A set for producing illuminated zones of extremely clean atmosphere is provided. The set comprises a laminar flow unit and illuminating equipment consisting of a source of light and a deviating system for the light, the source of light being installed outside and the deviating system inside the zone of extremely clean atmosphere.
SET FOR PRODUCING ILLUMINATED ZONES OF EXTREMELY CLEAN ATMOSPHERE

The present invention relates to a set comprising a laminar flow unit and illuminating equipment to produce illuminated zones of extremely clean atmosphere.

Contamination of working places by foreign particles and germs from the surrounding atmosphere can be excluded with the aid of modern clean air techniques according to the laminar flow principle with a safety that is several decimal powers higher than that of methods hitherto used, provided, however, that on the respective working places laminar flow currents of air of high quality are maintained.

Working places requiring extreme cleanliness are, for example, operating tables in surgery. It has been proposed to use laminar flow units to produce zones of extremely clean atmosphere in operating rooms. A drawback with these units is, however, the arrangement of reflectors indispensable for operations. They have relatively large dimensions and thus impede the flow at the working place proper and by the strong generation of heat a warm air current is produced which disturbs the laminar flow current so that at the critical place, i.e., where the patient lies, the laminar flow collapses. Thus the control of the air flow is lost, as is the laminar flow transport of particles or germs. The essential characteristic of the laminar flow principle is no longer maintained.

Attempts have been made to replace the reflectors by uniformly distributed cold fluorescent lamps, but the illumination thus obtained is insufficient for modern operation technics. Hence, in spite of their disadvantage, it is not possible to do without reflectors.

It is the object of the present invention to provide the required illumination of the place of operation and simultaneously to produce at the said place a controlled current of first quality air preventing the transport of contaminants from the surroundings to the operating table.

The set according to the invention comprises a laminar flow unit and illuminating equipment to produce illuminated zones of extremely clean atmosphere, wherein the illuminating equipment consists of a source of light and a deviating system for the light, the source of light being installed outside and the light deviating system inside of the zone of extremely clean atmosphere.

The deviating system consists of at least one mirror or prism or light-conducting cable. Deviating systems consisting of small mirror strips or a plurality of narrow prisms are preferred so that no "shadow" with respect to flow technics is formed at the place of operation.

The set according to the invention is equally suitable for vertical and horizontal arrangement. With vertical arrangement the lateral limitation of the laminar flow unit should be provided with an opening for the light in such a manner that a partial current of the laminar flow in the zone of the source of light emerges from the laminar flow unit. The design of such an opening gives a sufficient security from the penetration of impurities from the surroundings.

The set according to the invention will now be described in detail and by way of example only with reference to accompanying drawings wherein: FIGS. 1 and 2 illustrate the state of air of laminar flow units in vertical and horizontal arrangement. FIGS. 3–5 illustrate respective embodiments of the present invention.

Referring to the drawings:

Through a preliminary filter 12 air is introduced into the laminar flow unit consisting of enclosure 1, in which are installed fans (not shown) and high-efficiency filters 6, with lateral limitations or curtain walls confining the flow of air to a predetermined area. 10

High-efficiency filters 6 purify the air and produce a parallel flow of air 2 in the sense of laminar flow technics. With a vertical arrangement as shown in FIG. 3 one lateral limitation or wall 11 of the laminar flow unit has an opening 10 through which the light of reflector 8, which is outside of the laminar flow unit, enters the unit. At the place where it is provided with opening 10, limitation 11 is fastened at enclosure 1 in such a manner that part of the air current 2 can emerge from the laminar flow unit. This partial current 9 prevents contaminated air from penetrating the zone of clean air. At the deviating system 7, consisting of mirrors or prisms, the light is deviated so that the working place 3 is fully illuminated. Several mirrors arranged at distances with respect to one another have the advantage that the flow pattern of the air is practically not disturbed and nevertheless almost the entire light reaches the working place. The same applies to the use of prisms.

In the case of a horizontal arrangement, it is expedient to conduct the light onto the deviating system 7 in a direction opposite to the direction of air current 2.

In the known sets of this type, as shown in FIGS. 1 and 2, the reflector 8 is within the laminar flow unit. As can be seen by the flow pattern of the air, the reflector causes the formation of air whirls and, owing to the upcurrent due to hot air, uncontrolled back and transverse currents 4 are formed. The uncontrolled flow prevents the supply of extremely clean air, the elimination of contaminations set free by the working process, or operation and promotes the transport of impurities to the working place or patient 3. In the drawings, numeral 5 indicates the working personnel from which air should possibly not be directed to the working place 3.

What is claimed is:

1. A device for illuminating and providing clean air to a clean room comprising, in combination, means for producing laminar flow of clean air in at least a predetermined portion of said room and means for producing an illuminated zone in the clean air laminar flow in the room, said means for producing a laminar zone comprising a source of light located outside of the laminar air flow in said predetermined portion of the room for directing light thereto and means positioned in the path of said laminar air flow and in said predetermined portion of the room, for deviating light from said light source to a predetermined location within said laminar air flow while substantially maintaining said laminar air flow to said predetermined portion of said room.

2. The device of claim 1, wherein the deviation means consists of at least one mirror.

3. The device of claim 1, wherein the deviating means consists of at least one prism.

4. The device as defined in claim 1 wherein said laminar air flow produces in mentioned manner said laminar air flow along a horizontal path across a predetermined portion of the room, said source of light being located
in said room on the side of said predetermined portion of the room opposite said air flow producing means.

5. The device as defined in claim 1 wherein said means for producing laminar air flow produces laminar air flow outside of said clean room adjacent a wall portion thereof and in a vertical direction, said wall portion of the clean room having an opening therein and said source of light being located outside of said room adjacent said wall portion thereof and positioned to direct light through said opening to said light deviating means, whereby heat produced from said light source is kept outside said clean room and the laminar flow of air along said wall portion prevents contaminants from entering said room through said opening.

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