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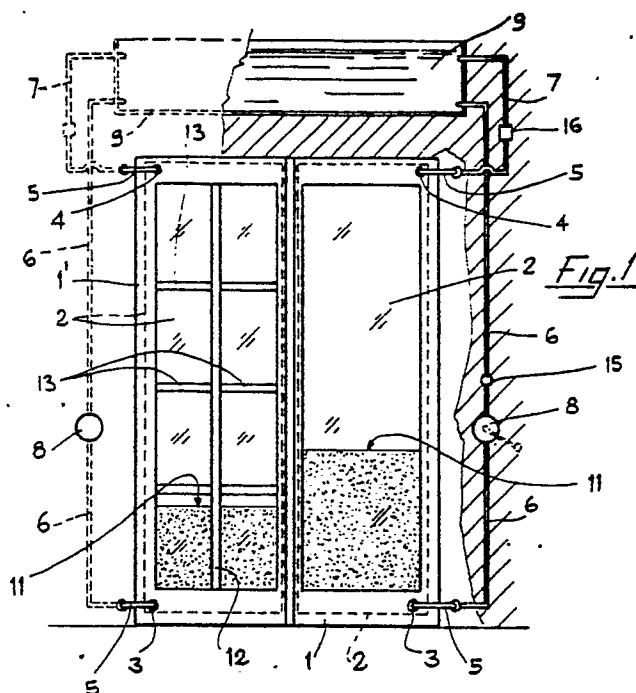
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54 **Darkening device with thermoacoustic insulation, for frames in general.**

57 In frames (1) are mounted glass chambers (2) in which, through manifolds (3), the coloured amorphous fluid is inserted which, filling the inside chamber (10) makes the transparency of the glass opaque and causes the darkening of the frames.

The insertion and/or discharge of the fluid is produced by means of a pump (8) which recalls or sends said fluid from a storage tank (9).



DARKENING DEVICE WITH THERMOACOUSTIC INSULATION, FOR FRAMES IN GENERAL.

The invention concerns a darkening device with thermoacoustic insulation for frames in general, comprising at least one amorphous, coloured, neutral fluid, insertable and extractable from glass chamber, comprised in frames, for means of movement and pump, with storage tank.

The circulation circuit and tank of the fluid being preferably inserted in the counterframe or wall.

The progress obtained in the field of light plugging in buildings has so far been focussed more on modifying the quality of already known devices, designed a long time ago, than on effective new technologies suitable to guarantee rational functions, in step with the times.

Among the improvements so far permitted, the most important are those referring to double windows, with which excellent thermal and acoustic insulations have been obtained, to armored windows, with which the display structures of the windows, of shops and similar have been made safer, to prefabricated frames in different materials like aluminium, plastic and similar, with which assembly times and production costs have been reduced.

In each case, however, said innovations, while excellent from the functional point of view, are only advanced improvements to already known means. In many of said structures, problems of primitive origin remain, from which the latest inventions are not substantially different.

In said innovations, in fact, many elements are present to complete the frames and obtain improved safety, to create dusk and/or darkness, to attenuate noise or leaps in temperature between the inside and outside of rooms, or to solve aesthetic problems both inside and outside.

Any innovative interventions, or modifications, and/or improvements, or attempts at improvements, have been substantially aimed at very many types of frames, e.g. at sliding or rolling gates, gratings, armored blinds, shutters of any form and/or material, rolling blinds etc., determining, besides indisputable assets, high production, installation and maintenance costs.

The object of the present invention is to eliminate the above problems.

The invention, as characterized by the claims, solves the problem by means of a darkening device with thermoacoustic insulation for frames in general, with which the following results are obtained: the frames are substantially composed of supporting frames of the glass chamber, in which any amorphous, coloured or neutral fluid can be inserted and/or extracted; the inner compartments of the glass chamber are perfectly sealed and the

fluid or fluids inserted in them fill them partially or totally, according to the needs of the users. The amorphous coloured or neutral fluids are inserted in the compartments of the glass chamber by means of hydraulic circuits comprising at least one circulating pump and at least one storage tank; said pump and tanks are preferably installed on the outside of the glass chamber frames and connected to same by means of suitable manifolds.

The advantages of the above device consist in the fact that it is substantially possible to obtain a standardization of the type of frames, apart from the applications; it is possible to obtain the necessary requisites of darkening, thermal insulation and acoustic insulation by means of a single type of frame, possibly equipped with reinforcing and/or decorating structures; said frames with glass chamber with amorphous coloured or neutral fluids consent the elimination of any type of darkening means like blinds, shutters, doors etc., encouraging substantial reductions of production, installation and maintenance costs.

The invention is described in detail below, according to some unbinding forms of construction, with reference to the enclosed drawings, in which:

fig. 1 shows a front view of frame equipped with the device object of the present patent application,

fig. 2 shows the partial cross-section of a frame with full-section glass chamber and

fig. 3 shows the partial cross-section of a frame with glass chamber, equipped with inside safety grating.

The drawings illustrate a darkening device with thermoacoustic insulation in which, according to preferred illustrative applications, in a framework for frames (1) a glass chamber (1) is mounted which comprises at least one delivery and exhaust manifold (3) and at least one breather manifold (4).

Said manifolds (3) and (4) are respectively connected by means of flexible connections (5) to a main pipe (6) and a breather and overflow pipe (7). On the main pipe (6) a pump (8) is interposed which can be manually or electrically operated.

The main pipe (6) and the breather and overflow pipe (7) are connected to a tank (9). The main pipe (6) is preferably equipped with on-off valve of the circuit (15), while the breather and overflow pipe (7) is preferably equipped with steam filter (16).

The main pipe (6), with the pump (8), the breather and overflow pipe (7) and the tank (9) are preferably comprised in the so-called counterframe of the frame (1) or in the zone of masonry adjacent to said tank.

In figure (1), for example, the tank (9) is positioned above the frame (1), incorporated in the wall, in the position usually occupied by the blind box, while the main pipe (6) is incorporated in the wall, in the position usually occupied by the straps or control rods of said blinds, with the manual drive shaft of the pump (8), or the motorized drive button of same, positioned in the same place as the pre-controls for blinds.

In other possible solutions, the tank (9) may be of centralized type, i.e. useful to serve various frames, for example all the frames in a single apartment or a single dwelling-house. In this case it is evident that the common tank is not located on a frame but in any suitable place, incorporated in a wall, in an attic etc.

The tank (9), single for each frame, or common for various frames, is filled with any coloured amorphous fluid, e.g. coloured water, ink, coloured alcohol etc.

Said fluid, through the action of the pump (8), is inserted in the chamber (10) comprised in the glass chamber (2) of the frame. In this case the fluid which enters makes the transparency of the glass (2) opaque and it is thus possible to obtain a partial more or less intense darkening of the frame, limiting to any intermediate height the filling or a total darkening completing the filling.

While not a limitative filling condition, it is preferably constructable with the delivery and exhaust manifold (3) positioned in the low part of the tank (1), so that, with drive of the pump (8), the level of the fluid inserted in the glass chamber (2) gradually rises from bottom to top, darkening in this direction and proceeding at constant level.

Similarly, the reverse operation of lightening consists in extracting from the chamber (10) of the glass chamber (2) the coloured amorphous fluid; the pump (8), driven in reverse direction, recalls the fluid from the chamber (10) and returns it to the tank (9).

Suction takes place gradually, with the progressive lowering of the level of the fluid.

Fluid feed from bottom to top, as described, is preferred as with it the formation of drips or rivulets is prevented on the inside walls of the chamber (10) which would form in the case of reverse feed, from top to bottom.

The feed from bottom to top and discharge from top to bottom consent a more precise, pleasant regulation of the darkening and/or lightening of the frame (1), also offering a pleasant view of the movement of the fluid based on the upward or downward movement of its surface level (11), always regular and continuous.

The upper vent/vents (4) are instead positioned at the top of the chambers (10) comprised in the glass chamber (2) and encourage the ejection or

insertion of the air in the chamber (1) during the filling or discharge phases of said chamber. Said vents (4) also, through the pipes (7), form the overflow discharge of the fluid if an involuntary prolonged drive of the pump (8) makes the level of the fluid rise beyond the upper edge of the chamber (10).

In figure 1, in the right-hand side view, a traditional all-glass frame is shown, which can be used to plug windows, doors and the like of traditional type. In the left-hand side view, an example of frame (1') of special type, comprising a safety grating (12) is shown. In a first solution, said grating (12) may be obtained on the outside of the glass chamber (2) and the crosspieces (13) are double or equipped with aligned transversal gratings through which the glass chamber (2) is inserted, in its extension from top to bottom.

In a second solution, the grating (12) is obtained inside the glass chamber (2); also in this case the crosspieces (13) must comprise slits (14), continuous or alternate, through which the coloured amorphous fluid must flow regularly from bottom to top and viceversa.

Said solutions are particularly valid for the construction of gates, small gates, windows, doors, glass windows for shops and/or displays without shutter etc.

The frames (1) structured according to the characteristics of the present invention consent easier, quicker, cheaper use, due to their intrinsic simplicity and versatility and also to the fact that, with them, all presently known darkening means like blinds, boxes, rolling blinds, doors, shields etc. can be eliminated.

The presence of a fluid inside the chamber (10) increases further and considerably the already high characteristics of thermoacoustic insulation of the glass chamber (2). Inside the glass chamber (2), instead of one fluid, two may be inserted: one neutral, the other coloured, with different characteristics and specific weights which prevent mixing. In this way the two fluids, contained in two different tanks, inside the glass chamber remain well separated and delimited, moving alternately they raise or lower the level of the coloured part as if it was a railway curtain, or the like, and cause partial or total darkenings of the glass surface.

In a further possible application of the invention, the glass chambers (2) can be used coupled on a single frame, positioned in adherence or spaced by free intermediate chambers in which air can circulate, or, for special cases, a vacuum can be made.

In each case, the coupled glass chambers (2) can be connected to a single fluid circuit (6) and a single tank (9), or each of them can be connected to its own independent circuit with relative tank. In

the second case, the circulating fluids are identical or different, or of the same or different colour, or present different tones of the same colour. This makes it possible to obtain, for example, different levels or different types of darkening: filling of fluid with softer tone or colour in a first glass chamber, it is possible to obtain a first level of semi-darkness, which may be changed into greater or complete darkening with the filling of the following glass chamber/chambers, with darker fluid-fluids. In other condition, the fluid of each glass chamber may be of identical tone, but the sum of their superpositions leads from a semi-darkness to a progressive darkening.

A further possibility is that the fluids of each glass chamber are of different colour, so that it is possible to obtain also special lighting effects by varying the sequence and level of their insertion and/or extraction in the glass chambers. Another conformation of double chamber is obtainable by means of the insertion of a sheet of transparent material, preferably glass, inside and in the centre of a glass chamber (2). This intermediate sheet is mounted and supported on a flexible peripheral gasket in elastic siliconic material and forms, inside the glass chamber (2) two separate chambers, fed by two separate tanks with different fluids. Increase or decreasing the pressure of the fluids comprised in the two chambers thus created, the central sheet of glass moves in one direction or the other, varying the volumes of the fluids with consequent variation of the intensity of the colour and of the degrees of semi-darkness and darkness.

All the above possibilities are, however, teamed with a considerable increase of the thermoacoustic insulation of the frames thus formed.

Claims

1) Darkening device with thermoacoustic insulation for frames in general, characterized by the fact that in traditional frameworks for frames (1) glass chambers (2) are inserted, equipped with delivery and exhaust manifolds (3) and breather manifolds (4), respectively connected to main pipes (6) with circulating pumps (8) and to breather and overflow pipes (7); said main pipes (6) and breather and overflow pipes (7) being connected to at least one tank (9) containing a darkening, coloured, amorphous fluid.

2) Darkening device according to claim 1, characterized by the fact of having the delivery and exhaust manifolds (3) positioned at the base of the glass chambers (2) and of having the breather manifolds (4) positioned at the top of said glass chambers.

3) Darkening device according to claim 1, char-

acterized by the fact that the pump (8) is of manual or electric type, with reversible drive.

4) Darkening device according to claims 1 and 2, characterized by the fact that the darkening amorphous fluid comprised in the circuit is coloured water, or ink, or coloured alcohol.

5) Darkening device according to claims 1 to 4, characterized by the fact that supply of the fluid takes place from bottom to top and discharge from top to bottom.

6) Darkening device according to claims 1 to 5, characterized by the fact that the tank (9) containing the darkening fluid is coupled to each frame (1).

7) Darkening device according to claims 1 to 5, characterized by the fact that the tank (9) containing the darkening fluid is single for plurality of frames (1).

8) Darkening device according to claims 1, 3, 6 and 7, characterized by the fact that the main feed and exhaust pipes (6), together with the pumps (8) and the breather and overflow pipes (7) are incorporated in the counterframe of the frames (1).

9) Darkening device according to claims 1, 3, 6 and 7, characterized by the fact that the main feed and exhaust pipes (6), together with the pumps and the breather and overflow pipes (7) are incorporated in the walls adjacent to the frames (1).

10) Darkening device according to claims 1 to 9, characterized by the fact that the glass chambers (2) are inserted in frames (1).

11) Darkening devices according to claims from 1 to 9, characterized by the fact that the glass chambers (2) are inserted in frames (1) equipped with gratings (12) with double crosspieces (13) and with through-slits for said glass chambers.

12) Darkening device according to claims 1 to 9, characterized by the fact that the glass chambers (2) are inserted in frames (1) and comprise internal gratings (12), on whose crosspieces (13) the through-slits (14) of the darkening fluid are present.

13) Darkening device according to claims 1 to 12, characterized by the fact of comprising two or more glass chambers (2) coupled on a same frame (1); said coupling being in adherence or with the interposition of open chambers with air circulation, or with vacuum.

14) Darkening device according to claims 1 to 13, characterized by the fact that the coupled glass chambers are connected to a single fluid circuit (6) and a single tank (9), or each connected to a separate circuit (6) and tank (9), in which different or identical fluids, with identical or different colours and also with different tones of identical colours, are present.

15) Darkening device according to claims 1 to 14, characterized by the fact that two separate

fluids are inserted in the glass chamber/chambers (2): one neutral and the other coloured, with different specific characteristics and weights and un-mixable.

16) Darkening device according to claims 1 to 16, characterized by the fact that the glass chambers (2) are equipped with transparent intermediate sheets mounted and supported on flexible peripheral gaskets in elastic siliconic material; these sheets forming two separate chambers fed with different fluids coming from separate tanks.

17) Darkening device with thermoacoustic insulation for frames in general according to the previous claims, as illustrated and described and for the objects specified.

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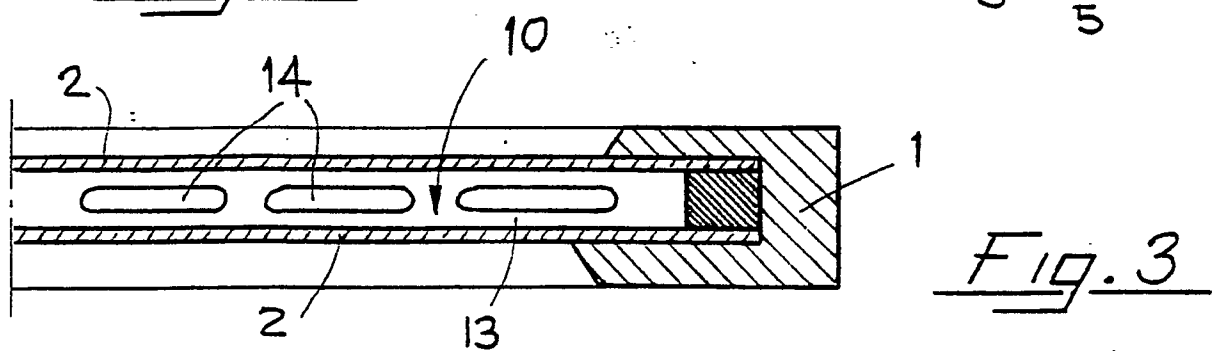
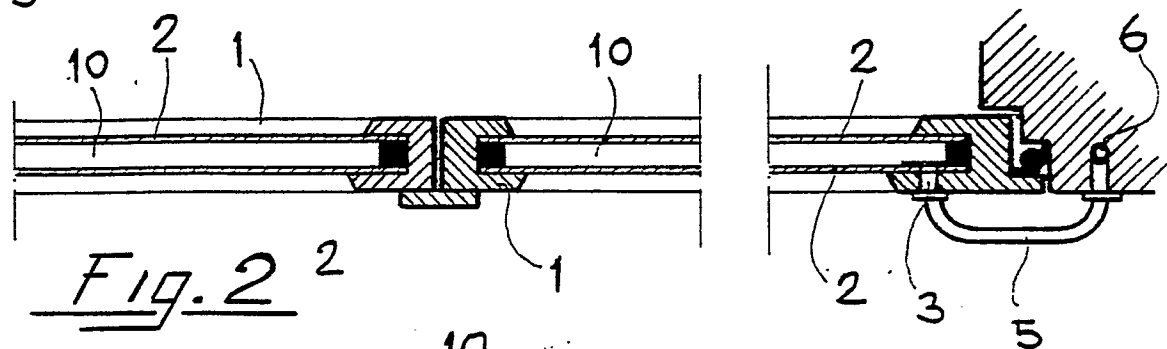
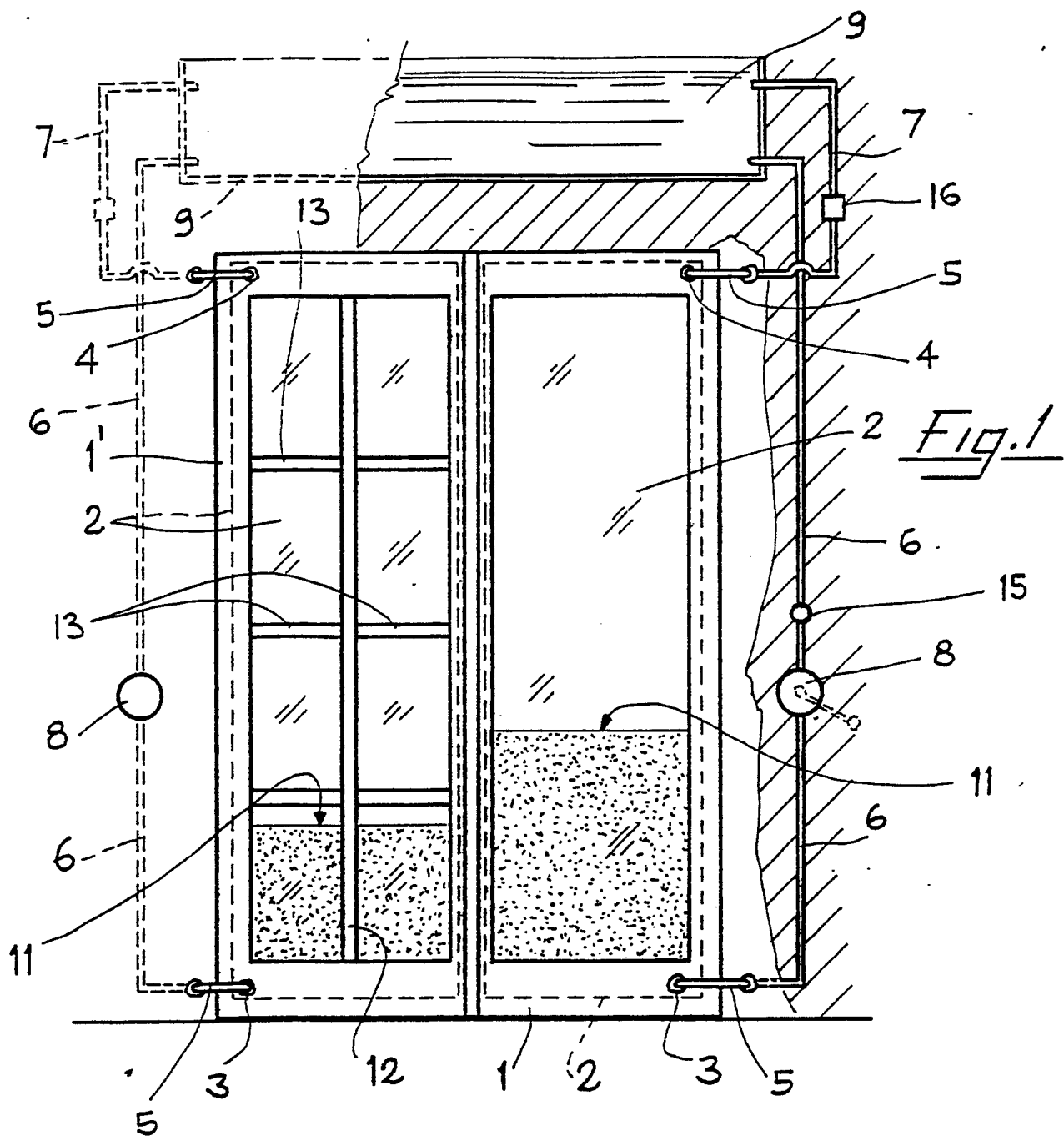
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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	FR-A-2599781 (BELLETTI) * page 2, lines 7 - 21 * * page 2, line 37 - page 3, line 9; figures *	1-3	E06B3/66
Y		4-7, 10	
A		13-15	
Y	DE-A-1509678 (MENZEL) * page 7, paragraph 2; figures *	4-7, 10	
A	BE-A-841731 (KITZIGER) * page 3, line 12 - page 4, line 9 * * page 6, lines 3 - 13; figures *	8, 9	
A	FR-A-2176916 (PILKINGTON BROS LTD) * page 3, lines 3 - 36; figures *	12	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			E06B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 19 SEPTEMBER 1990	Examiner KUKIDIS S.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			