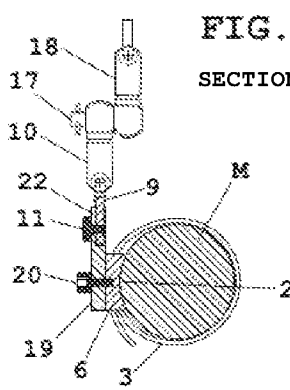


FIG. 6

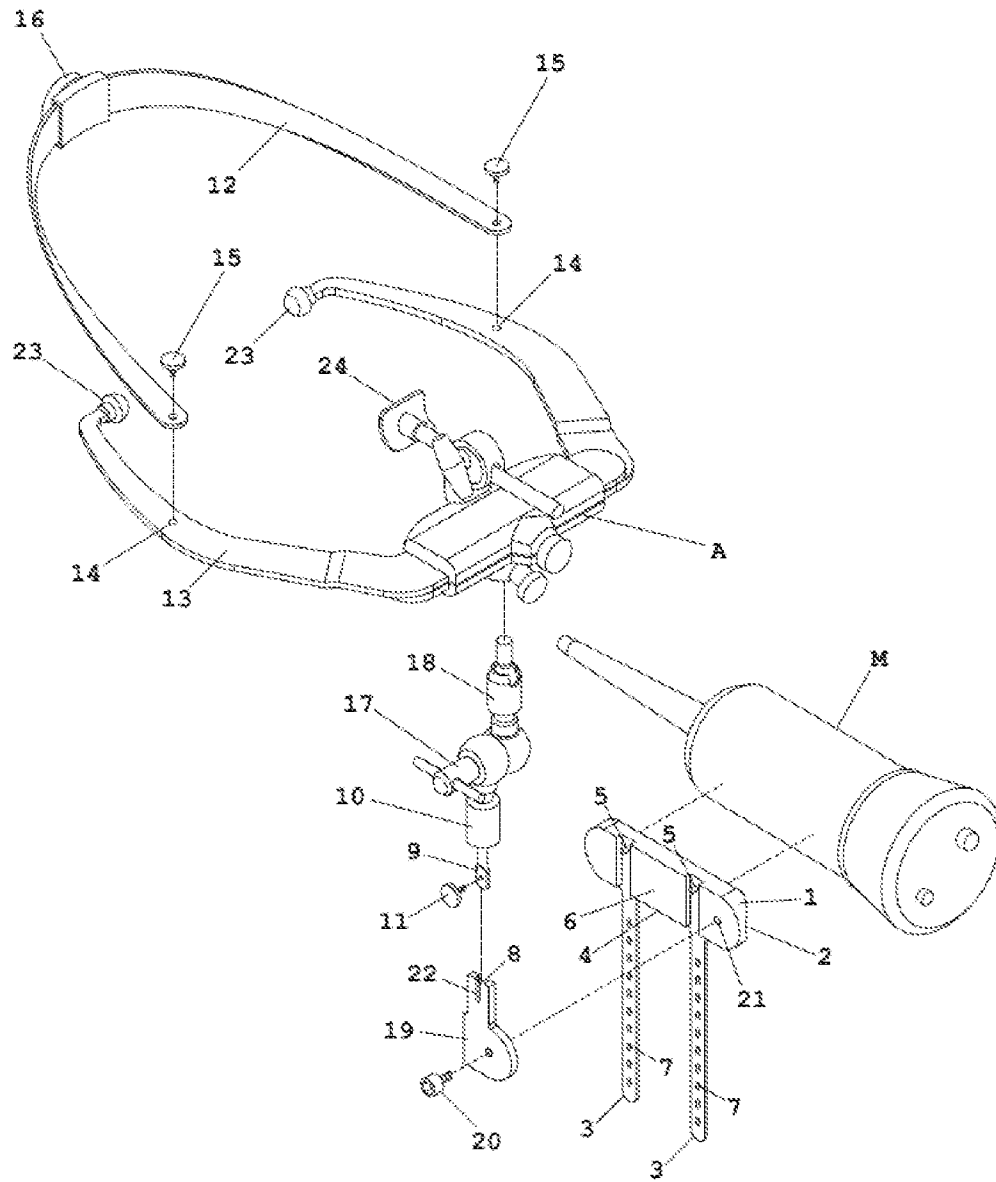


FIG. 7

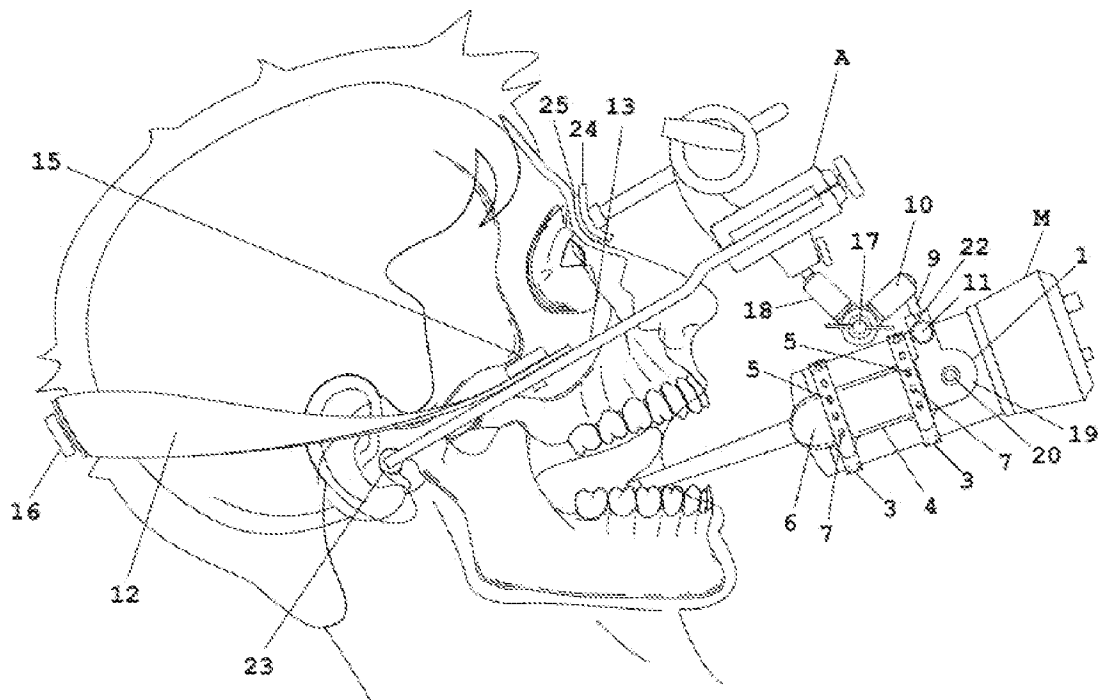
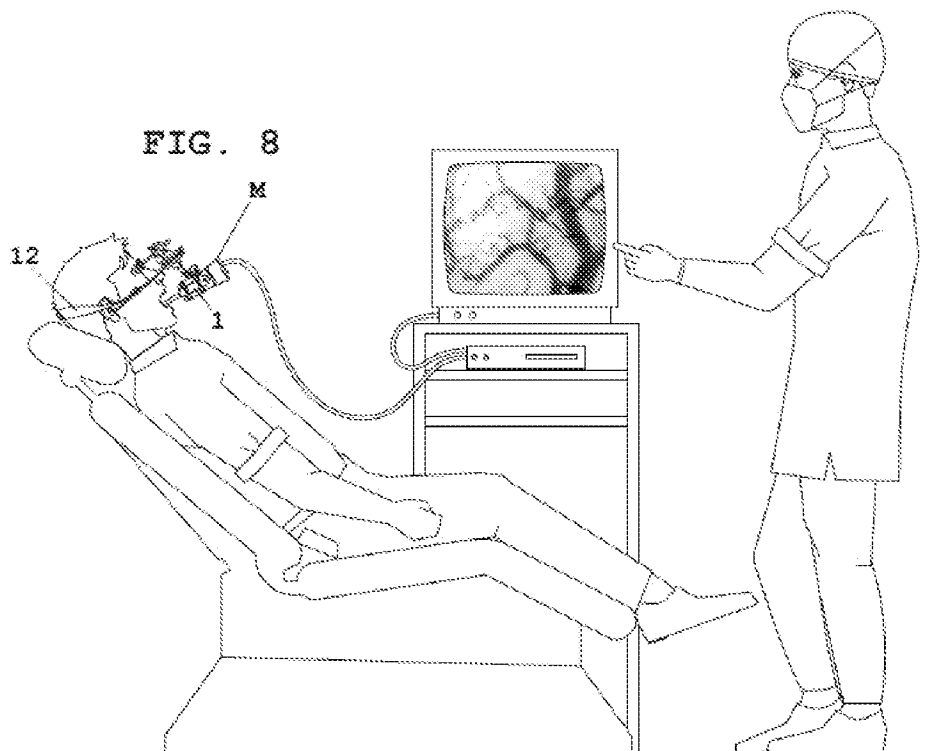


FIG. 8



INTERNATIONAL SEARCH REPORT

International application No.

PCT/IB 19/52627

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - A61C 19/04, A61B 1/24, A61B 1/247 (2019.01)

CPC - A61C 19/04, A61B 1/00147, A61B 1/24, A61B 1/247, A61B 13/00, A61B 2576/02, A61M 2210/0625

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

See Search History Document

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

See Search History Document

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

See Search History Document

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 102017005185 A1 (OSTERMEIER) 06 December 2018 (06.12.2018), Fig 1-4; para [0024], [0029], [0030]; claim 1, 6	1
A	US 4,695,252 A (EDWARDSON) 22 September 1987 (22.09.1987), Fig 1-4; col 4-5	1
A	CN 202553892 U (LUO) 28 November 2012 (28.11.2012), abstract; Figure	1
A	US 2015/0118638 A1 (COWBURN) 30 April 2015 (30.04.2015), abstract	1
A	US 2010/0217130 A1 (WEINLAENDER) 26 August 2010 (26.08.2010), entire document	1

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Date of the actual completion of the international search

28 August 2019

Date of mailing of the international search report

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