



(11) Publication number : **0 506 464 A2**

(12) **EUROPEAN PATENT APPLICATION**

(21) Application number : **92302719.7**

(51) Int. Cl.⁵ : **E03D 9/00**

(22) Date of filing : **27.03.92**

(30) Priority : **27.03.91 GB 9106541**

(43) Date of publication of application :
30.09.92 Bulletin 92/40

(84) Designated Contracting States :
AT BE CH DE ES FR GB GR IT LI LU NL SE

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(54) **An anti-liquid splash device.**

(57) An anti-liquid splash device comprises a pair of substantially parallel supports (23, 25). The device is provided with attachment means for attachment to a wall (27) defining a receptacle or flow passage. Respective deflectable floats (11, 13) are connected to the supports and can be arranged to extend towards one another from the supports (23, 25) across substantially the entire surface of liquid in the receptacle or flow passage. The floats (11, 13) may be provided with means for releasing a fragrance.

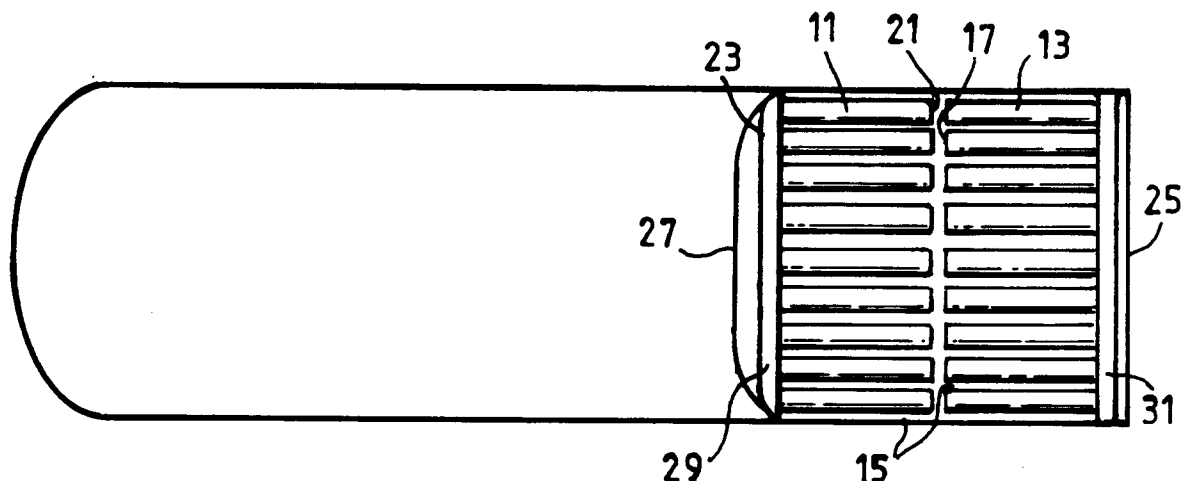


FIG. 8a

This invention relates to anti-liquid splash devices, and in particular to devices concerned with the inhibiting, dampening or suppression of the splashing effect and/or undesirable odours when solid or liquid matter impacts a liquid surface. These devices are particularly, although not exclusively, suited to application in lavatories.

During such an impact, the kinetic energy of the liquid or solid matter impacting the surface is released and transferred to or shared with the impacted liquid, which thereby achieves its own momentum and is displaced from the liquid surface. The problem of splashing varies with the size of the solid matter in relation to the impacted water surface area and this in turn is related to the size of the receptacle or duct in which the liquid is present. In the case of a receptacle the impact may splash water up and indeed over the sides of the receptacle if the solid or liquid matter is of sufficient mass or size and falls through sufficient distance before impacting the liquid surface.

European Patent Application No. EP-A-0 431 225 (which was not published before the priority date of the present invention) describes and claims anti-liquid splash devices having a plurality of elongate floats extending substantially parallel from a support, across substantially the entire surface of a liquid in a receptacle or flow passage. The floats are arranged generally transverse to the liquid flow path to be impacted and deflected downwardly by any solid or fluid matter entering the receptacle or moving along the flow passage, thereby to inhibit the resultant splashing effect.

Inhibition of the splashing effect gives rise to two advantages. The first is minimisation of the noise of impact. The second is a reduction in the spreading of undesirable odours, particularly when the devices are used in lavatories.

The devices described in European Patent Application No. 89312681.3 are illustrated in figures 1-7. They comprise eight or nine tubular floats 1 separated from one another by a space 2 of between 1 and 5 mm. Each of the elongate floats 1 is hingedly attached to a support 3 via a hinge 4. The elongate floats 1 and the support 3 may be integrally moulded as a single piece from a plastics material, for example polypropylene. In this case, the hinge 4 can be formed from a narrow strip of the plastics material which can provide for hinged movement between the elongate floats 1 and the support 3 without breaking. A plastics hinge 4 formed in this way can maintain its integrity over a long period of time.

The support 4 can be attached to a wall 5 of the water closet by glueing or by any suitable form of attachment arrangement. It is conceivable that a hook (not shown) may be formed on the attachment means for engagement with a corresponding engagement member of the wall 5 of the water closet.

The device is attached to the wall 5 of the water

closet within a water flow passage 6 comprising a vertical limb of a U-trap at the lower half or neck 8 of a water closet bowl 7. A water column 9 with an upper exposed surface 10 is located within the U-trap to form a water seal and holds waste matter which has flowed into the bowl 7 prior to discharge through the U-trap into the interconnected waste or sewerage system (not shown) by a conventional flushing mechanism.

The elongate floats 1 are dimensioned so that they extend across substantially the entire surface of the upper exposed surface 10 of the column of water 9. Ideally, there are no spaces exposed on the upper exposed surface 10 other than the spaces provided between the elongate floats 1.

Fluid or solid matter dropped into the bowl 7 will drop onto the elongate floats 1 as illustrated in Figures 2a and 2b.

In Figure 2a, the elongate floats are formed in tubular form from a material which inherently floats on water. Figure 2b illustrates an alternative configuration of elongate floats which have a "D" cross-section whereby a flat top is exposed to the impacting solid or liquid material while the under side of the elongate floats 1 have a rounded bottom shape in order to ensure minimal water resistance as the elongate floats are caused to deflect downwardly into the liquid 9. The flat surface of the floats 1 provides for a better and larger landing surface for the liquid and solid matter.

The elongate floats 1 are sufficiently flexible that the elongate floats 1 can deflect as illustrated in Figure 3. The impact is absorbed by the elongate floats without causing water to splash out of the water closet. Since the elongate floats are made from a light and soft material (such as polyethylene, natural rubber, silicon rubber, polyurethane etc) the impact will be relatively quiet.

After the weight of the liquid or solid material has caused the elongate floats 1 to deflect as illustrated in Figure 3, the material will tend to slip away from the surface of the floats 1 and down into the water 9. To assist the slipping of the material from the floats 1, the surface of the floats are such as to be very slippery. A slippery surface could be achieved by a thick coating of polyethylene, PVC or a similar type of film on the surfaces. Afterwards, the floats will tend to return to their original position as illustrated in Figures 4 and 5.

Flushing of the water closet will assist the removal of material from the surface of the floats 1.

Figure 6 illustrates a bias means provided between a bracket 11 on which the elongate floats 1 are mounted and the support 4. The bias means, which may be in the form of an elastic or rubber material, aids return of the floats to the original non-deflected position.

As illustrated in Figure 7, alternative configurations may be provided initially with relatively long

elongate floats 1 so that they can be cut to fit the water closet to which the device is to be installed.

Variants of these devices may be constructed so that the elongate floats 1 can be detached from the support when required, thereby enabling replacement of the floats.

The present invention provides two improvements over all these devices described in the aforementioned European Patent Application and over other anti-splash devices previously known.

Thus in a first aspect, the present invention provides an anti-liquid splash device comprising a pair of substantially parallel supports, the device being provided with attachment means for attachment to a wall defining a receptacle or flow passage, wherein respective deflectable floats are connected to the supports and can be arranged to extend towards one another from the supports across substantially the entire surface of liquid in the receptacle or flow passage

This arrangement helps to prevent the floats from being tangled with elongate material such as toilet paper and in general provides less obstruction than the devices described in the aforementioned European Patent Application, although it is generally equally effective in its anti-splash effect.

Preferably, a respective plurality of elongate floats is provided to extend from each support towards the plurality of floats extending from the respective opposing support.

It is generally preferred that the floats can be arranged to extend transverse to the direction of liquid flow along the passage or from the receptacle. It is also preferred, in the case comprising respective pluralities of floats, that the floats in each plurality can be arranged to extend substantially parallel to each other and approximately perpendicularly to their respective supports.

The opposing float or floats extending from their respective supports may be configured to touch at their free ends but preferably, they are arranged so that there is a small gap between these ends. This prevents them from interfering with one another when they are deflected.

The invention is not limited to embodiments having only two supports with respective floats. Three or more supports may be provided so long as at least two are substantially parallel and their floats are arranged to extend towards one another when in use.

A second aspect of the present invention provides an anti-liquid splash device comprising at least one deflectable float extending from a support, the device including attachment means for attachment to a wall defining a receptacle or flow passage and the at least one float being provided with means for releasing a fragrance.

When two or more floats are provided, any or all of such floats may be provided with said fragrance releasing means.

The fragrance is intended to be released at any appropriate time but especially when the float(s) is/are impacted by solid or liquid. This has the beneficial effect of masking any undesirable odours.

The fragrance may be of any kind, for example, rose, lemon or other fruit fragrances.

The fragrance releasing means may comprise an additional member provided on the float or floats. For example, the floats may be covered with a layer impregnated with the fragrance. However, for a long lasting effect, it is preferred that the floats be moulded from a plastics material and the fragrance be introduced into the polymer mix before moulding, in much the same way as colour masterbatch is added to produce coloured items moulded in plastics. In this case, the fragrance may be pre-mixed with a suitable medium such as a solvent and/or polymer, before being pre-mixed with the bulk of the polymer for moulding.

The present invention also includes devices which are in accordance with both the first and second aspects of the present invention.

The invention in both aspects is particularly, but not exclusively concerned with the suppression of splashing in sanitary ware, in particular in water closet receptacles or bowls where a water sealed trap is formed in a U-shaped waste pipe integrally formed with the base of the receptacle and communicating with a waste pipe.

The water seal or trap is essential for hygiene purposes to retain the cleanliness of the receptacle and waste pipe wall, to form an initial mass of water for carrying away in solution the waste matter deposited in the bowl and also to form a seal against noxious gases passing up the waste pipe into the bowl from the waste services into which the water closet insulation is connected. The water seal acts in conjunction with the water flushing facility from the bowl rim to sweep the contents of the bowl into the waste system in solution; a fresh water seal being formed after each flush by surplus water gathering in the U-trap, after the primary force of the flushing action has triggered the original contents of the U-trap into the waste pipe connected thereto and beyond by the connected waste and sewer system.

Whilst the water seal is virtually indispensable as described, there is the unfortunate side effect of the splashing upon the impact of solid or liquid matter, for example faces or urine or other matter falling or deposited into the bowl.

The splashing effect will vary with the character of the impact as described generally above and may have the unpleasant and unhygienic effect of contacting the user with soiled water. Thus, it will be appreciated that the present invention in both aspects is particularly advantageous in this kind of application.

Devices according to either aspect of the present invention may also comprise any of the features of de-

vices according to European Patent Application No. 893121681.3 and as particularly described hereinbefore

Thus, for example, when a plurality of elongate floats is provided, each may be separated from adjacent ones by about 1 to 5 mm. Normally, in each respective plurality, they should be arranged to be substantially parallel when in use.

Each of the floats may be hingedly attached to the support so that they can be deflected downwardly into the liquid when impacted by the solid or fluid matter

Alternatively or in addition to the hinge attachment, the floats may be formed of a material sufficiently flexible that they can deflect downwardly under the weight of the impacting liquid or solid matter. This deflection serves to alleviate or eliminate the noise of impact which would otherwise occur between the solid or fluid material and the liquid surface.

Bias means may be provided between the floats and the support for aiding restoration of the deflected elongate floats to their non-deflected state.

The floats are preferably provided with smooth surfaces for assisting removal of the liquid and solid matter therefrom.

The floats may themselves be of tubular form, or alternatively they may have a "D" cross-section to provide a flat top and round bottom. They may also have any other shape in cross section.

The attachment means may comprise a surface which can be glued to the wall thereby establishing a rigid connection to the wall. Alternatively, the attachment means may comprise a hook formed on the support for engagement with a corresponding engagement member fixed to the wall of the receptacle or flow passage.

The elongate floats and support may be moulded integrally as a single piece from a plastics material, eg polypropylene, silicone rubber, polyurethane, polyethylene, polystyrene or any other polymer.

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

Figure 1a is a plan view of a water closet in which a device described in European Patent Application No. 89312681.3 is in place;

Figure 1b is a side view of the water closet of Figure 1a;

Figure 2a is a perspective view of the device shown in Figures 1a and 1b;

Figure 2b is an alternative form of the device described in European Patent Application No. 89312681.3;

Figure 3 is a perspective view of the embodiment of Figure 2a undergoing deflection upon impact with solid or liquid material;

Figure 4 illustrates the embodiment of Figure 2a in which the solid or liquid material is sliding off the surface of the elongate floats;

Figure 5 illustrates the embodiment of Figure 4 after restoration of the deflected elongate floats to their non-deflected state;

Figure 6 illustrates yet another form of device described in European Patent Application No. 89312681.3 and in which bias means is provided between the elongate floats and the support;

Figure 7 illustrates how the device shown in Figure 2a can be adapted for a particular size of water closet;

Figure 8a is a plan view of a water closet in which is mounted a device according to the present invention; and

Figure 8b is a cross sectional view through the closet and device shown in Figure 8a.

The anti-liquid splash device will be described with reference to such a device being installed in a sanitary water closet, the general arrangement being illustrated in Figures 8a and 8b.

The device shown in Figures 8a and 8b generally corresponds to that shown in Figures 1a and 1b, except that it comprises respective sets 11, 13 each of eight or nine tubular floats separated from one another by a space 15 between 1 and 5 mm. The free ends 17, 19 of each set of floats are separated from each other by a narrow gap 21.

The floats are hingedly attached to respective substantially parallel supports 23, 25 which are shown attached to a wall 27 of a water closet by any suitable means, eg glueing, hooks, screws or other fastenings, or by interference fit.

The floats are attached to the supports by hinges 29, 31 although alternatively, they may be flexible as hereinbefore described. Spring bias means to assist their return after deflection may also be provided.

Functioning of the device and its alternatives is analogous to that described above with respect to the devices shown in Figures 1a-7.

The device is moulded from a plastics material and the floats are impregnated with an attractive fragrance which is released into the atmosphere when impacted by liquid or solid material. The fragrance is added to the polymer material before moulding.

Claims

1. An anti-liquid splash device comprising a pair of substantially parallel supports (23, 25), the device being provided with attachment means for attachment to a wall (27) defining a receptacle or flow passage, wherein respective deflectable floats (11, 13) are connected to the supports and can be arranged to extend towards one another from the supports across substantially the entire surface of liquid in the receptacle or flow passage.
2. A device according to claim 1, wherein a respec-

tive plurality of elongate floats (11, 13) is provided to extend from each support (23, 25) towards the plurality of floats extending from the respective opposing support.

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3. A device according to either proceeding claim, wherein the floats (11, 13) in each plurality can be arranged to extend substantially parallel to each other and approximately perpendicularly to their respective supports (23, 25). 10
4. A device according to any preceding claim, wherein the float or floats (11, 13) extending from their respective supports (23, 25) are configured to touch at their free ends. 15
5. A device according to any of claims 1-3, wherein the float or floats (11, 13) extending from their respective supports (23, 25) are arranged so that there is a gap (21) between their free ends. 20
6. An anti-liquid splash device comprising at least one deflectable float (11, 13) extending from a support (23, 25), the device including attachment means for attachment to a wall (27) defining a receptacle or flow passage and the at least one float being provided with means for releasing a fragrance. 25
7. A device according to claim 6, comprising two or more floats (11, 13) any or all of which floats may be provided with said fragrance releasing means. 30
8. A device according to claim 6 or claim 7, wherein said fragrance releasing means comprises an additional member provided on the float or floats (11, 13), said additional member comprising a layer impregnated with the fragrance. 35
9. A device according to any of claims 6-8, wherein the float or floats (11, 13) is are moulded from a plastics material admixed with said fragrance. 40
10. A process for manufacturing a device according to claim 9, the process comprising admixing a polymer and a fragrance, and moulding the resultant mixture to form said float or floats (11, 13). 45

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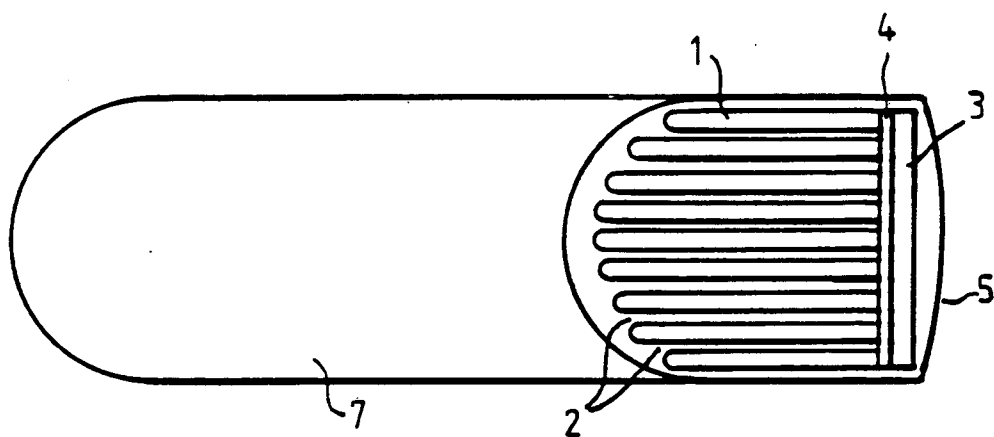


FIG. 1a.

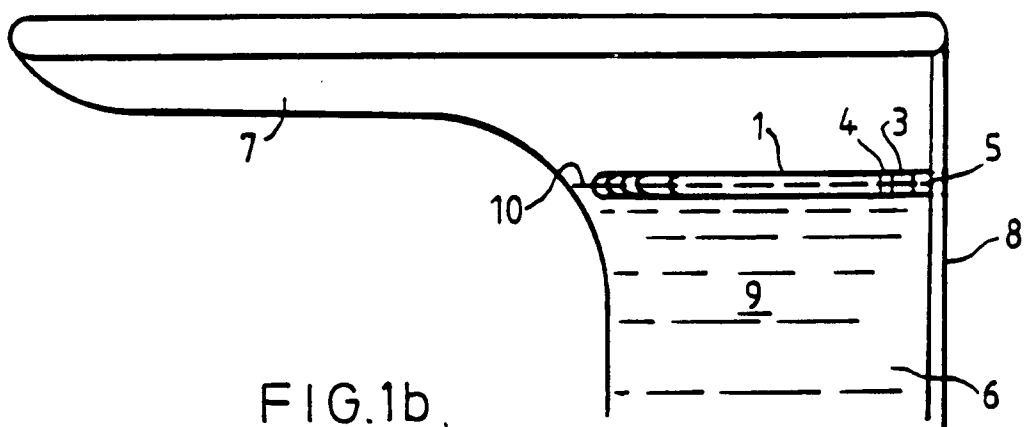


FIG. 1b.

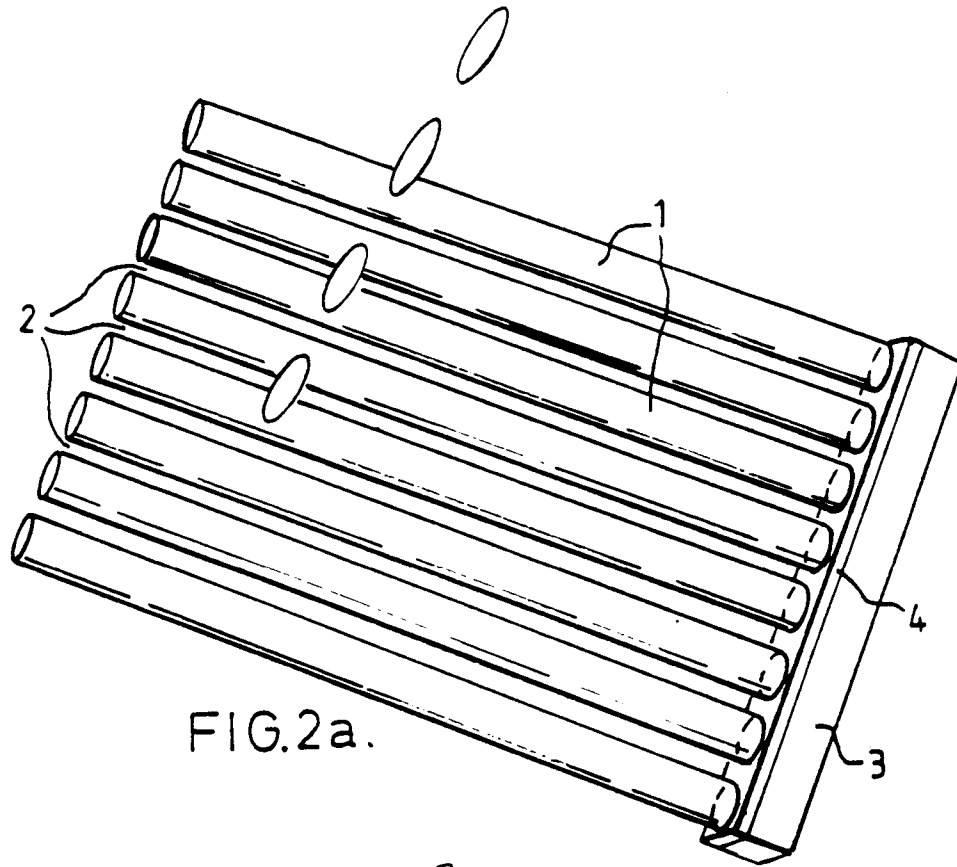


FIG. 2a.

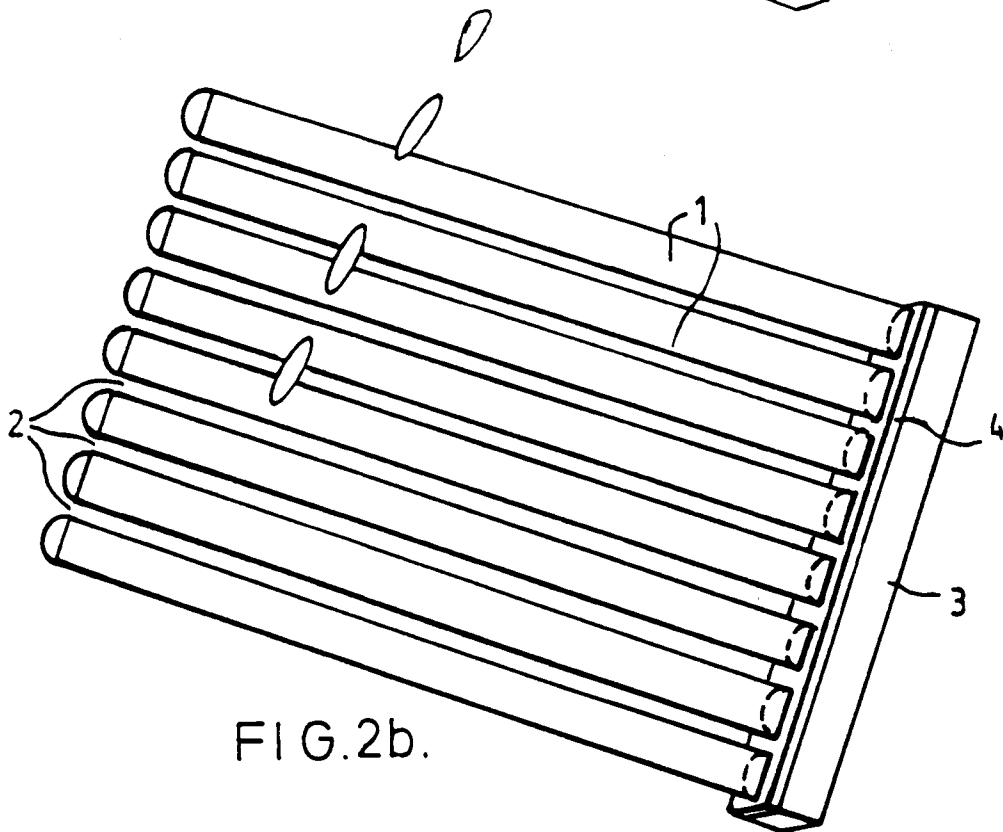


FIG. 2b.

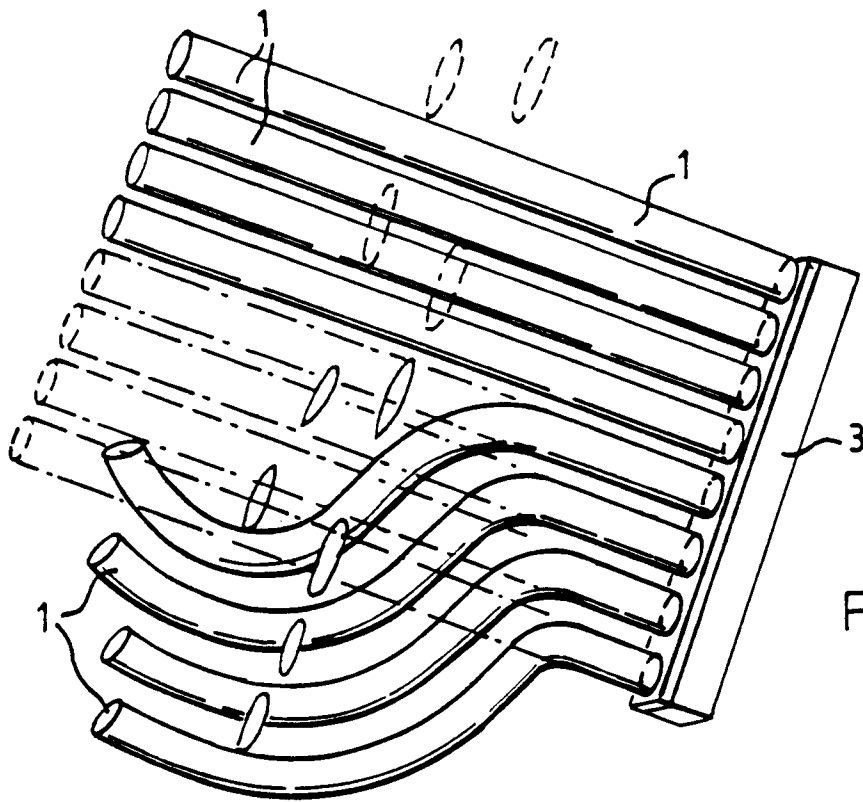


FIG. 3.

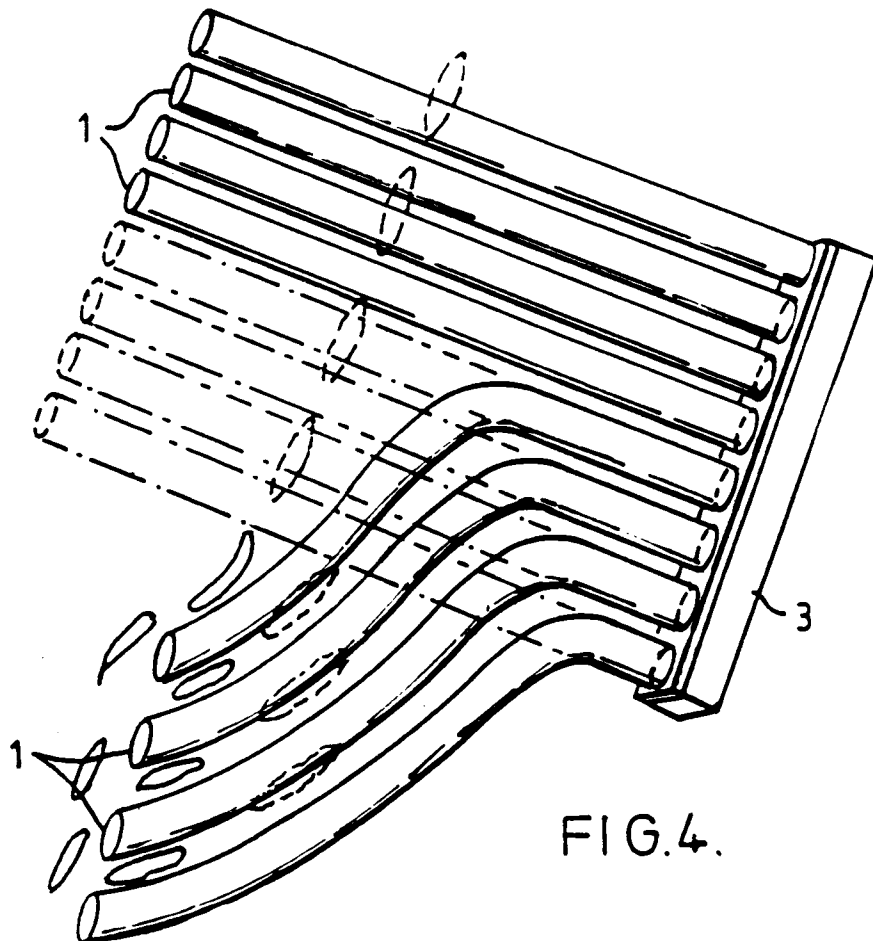
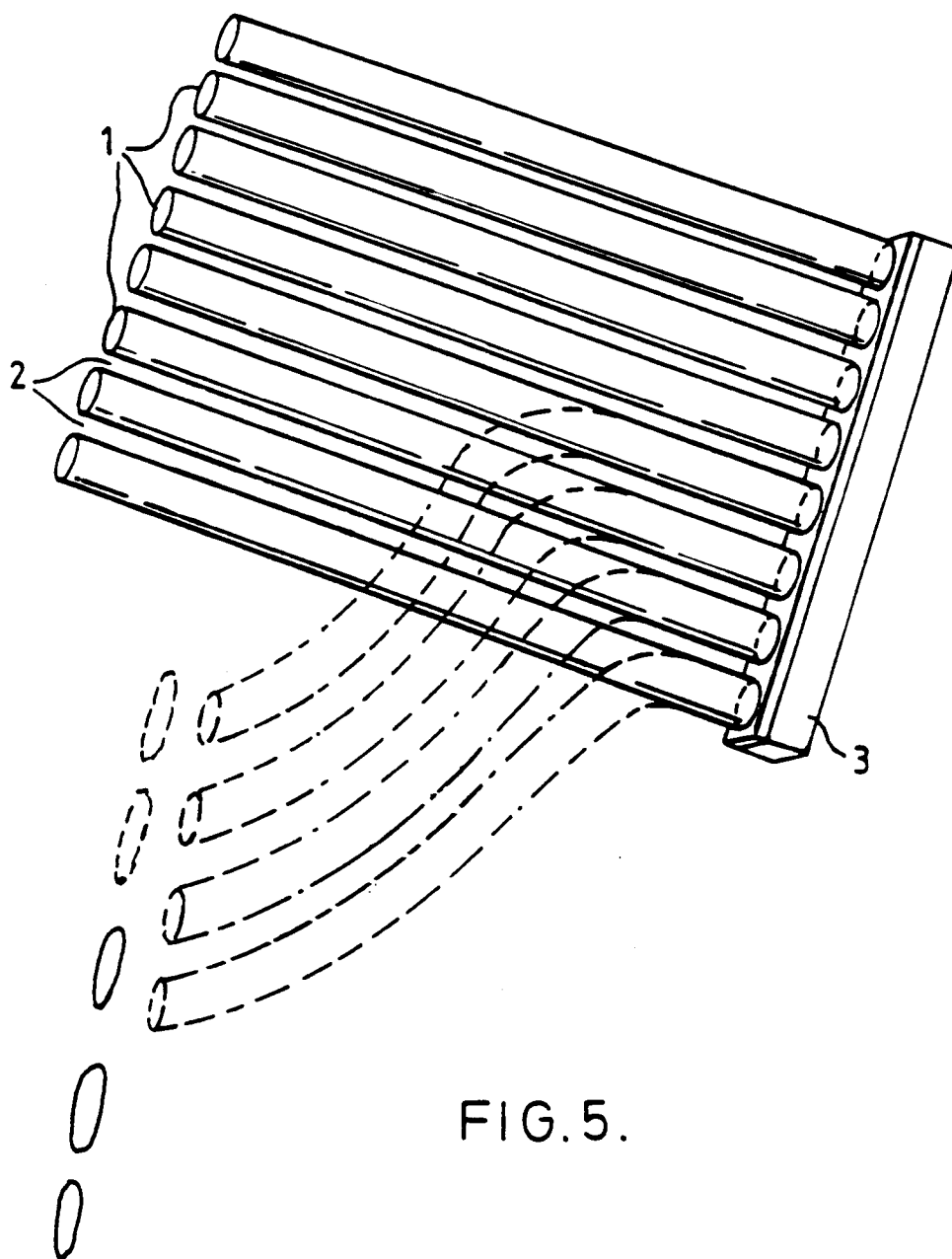


FIG. 4.



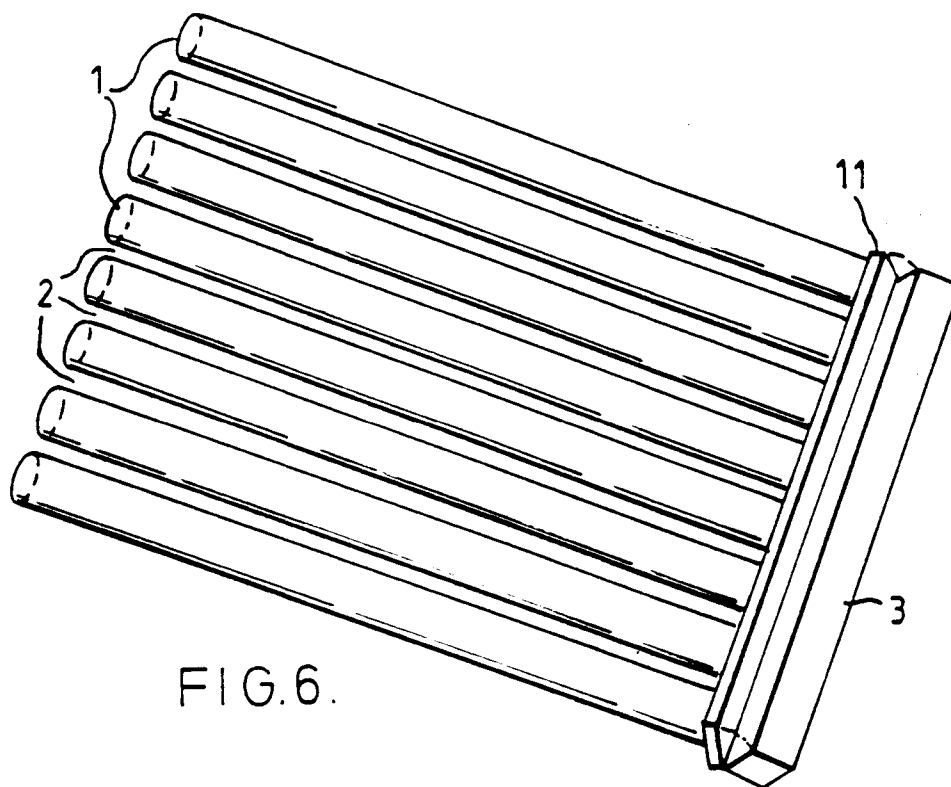


FIG. 6.

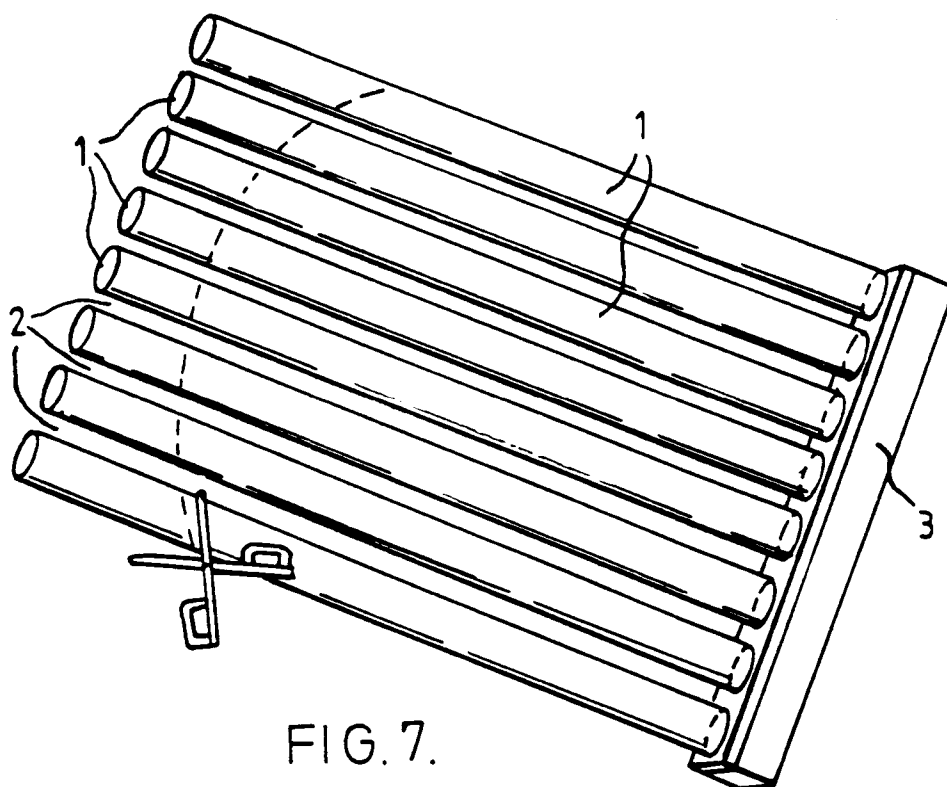


FIG. 7.

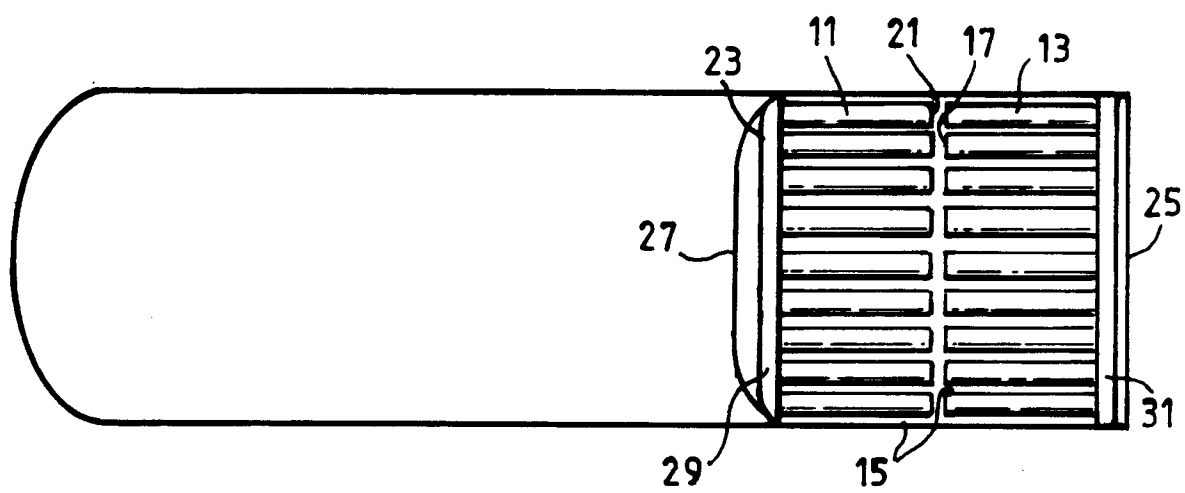


FIG. 8a

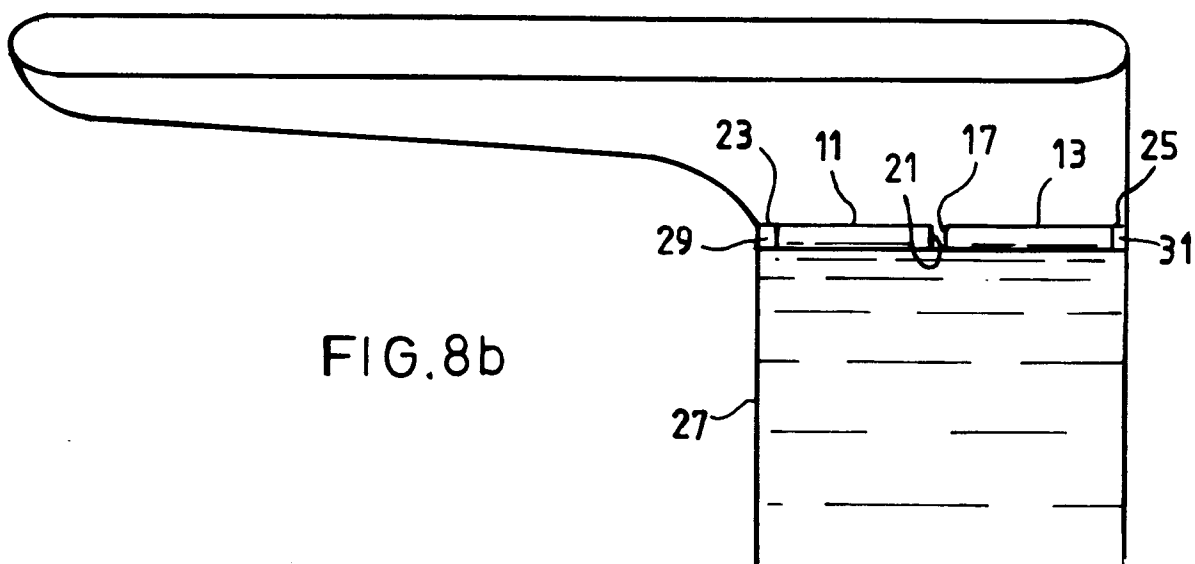


FIG. 8b