(12) UK Patent Application (19) GB (11) 2 255 201 (13) A

(43) Date of A publication 28.10.1992

(21) Application No 9209092.7

(22) Date of filing 27.04.1992

(30) Priority data
(31) 9109141 (32) 27.04.1991 (33) GB

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(51) INT CL[5]
G02B 5/24

(52) UK CL (Edition K)
G2J JFF

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(58) Field of search
UK CL (Edition K) G2J JFF
INT CL[5] G02B

(54) Optical fluid filter having displaceable light transmitting members

(57) A filter for a light beam comprising mutually opposed light transmitting membranes 41, 42 containing between them a light obstructing or modifying fluid material; the membranes 41, 42 being displaceable relatively against one another to expel said material out of an area of the membranes to permit the incident light to pass through the membranes.

Electrical devices 51, 53 change in axial length in response to the application of electrical power which causes plates 41 and 42 to contact each other and expel mercury from the central region allowing light to pass through 45a, 50c, 51a, 41, 42, 53a, 52c and 47a in the example shown.

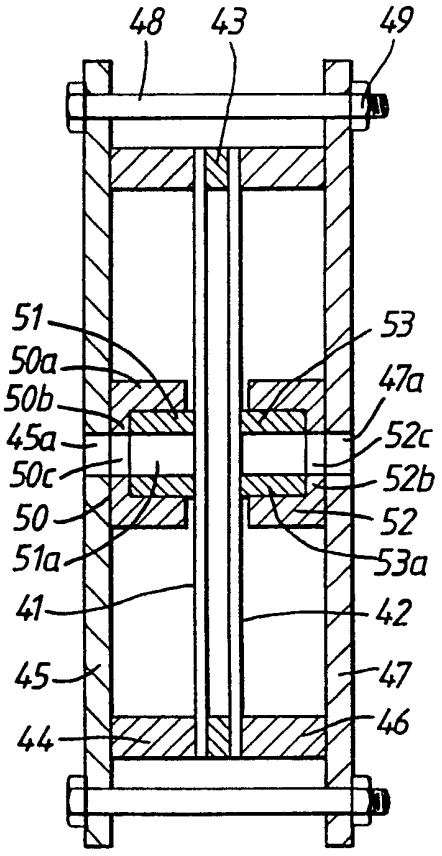

Fig.8.

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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

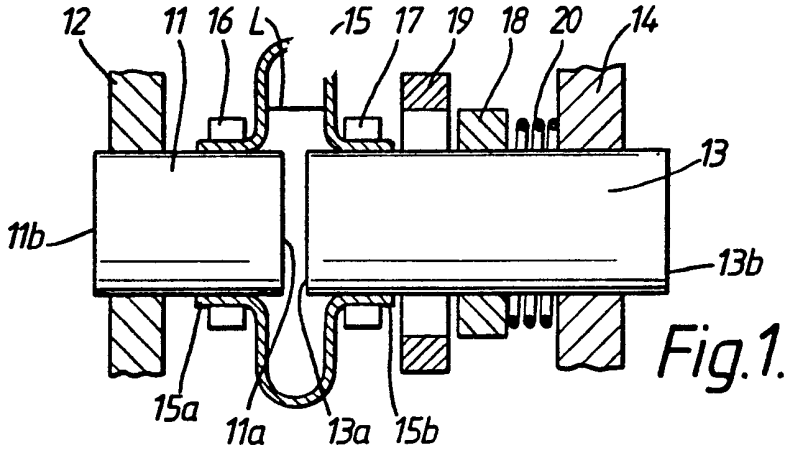

Fig.1.

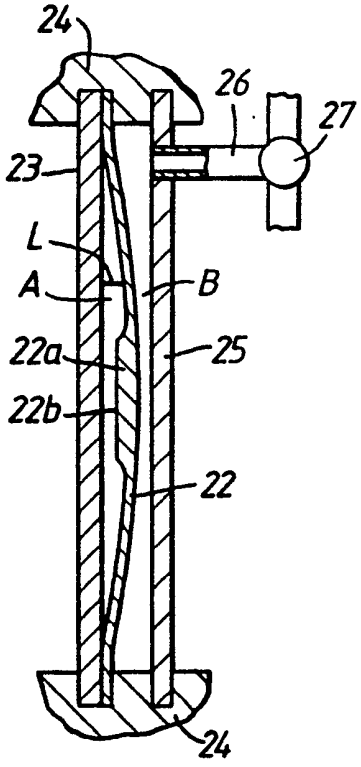

Fig.2.

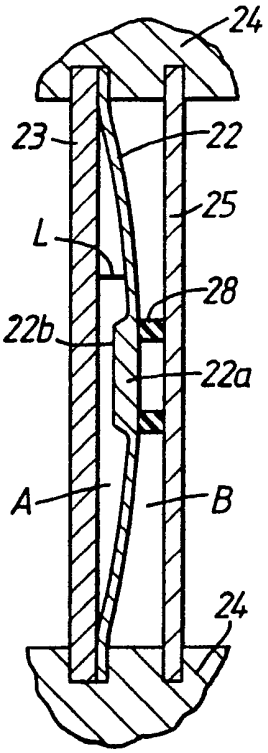

Fig.3.

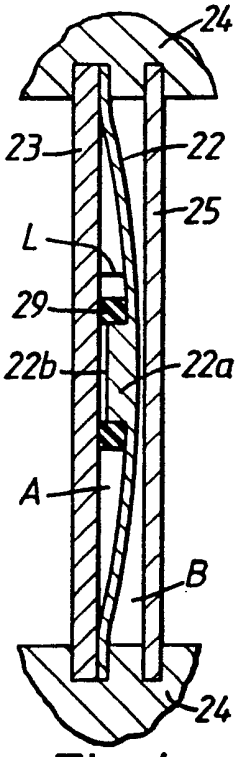

Fig.4.

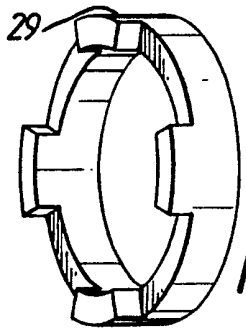

Fig.5.

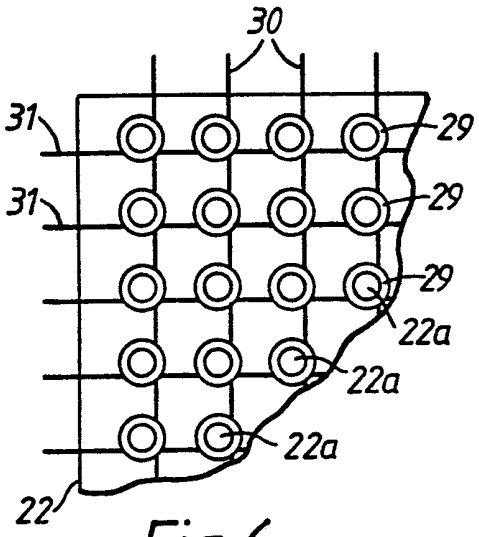

Fig.6.

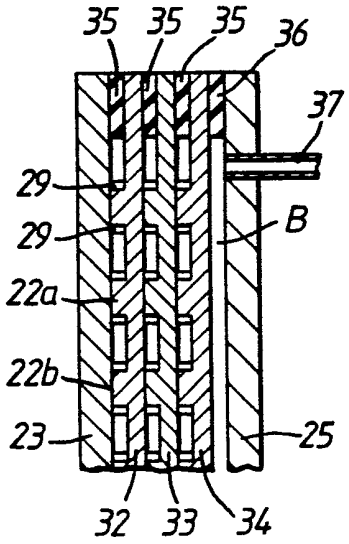

Fig.7.

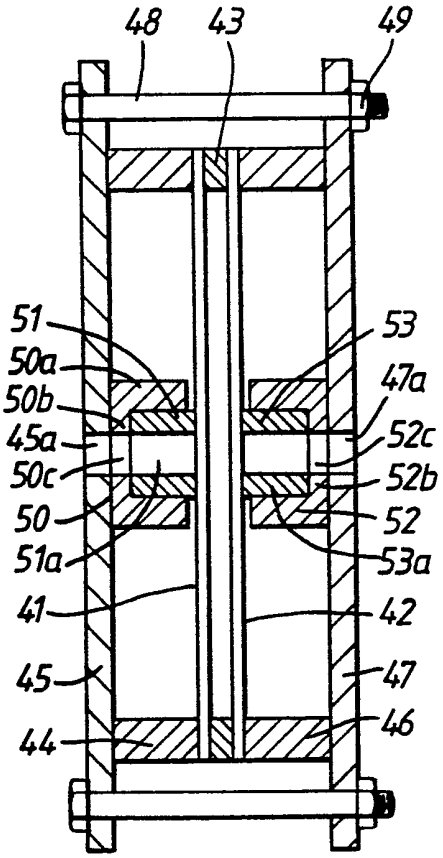

Fig.8.

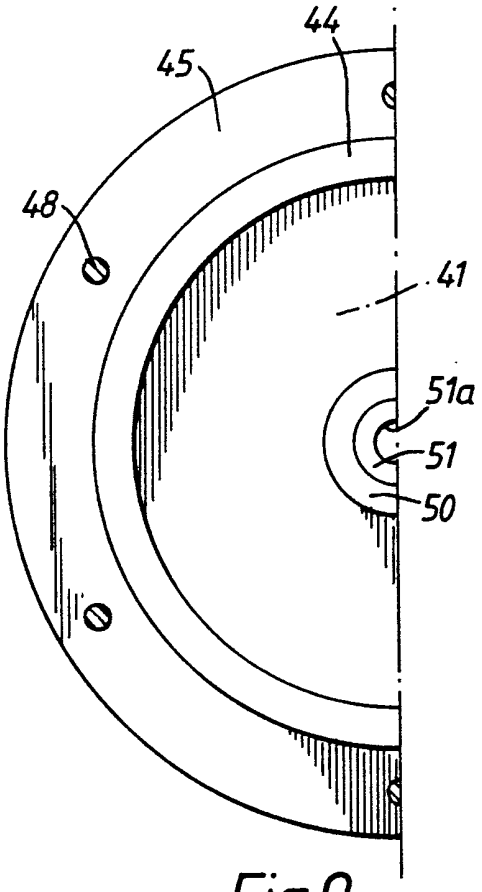

Fig.9.

"IMPROVEMENTS IN OR RELATING TO FILTER ARRANGEMENTS"

This invention relates to filter arrangements and, more particularly, to a filter arrangement intended to lie in the path of a light beam to effect a change to light passing through the filter arrangement.

In this specification the term "filter arrangement" means any arrangement capable of affecting the transmission of light through the arrangement and includes arrangements from selectively blocking the transmission of light through the arrangement.

It is well known in the art to change the colour of a light beam, or to totally obstruct the passage of light, by introducing a sheet of coloured material into the path of the light beam. Generally such prior art filter arrangements comprise coloured sheet elements which are movable into, and removable from, the path of the light beam by mechanical actuating means and, therefore, such prior art filter arrangements have a relatively slow response time.

The present invention seeks to provide a filter arrangement for a light beam which has a relatively fast

response time.

According to the present invention there is provided a filter arrangement for a light beam comprising first and second members with a fluid filter material therebetween and means for displacing a defined area of said first member into and out of pressure contact with said second member.

In one embodiment said first member comprises a solid member and said means for displacing displaces the whole of said first member towards and away from said second member. With such an arrangement said defined area of said first member conveniently comprises the leading face of said first member.

In another embodiment said first member comprises a flexible member and said means for displacing is arranged to displace part of said first member towards and away from said second member.

Preferably said first member comprises a flexible sheet and said defined area is displaced from the general plane of said sheet.

In one preferred embodiment in accordance with the invention the first and second members comprise flexible sheet-like members with their peripheral edges secured in fixed relationship by a rigid frame.

In one embodiment in accordance with the invention said means for displacing comprises first means for displacing said defined area of said first member into pressure contact with said second member and means for displacing said defined area of said first member out of pressure contact with said second member.

In one embodiment in accordance with the invention said first member comprises a flexible resilient member and said flexible, resilient member is resiliently stressed, in a plane or planes parallel to said defined area, whereupon said flexible resilient member continuously urges the defined area of said first member into pressure contact with said second member.

In a preferred embodiment said means for displacing

comprises an electrical device which, when electrically actuated, undergoes a change of position or a change of shape.

In one embod ıt said electrical device may conveniently comprise a solenoid arrangement but in other embodiments said electrical device conveniently comprises a piezo electric device or an electro-strictive device.

In a preferred embodiment in accordance with the invention said first member presents a plurality of defined areas arranged to be displaced into and out of pressure contact with said second member.

In a preferred embodiment the arrangement includes means individual to each defined area of said first member whereby each said defined area can be independently moved into and out of pressure contact with said second member.

In one embodiment in accordance with the invention the filter arrangement comprises a second member and a plurality of first members arranged in close parallel relationship with each said first member presenting a defined area on one side of that member, the defined areas of said first members being in axial alignment, means for displacing each defined area into and out of pressure contact with the adjacent member, and a fluid filter material between said adjacent members.

In another embodiment each of said first members presents a plurality of defined areas spaced over one major surface thereof, the first members are of identical construction whereupon each defined area on each member is axially aligned with a defined area on each of the other first members, and means associated with each defined area for displacing that defined area into and out of contact with the member immediately adjacent thereto.

The fluid filter material may conveniently comprise a coloured liquid selected to change the colour of light passing therethrough, a silver liquid material to reflect light falling thereon, or a liquid material selected, or including materials selected, to filter certain light frequencies and may, for example, be selected to filter ultra-

violet or infra-red frequencies from the light passing through the liquid material.

The invention will now be described further by way of example with reference to the accompanying drawings in which,

Fig. 1 shows, in longitudinal cross section, one filter arrangement in accordance with the invention.

Fig. 2 shows, in axial cross section, a second filter arrangement in accordance with the invention,

Fig. 3 shows, in axial cross section, a third filter arrangement in accordance with the invention,

Fig. 4 shows, in axial cross section, a further embodiment in accordance with the invention,

Fig. 5 shows, in perspective view, an electric device for use in the embodiment illustrated in Fig. 4,

Fig. 6 shows, in front view, part of a first member including a plurality of defined areas for engagement with a second member,

Fig. 7 shows a cross section through a further embodiment in accordance with the invention.

Fig. 8 shows, diagrammatically, an axial cross-section through a further embodiment in accordance with the invention, and

Fig. 9 shows, diagrammatically, an axial view of the embodiment illustrated in Fig. 8 to the left of the axial centre line.

In the embodiment illustrated in Fig. 1 a first transparent member 11, presenting radial plane surfaces 11a and 11b at right angles to the axis of the member 11, is held in fixed position by a machine frame 12 and a second transparent member 13, presenting radial plane surfaces 13a and 13b at right angles to the axis of the member 13, is supported in a bearing 14 for axial displacement towards and away from the member 11.

A flexible seal 15 has one side edge region 15a secured by a clamp 16 to the member 11, the other side edge region 15b of said seal 15 is secured by a clamp 17 to the member 13 and the seal 15 defines a closed volume which is charged with a liquid filter material up to a level L, as shown in Fig. 1.

The member 13 is displaceable by a solenoid arrangement comprising an annular soft iron core 18, secured on the member 13, a coil 19 arranged, when activated, to receive the soft iron core 18, and a coil tension spring 20 acting between the core 18 and bearing 14 to urge withdrawal of the core 18 from the coil 19 when the coil 19 released, thereby to space the member 13 from the member 11.

With the device in the condition illustrated in Fig. 1, and wherein the plane surfaces 11a and 13a are spaced apart, the liquid in seal 15 lies between the surfaces 11a, 13a and thus lies in the path of light passing through the member 13, to the member 11. When the liquid filter material in the seal 15 is coloured, light flowing from the member 13 into the member 11 will be coloured by its passage through the liquid filter material.

When now, from the condition illustrated, the coil 19 is energized to attract the soft iron core 18 thereinto the displaceable element 13 slides towards the left, (as viewed in

Fig. 1) expelling the liquid filter material from between the plane surfaces 13a, 11a, and the expelled liquid is accommodated in the seal by contraction of the air volume above the liquid level L in the seal 15. With the liquid filter material expelled from the gap between the surfaces 11a, 13a, light passing through the member 13 is transmitted across the plane surfaces 13a to 11a and therefrom to member 11 without any change of colour.

The embodiments illustrated in Figs. 2, 3 and 4 include a number of identical parts and thus, in each embodiment, a flexible first member 22 has its peripheral edge regions secured to the peripheral edge regions of a rigid second member 23, conveniently by an adhesive, and the said secured edge regions are retained in a frame 24. The frame 24 further supports a rigid transparent plate 25 in spaced, parallel relationship to the second member 23, and whereupon the first and second members 22, 23, define a volume "A" therebetween and the first member 22 and the plate 25 define a second volume "B" therebetween.

The first member 22 presents a protuberance 22a from its central regions facing the second member 23 and said protuberance 22a presents a plane surface 22b for contact with the central regions of the second member 23.

The second member 23 and the plate 25 conveniently comprise sheets of plain glass and the first member 22 conveniently comprises a flexible sheet of transparent plastics material.

In all three embodiments volume A is partially charged with a liquid filter material, the level L of liquid is always above the protuberance 22a for all conditions of the flexible member 22, and the level L defines an air space above the liquid which is compressible to allow the level L to rise when the volume A is reduced by displacement of the first member 22 to the point where surface 22b makes pressure contact with the member 23.

In the Fig. 2 embodiment a duct 26 passes through the

plate 25 and connects the volume B selectively to atmosphere or to a high pressure source, through a valve 27.

With the members and parts in the positions shown in Fig. 2 the volume B is connected to atmosphere and the hydraulic head for the liquid in volume A pushes the mid-regions and lower regions of first member 22 away from the second member 23, whereupon liquid lies between the second member 23 and the surface 22b of first member 22. With the parts in this condition light passing through the plate 25, across the volume B, and through the first member 22 must pass through the liquid before passing through the second member 23, whereupon the light passing through the second member 23 will be coloured by the liquid in volume A.

When now the valve 27 is switched so that the volume B is connected to the high pressure source the volume B is charged with high pressure fluid which causes first member 22 to be displaced until the surface 22b is in contact with the central regions of the second member 23 and, in this condition, light passing through the plate 25 across the volume B and through the protuberance 22a to the second member 23 is unaffected by the liquid in volume A.

Thus, by selection, the light passing through the protuberance 22a may be white light, or light coloured by the liquid filter material.

In the arrangement illustrated in Fig. 3 an electrical device 28 of the type which undergoes a change of shape when current is passed therethrough, conveniently in the illustrated example an annular piezo electric device, is attached, as by an adhesive, to the central regions of the first member 22 on that surface of member 22 adjacent the plate 25, and wherein the device 28 acts between the first member 22 and the plate 25.

In a deactivated condition for the electrical device 28 the hydraulic pressure in the liquid in volume A acts on the mid-regions and lower regions of the first member 22 to displace the protuberance 22a, and thereby the surface 22b,

away from the second member 23. In this condition, light passing through the plate 25, through the aperture in the electrical device 28 a through the protuberance 22a is coloured by the liquid between first member 22 and surface 22b before passing to the second member 23.

When now the electrical device 28 is activated said device extends horizontally, as viewed in Fig. 3, to displace the mid-regions of the first member 22 until the surface 22b engages in pressure contact with the inner surface of the second member 23, whereupon the liquid in volume A is displaced from between the said surface 22b and first member 23.

In this condition light passing through the plate 25, through the aperture in the annular electrical device 28 and through the protuberance 22a passes to the second member 23 without being effected by the liquid in volume A.

Thus, by deactivating the device 28 light passing through the device will be coloured by the liquid in volume A and, by activating the device 28, light passing through the surface 22b to the second member 23 will be unaffected by the liquid in volume A.

In the embodiment illustrated in Fig. 4 an annular electrical device 29, of the type which undergoes a change of shape when a voltage is extended thereto, is located in the volume A and surrounds the protuberance 22a. As will be seen from Fig. 4 the device 29 has a castellated end and that castellated end is presented to the second member 23.

The device 29 is of such length that, when activated, said device 29 extends axially to displace the surface 22b of protuberance 22a out of contact with the second member 23 and, in such condition, liquid in volume A flows between the castellations of device 29 to fill the space between the protuberance 22a and the mid regions of second member 23. In such condition light passing through the plate 25, across the volume B and through the protuberance 22a must pass through the liquid before passing through second member 23 and the

light is coloured by passage through said liquid.

When now the device 29 is deactivated its axial length is less than the axi' length of the protuberance 22a whereupon, when device 29 is relaxed, the surface 22b can contact the second member 23 to expel liquid from between the surface 22b and second member 23.

In one arrangement for the embodiment illustrated in Fig. 4 the first member 22 may comprise a flexible resilient material which is subject to elastic deformation when the electrical device 29 is activated and which resiliently returns when the device 29 is deactivated, to urge the surface 22b into pressure contact with the second member 23. In another arrangement the volume B may be charged with a pressure fluid to ensure pressure contact between the surface 22b and second member 23 when the device 29 is deactivated.

In the embodiment illustrated in Figs. 1, 2, 3 and 4 the first member 13 or 22 presents only one defined area of the first member displaceable into and out of pressure contact with the second member.

Fig. 6 shows in front view of a first member 22 including a plurality of protuberances 22a spaced apart over one face of the member 22 and each protuberance 22a presents a defined area 22b engageable with a second member 23.

One arrangement for the first member illustrated in Fig. 6, can apply to a construction similar to that illustrated in Figs. 2, and wherein all the defined areas 22b, will engage with member 23 when the volume B is charged with a pressure gas.

When the member 22 illustrated in Fig. 6 is used in, for example, constructions similar to the constructions shown in Figs. 3 or 4, each protuberance 22a is associated with an electrical device 29 individual thereto. A vertical conductor 30 is arranged to extend voltage to each vertical row of devices 29 and a horizontal conductor 31 is arranged to extend voltage to each horizontal row of devices 29 and whereupon each device 29 is activated only when it receives a

voltage from a vertical conductor 30 and a horizontal conductor 31. The conductors 30 and 31 are conveniently applied to the surfac of flexible member 22 having the electrical devices 29 secured thereon and the conductors 30 and 31 may conveniently be embedded in that surface of the member 22, or printed on said surface.

It will thus be seen that with the above described example all of the defined areas 22b may be displaced from the second member 23, whereupon all the light passing through said surfaces 22b will be coloured by the liquid in volume A before passing through the second member 23 and, selectively, any one, combination, or all the defined areas 22b can be brought into pressure contact with the second member 23, whereupon the light passing through all those defined areas 22b in contact with the second member 23 will allow the light to pass therethrough without being coloured by the liquid in volume A.

In the embodiment illustrated in Fig. 7 three first members 32, 33 and 34, each constructed identical to the member 22 illustrated in Fig. 6, are clamped in parallel relationship between a second member 23 and a back plate 25. Being identical in construction said flexible first members 32, 33 and 34 have each of their protuberances 22a axially aligned with corresponding protuberances 22a on the other first members.

The second member 23 and the first members 32, 33 and 34 are held in spaced apart relationship by spacer plates 35, which have an axial thickness (as viewed in Fig. 6) equal to the axial length of the protuberances 22a, and a spacer 36 between the first member 36 and the said back plate 25 defines a volume B between said back plate 25 and the adjacent first member 36.

Each protuberance 22a on each members 32, 33 and 34 has an electrical device 29, arranged in identical manner as that shown in Fig. 4, located thereon. The volume between second member 23 and the member 32 is charged with a red liquid, the volume between the first displaceable member 32

and the displaceable member 33 is charged with a blue liquid, and the volume between the member 33 and member 34 is charged with a green liquid. The volume B is maintained at a pressure above atmosphere, via a duct 37 connected to a pressure source (not shown).

It will be appreciated that in the above described embodiment the first member 32 acts as a second member for the first member 33 and the first member 33 acts as a second member for the first member 34.

With this embodiment, and with all the devices 29 deactivated and volume B at pressure, the defined areas 22b of each and every protuberance 22b will be in pressure contact with the surface of the member 22, 32 or 33 immediately adjacent thereto and thus, all the surfaces 22b presented by the member 32 will be in pressure contact with the second member 23, all the areas 22b of member 33 will be in pressure contact with the adjacent surface of the member 32 and all the surfaces 22b of the member 34 will be in pressure contact with the adjacent surface of the member 33. In this condition, light passing through the back plate 25 and across the volume B will pass through all the protuberances 22a and to the second member 23 without being coloured by any of the liquids in the device.

In the event that one of the electrical devices 29 surrounding a defined area 22b of the member 32 is activated, by transmitting signals on the conductor 30 and conductor 31 extending to that device 29, the surface 22b of that protuberance 22a will be spaced from the second member 23 and red liquid will flow into the space between the surface 22b and second member 23 so that the light passing through that protuberance 22a will pass to the member 23 coloured red. In like manner, if any one of the electrical devices 29 on the protuberances 22a of member 33 is activated the light passing through that protuberance 22a will be coloured blue and, activation of a device 29 on a protuberance 22a of member 34 will allow green fluid to flow between the surface 22a of that

protuberance and the member 33, whereupon light passing through that protuberance 22a will be coloured green as it is transmitted through the s nd member 23.

It will now be appreciated that, using the device illustrated in Fig. 7, any one or more of the electrical devices 29 associated with the first member 32, the first member 33, or the first member 34 may be activated to produce any desired pattern of colours viewed through the second member 23 and said colours may be white, blue, red, green. Further, when the electrical device 29 is a piezo electrical or similar device, whereupon the displacement of the device 29 is dependant upon the voltage supplied thereto, the gap between a surface 22a and the adjacent surface to be contacted by said surface can thereby be varied, and light transmitted through any aligned set of protuberances 22a may comprise shades of the colours red, blue or green or any mixture or combination of the said colours white, red, blue or green.

The light applied to the back plate 25 may be provided by a single illuminating means but, in another embodiment particularly suited for fibre optic displays, each axially aligned set of protuberances 22a may be provided with the light from an optical fibre individual thereto.

It will be seen that with the arrangement illustrated in Fig. 7 a very sophisticated and complex visual display can be obtained and, as a colour change for each aligned set of protuberances 22a is dependant only upon reaction time of the electrical devices 29 and which response time is very rapid, very fast changes of the visual image viewed through the second member 23 can be obtained.

In the above defined examples the fluid filter material has been described as a coloured liquid, but, in accordance with the invention, other fluid materials can be used and thus, for example, the liquid may comprise, or be doped with, ultra violet blocking material, so as to filter out the ultra-violet wavelengths from the light passing across

the device.

In another embodiment the fluid filter material may comprise, or be doped wi a material capable of blocking the transmission of infra-red, so as to filter out infra-red wavelengths from the light passing through the device.

In a further embodiment the fluid filter material may comprise a silver liquid, such as mercury, whereupon when the defined area of the first member is out of pressure contact with the second member the fluid filter material lies between the defined area and the second member and light is reflected by said liquid back into the illuminated member. Such an arrangement may, for example, be effectively used as "Q" switch for a laser.

In the embodiment illustrated in Figs 8 and 9 two annular, flexible transparent plates 41 and 42 are supported in spaced apart parallel relationship by a resilient annular seal 43 therebetween, an annular resilent seal 44 lies between the plate 41 and a substantially rigid disc member 45, and an annular resilent seal 46 lies between the plate 42 and a substantially rigid disc member 47.

The rigid disc members 45 and 47 have a greater diameter than the annular seals 43, 44 and 46 and six bolts 48, with nuts 49 secured thereon, pass through the rigid disc members 45 and 47, equally spaced about a pitch circle concentric with the axes of the annular seals 43, 44 and 46 and having a diameter greater than the maximum diameter of the annular seals 43, 44 and 46. The said bolts 48 maintain the disc members 45 and 47 in spaced apart parallel relationship with the annular seals 43, 44 and 46 in axial compression. The rigid disc members 45 and 47 have, respectively, axial apertures 45a and 47a therethrough.

An annular cup-like member 50, comprising an axially extending cylindrical wall portion 50a and a radially inwardly directed wall portion 50b, lies between the plate 41 and the disc member 45, with the radially inwardly directed wall 50b immediately adjacent to and in contact with, the disc member

45. The radial wall 50b includes a central aperture 50c therethrough and which aperture 50c is axially aligned with the aperture 45a in rigi `isc 45.

The cup-like member 50 may be formed integral with the disc-like member 45, or said member 50 may be attached to the disc-like member 45 by an adhesive or by any other means subject to the aperture 50c being axially aligned with the aperture 45a and the cup-like member 50 being concentric with the said aperture 45a.

A cylindrical electrical device 51, with an axial bore 51a therethrough, is inserted into the cup-like member 51 until the leading radial face of the device 51 abuts the radial wall 50b and the device 51 has such axial length as to protrude axially beyond the radial face of the cup-like member 50 remote from the disc-like member 45.

A cup-like member 52, identical to the cup-like member 50 lies between the plate 42 and the disc-like member 47 and is arranged in identical manner to the cup-like member 50. A cylindrical electric device 53, identical with the device 50, is inserted into the cup-like member 52 until the leading radial face thereof abuts the radial face of the radial wall 52b of the cup-like member 52 and, in like manner to device 51, the device 53 protrudes axially beyond the plane of the radial face of the cup-like member 52 most remote from the disc-like member 47.

Thus, in the device described so far, the parts and elements to one side of the central plane passing through the device is a mirror image of the elements and parts to the other side of the said central plane.

The electrical devices 51 and 53 are electrical devices arranged to undergo a change of shape in accordance with electrical power applied thereto and, in the present example,the said devices 51 and 53 are arranged to undergo a change of axial length in response to electrical power applied thereto.

It will be noted that the plates 41 and 42 and the peripheral seal 43 define a volume V1 and the said volume is partially filled with mer -y, the free surface of the mercury being always above the bores 51a, 53a through the electrical devices 51 and 53 respectively when the apparatus is in its position for use, that is to say when the plates 41 and 42 and the radial disc-like members 45 and 47 are substantially vertical.

With the apparatus in the condition illustrated in Fig. 8 the electrical devices 51 and 53 are de-energized and have their mimimum length conditions, whereupon the flexible resilient plates 41 and 42 can lie in spaced-apart, substantially parallel relationship, as illustrated.

When the devices 51 and 53 are energized said devices 51 and 53 undergo an increase in length, which causes the radial faces of said devices 51 and 53 in contact with the plates 41 and 42 to drive said plates towards one another and into pressure contact, whereupon the mercury between the central regions of the plates 41 and 42 is expelled therefrom. With the central parts of plates 41 and 42 in pressure contact the volume V1 defined by plates 41 and 42 and the peripheral seal 43 is reduced from the rest position for the said plates 41 and 42 and the level of mercury will rise within said volume, compressing the gas in the head space above the mercury. When the devices 51 and 53 are relaxed, by disconnecting the electrical power supply to said devices, the gas pressure in the head space above the mercury urges the mercury downwardly, thus returning the plates 41 and 42 to their spaced apart relationship.

With the above described arrangement, in the rest position wherein the flexible plates 41 and 42 are in spaced apart relationship, the mercury within the volume V1 blocks the transmission of light from plate 41 to plate 42.

When electrical power is extended to the devices 51 and 53, to expel the mercury from the central regions of plates 41 and 42, a light beam directed down aperture 45a,

aperture 50c and bore 51a and through plate 41 can be transmitted across the contacting surfaces of the plates 41 and 42, and thereby ε lly through the bore 53a of electrical device 53, through the aperture 52c of cup-like member 51 and through the aperture 47a in the plate 47, and thereby from the apparatus.

In some embodiments the electrical devices 51 and 53 are selected to have a very rapid response time and may, conveniently, comprise piezo electric devices, magneto strictive devices, or the like electrical devices which undergo a very rapid change of shape when an electrical power supply is extended thereto.

In a further arrangement in accordance with the invention the volume A is totally charged with a material, such as silica gel, which changes its light transmission characteristics with pressure changes. Thus, as in all the embodiments including an electrical device, the displacement of the movable member is dependent upon the voltage applied to the electrical device for displacing the movable member, the degree of compression applied to the liquid between the first and second members can be infinitely varied, and whereby the wavelengths of the light transmitted through the device can be infinitely varied.

Such an arrangement offers advantages in data transmission system and may, for example, be efficacious for telephone data transmission systems.

CLAIMS

1. A filter arrangement for a light beam comprising first and second members with a fluid filter material therebetween and means for displacing an area of said first member into and out of pressure contact with said second member.

2. A filter arrangement according to claim 1, characterized in that said first member comprises a solid member and said means for displacing displaces the whole of said first member towards and away from said second member.

3. A filter arrangement according to claim 1 or 2, characterized in that said area of said first member engageable with said second member conveniently comprises the leading face of said first member.

4. A filter arrangement according to claim 1, 2 or 3, characterized in that said said means for displacing is arranged to displace said first member towards and away from said second member.

5. A filter arrangement according to claim 1, 2 or 3, characterized in that said first member comprises a flexible sheet and said area displaceable into contact with said second member is displaceable from the general plane of said sheet.

6. A filter arrangement according to claim 5, characterized in that the first member comprises a flexible resilient sheet and said sheet is resiliently stressed, in a plane or planes parallel to said defined area, to continuously urge the defined area of said first member into pressure contact with said second member.

7. A filter arrangement according to claim 6, characterized in that said means for displacing comprises means for displacing the said defined area of said first member out of contact with said second member.

8. A filter arrangement according to claim 5, characterized in that said first member comprises a flexible resilient sheet and said sheet is resiliently stressed, into a plane parallel to said defined area, to continuously urge the defined area of said first member away from pressure contact with said second member.

9. A filter arrangement according to claim 8, characterized in that said means for displacing comprises first means for displacing said defined area of said first member into pressure urges contact with said second member.

10. A filter arrangement according any one of the preceding claims, characterized in that arrangement includes means for displacing at least part of said second member into contact with said first member.

11. A filter arrangement according to claim 10, characterized in that the first and second members comprise flexible sheet-like members with their peripheral edges secured in spaced apart relationship.

12. A filter arrangement according to any one of the preceding claims, characterized in that said means for displacing comprises an electrical device which, when electrically actuated, undergoes a change of position or a change of shape.

13.. A filter arrangement according to claim 12, characterized in that said electrical device comprises a solenoid arrangement.

14. A filter arrangement according to claim 12, characterized in that said electrical device comprises a piezo electric device.

15. A filter arrangement according to any one of the preceding claims, characterized in that said first member presents a plurality of defined areas arranged to be displaced into and out of pressure contact with said second member.

16. A filter arrangement according to claim 15, characterized in that the arrangement includes means for displacing individual to each defined area of said first member arranged to allow each said defined area to be moved independently into and out of pressure contact with said second member.

17. A filter arrangement according to any one of the preceding claims, characterized in that the filter arrangement comprises a second member and a plurality of first members arranged in close, spaced apart parallel relationship with said second member and with each other, each said first member presenting a defined area for contact with the second member, or an adjacent first member, the defined areas of all said first members being in alignment at right angles to the planes of said first members, means for displacing each defined area into and out of pressure contact with the adjacent member, and a fluid filter material between said adjacent member.

18. A filter arrangement according to claim 17, characterized in that each of said first members presents a plurality of defined areas spaced over its major surfaces thereof, the first members are of identical construction whereupon each defined area on each member is aligned with a defined area on each of the other first members at right angles to the planes of said members, and means for displacing are associated with each defined area for displacing that defined area into and out of contact with the member immediately adjacent thereto.

19. A filter arrangement according to any one of the preceding claims, characterized in that said fluid filter material comprises a coloured fluid material selected to colour light passing therethrough.

20. A filter arrangement according to any one of claims 1 to 18, inclusive characterized in that the fluid filter material comprises a liquid, said liquid when in the path of light passing through the first and second members being selected to vary one or more parameters of said light.

21. A filter arrangement according to any one of the preceding claims, characterized in that said fluid medium comprises a liquid intended to totally prevent the transmission of light therethrough.

22. A filter arrangement according to any one of the preceding claims, characterized in that said fluid filter medium comprises a liquid selected to reflect light at the surfaces in contact with said first and second members.

23. A filter arrangement substantially as hereinbefore described with reference to and as illustrated in Figs. 1, 2, 3, 4, 6, 7 or 8 of the accompanying drawings.

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Patents Act 1977
Examiner's report to the Comptroller under Section 17 (The Search Report)

Application number

9209092.7

Relevant Technical fields

(i) UK Cl (Edition K) G2J (JFF)

(ii) Int Cl (Edition 5) G02B

Search Examiner

MR C ROSS

Databases (see over)

(i) UK Patent Office

(ii)

Date of Search

22 JULY 1992

Documents considered relevant following a search in respect of claims 1-23

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X	GB 2191602 A (DONNELLY) - see especially Figures 1 and 2	1 at least
X	GB 743163 (FERNSEH)	1 at least
X	GB 698074 (APARICIO) - see especially page 4 line 108 on and Figures 8-11	1 at least
X	GB 426269 (HOLIDAY)	1 at least
X	EP 0065362 A1 (FENNER)	1 at least

Category	Identity of document and relevant passages	Relevant to claim(s)

Categories of documents

X: Document indicating lack of novelty or of inventive step.

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P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

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