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(54) **Device for extracting moisture from a wall**

(57) A device (10) to abstract moisture from a wall (20,30) or similar comprising a housing (70) having an air guide means (40), an at least one removable fan, an at least one motor (60) to drive the at least one removable fan (50), characterised in that said device can be applied in a hole (90) in a wall, said hole having a front at its exterior portion and a back at its interior portion,

said air guide means defining an air guide channel (100) between at least first and second openings, said at least one fan being positioned in said at least first and second openings, such that air driven by said first fan through said first opening flows through said air guide channel and through said second opening, thereby carrying off moisture originating from said wall.

Figure 1A

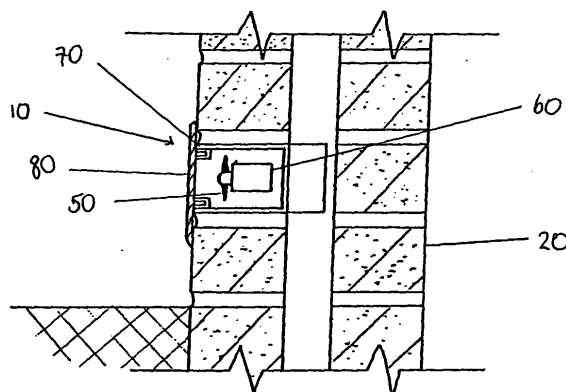


Figure 1B

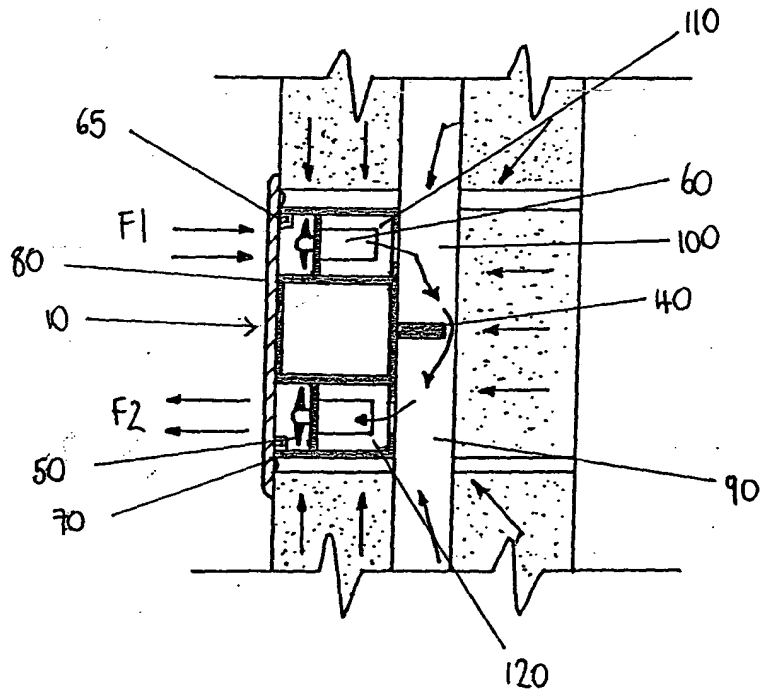
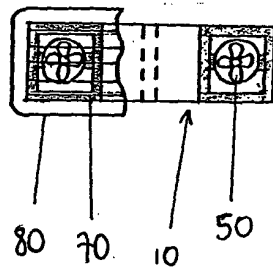


Figure 1C



## Description

**[0001]** The present invention relates to a device to abstract moisture from a wall or similar, more particularly from a wall made of masonry, concrete or other moisture-absorbing material.

**[0002]** Rising damp, caused by ground moisture being absorbed into brick and masonry walls, is a major cause of decay to masonry materials such as stone, brick and mortar. Even when mild it can cause unsightly crumbling of exterior masonry and staining of internal finishes. When severe it is a potential health hazard to building occupants due to high humidity levels and the growth of moulds. When coupled with high salt concentrations, severe damp can cause extensive fretting and crumbling of the lower parts of walls, requiring difficult and expensive repairs. Horizontal penetrating damp (where rainwater seeps through defective brick walls or incomplete mortar joints), condensation (caused by inadequate ventilation or large variations between the internal and external temperature or humidity), and falling damp (resulting from defective roofing and plumbing equipment, such as leaking gutters, flashings or pipes) are other known forms of damp, all of which can cause similar problems to those outlined above.

**[0003]** The installation of a damp proof course (DPC) into e.g. masonry or concrete building walls is a traditionally used method to preventing moisture uptake by a wall. However, if the damp proof course is breached, rising damp in the wall can cause serious problems, as explained above. In many cases of severe damp the only effective solution is the insertion of a new DPC, by either physical or chemical means. The traditional physical means of introducing a new DPC is the technique known as undersetting, where sections of the base of the wall are removed and progressively replaced with new materials and a DPC. Slot sawing is another physical method which involves sawing a horizontal slot through the wall along a mortar joint, inserting a DPC membrane and repacking the joint.

**[0004]** Chemical treatments, which have become popular in recent years, aim to create an impermeable barrier in the wall by injecting water-repellent compounds into masonry pores via a series of pre-drilled holes along the base of the wall. Critical to the success of any chemical treatment is the formation of a continuous water-repellent zone through the entire wall thickness. In practice this may be difficult to ensure, and must be judged by the operator, whose experience and skill are essential.

**[0005]** The problem with existing physical and chemical DPC treatments is that they are expensive, unreliable, impractical and disruptive. Moisture removing devices, such as those disclosed in NL183,148 or EP0829587, offer an alternative to DPC treatments. Such devices typically comprise a frame which is inserted and secured in a hole fabricated (for example by removing bricks from the outer wall) in the wall to be treat-

ed. Prior art devices also comprise a separate body that extends outside the outer wall as well as the hole, which is provided with a partition, such that the body and the partition divide the hole into two chambers, leaving a free passage between them. When wind flows along the outer wall and contacts the outwardly protruding body of the device disclosed in NL 183,148, some of the air is forced through the chambers of the device, displacing the damp air present within the hole, resulting in a drying effect. The disadvantage of this device is that when it is placed in a cavity wall, the cavity must be bricked up at the place where the device is positioned, a process which is time-consuming, difficult and expensive.

**[0006]** To overcome these disadvantages, prior art device EP 0829587 was realised. The device works in a similar way to that disclosed in NL 183,148, and has an air guide channel around which the dry air flows and displaces the damp air contained within the cavity, but circumvents the requirement for bricking up the cavity wall into which it is installed through the use of means which form a cover between the air guide channel and the surrounding cavity.

**[0007]** Although these devices offer a better alternative to either physical or chemical DPC treatments, they are associated with several significant problems. The first is that a drying effect can only be achieved when sufficient air is moving over and around the device. On a day when there is no wind moving externally over the wall to be treated, or when a wall to be treated is shielded from the wind, the drying effect exerted by a prior art devices is considerably reduced, resulting in either significantly longer drying times for the wall which is being treated, or no drying effect whatsoever.

**[0008]** Another problem with the prior art devices is that the opening into and through which the air is channelled often becomes blocked with debris such as foliage, twigs, dirt, dust, and even insects - all of which can restrict airflow through the device and impede its function, or block the device completely and abrogate its function. Removal of debris contained within the prior art devices is not considered in the above publications and is difficult, labour intensive, and time consuming, if not impossible, due to their construction.

**[0009]** It is an object of the present invention to overcome these prior art disadvantages by providing a device for abstracting moisture from a solid or cavity wall which contains powered removable fans to drive air into and through the device, optionally together with a protective grill covering the external openings of the air guide channel to prevent accumulation of unwanted debris, which can block the device and restrict, impede or abrogate its function. The provision of powered fans ensures that air flow through the device (and thus the drying process) is maintained irrespective of external air currents moving over the external wall and the device, resulting in consistent and rapid drying times for a wall which is treated.

**[0010]** Thus, according to a first aspect of the present

invention there is provided a device to abstract moisture from a wall or similar comprising a housing having an air guide means, an at least one removable fan, an at least one motor to drive the at least one removable fan, characterised in that the device can be applied in a hole in a wall, the hole having a front at its exterior portion and a back at its interior portion, the air guide means defining an air guide channel between at least first and second openings, the at least one fan being positioned in the at least first and second openings, such that air driven by the first fan through the first opening flows through the air guide channel and through the second opening, thereby carrying off moisture originating from the wall.

**[0011]** The at least one removable fan may be positioned to draw air into the first opening. The air that circulates through the air guide channel may exit the device through the second opening due to an increase in air pressure within the hole, resulting in a drying effect.

**[0012]** The air guide means may be removable from the housing, thereby facilitating access to the hole in the wall and any cleaning or maintenance of the device or hole that may be required.

**[0013]** The housing may additionally comprise a removable vented front section with vents sufficiently narrow to prevent the entry and accumulation of unwanted foliage, twigs and debris within the device or the hole in the wall. In contrast to prior art devices, the vented front section may serve to minimise the vigilance and maintenance required to ensure a concerted and prolonged drying effect on a wall to be treated. The vented front section may be manufactured from a lightweight, durable, resilient synthetic material such as plastic.

**[0014]** The at least one removable fan may be an axial flow fan, i.e. a fan where the airflow is straight through the propeller. Such propeller fans efficiently move large volumes of air at low pressures, and they are normally used for general ventilation through a wall.

**[0015]** The at least one removable fan may comprise a synthetic material. The removable fan may be water and weatherproof, and easily maintainable. The fan may be easily removable from the housing of the device, such that it can be maintained, replaced, or cleaned, or provide access to the air guide channel and the hole in the wall.

**[0016]** The device may comprise more than two fans. In treating a particularly damp wall, or a wall with a large damp area, a device may be used which comprises two or more fans located within each of the first and second openings. The fans may be positioned within the first and second opening so as to maximise air flow into and out of the air guide channel, thereby improving the efficiency of the device.

**[0017]** The air guide means may comprise a vertically separating wall, preferably extending over the full or nearly full height of the device, which divides the hole into two adjacent chambers, whereby a passage is left between the two chambers. The passage may be locat-

ed toward or at the back of (i.e. the innermost portion of) the hole in the wall, such that the air moving from one chamber to the other through the passage is close to or contacts the wall under treatment, thereby maximising the drying effect produced by the device. The vertically separating wall may comprise e.g. ceramic material or a synthetic material such as plastic.

**[0018]** The device may comprise first and second openings, each of which may comprise a removable fan and a motor to drive the fan. The air flow created by each of the fans may be of opposite polarity, such that the fan positioned in the first opening serves to draw dry air into the air guide channel thereby contacting the damp wall, and the fan positioned in the second opening serves to draw the resulting damp air out of the air guide channel and out of the device. The flow rate of a removable fan may be adjustable.

**[0019]** The flow rates of the fans in a device comprising two fans may be different, or they may be equal, such that the volume of air drawn into the device by a first fan is equal to the volume of air drawn out of the device by a second fan.

**[0020]** In maintaining equal flow rates, the flow of air through the air guide channel and over the damp wall is controlled and localised rather than being turbulent, and in the case of a cavity wall, this results in minimal disturbance of warm air within the cavity. Since the majority of the volume of warm air in the cavity is not disturbed by turbulent air flow through the device, the amount of this warm air drawn out of the device by a second fan, is minimised, thereby minimising temperature decrease within the cavity, and maintaining a higher temperature within the wall, and thus the building.

**[0021]** There is no suggestion in the prior art that such ventilation of a cavity wall can be effected, and indeed EP 0829587 teaches that a cavity wall must be bricked up or that a cover means be provided to seal off a volume of a cavity to be ventilated.

**[0022]** The device may be installed for use in a hole realised in either a cavity wall or a solid wall.

**[0023]** The housing of the device may comprise a synthetic material which is durable and resilient. The housing may comprise a means by which the at least one removable fan can be mounted in position and stabilised, for example through the use of grooves or mounting pins. Other means of mounting, positioning and stabilising the fans are envisaged, and will be well known to a person skilled in the art. Similarly, the guide means may be removable, and the housing configured to enable the convenient removal and insertion of the guide means.

**[0024]** The housing may comprise a non-vented front section which may be removably attachable. When treatment of a wall is completed, the fans, motors, vented front section and the air guide means may be readily removed from the housing of the device. The non-vented front section may be attached to the housing thereby completely closing or sealing off the hole in the wall from

the outside, and circumventing the requirement to remove the housing from the wall and brick up the hole. The provision of the non-vented front section thereby reduces labour costs and saves time and money. The non-vented front section may be coloured and contoured to blend in with the brickwork of the treated wall. In the event that the damp problem resurfaces and the wall should require further treatment, the non-vented front section may be removed, and the air guide means, and at least one fan and motor may be installed back into the housing of the device, and the vented front section may be replaced. The wall may be treated using the device until such a time as the damp is satisfactorily treated, and then the components of the device may be removed and the hole in the wall sealed up again using the non-vented front section.

**[0025]** The non-vented front section may comprise an insulating material on the innermost side, i.e. the side which faces into the hole in the wall, to so as to prevent heat loss from the hole. Alternatively, one or more insulating bricks may be provided, which can be used to fill the hole in the wall prior to attaching the non-vented front section.

**[0026]** The fans, motors, air guide means and front sections may all be easily removable from the housing of the device. In direct contrast to the prior art devices, the modular nature of the device according to the present invention and its components means that the hole in the wall is readily accessible for cleaning, maintenance and inspection purposes.

**[0027]** The device may be partially or substantially contained within a house brick, which may then be easily installed into a hole in the wall to be treated. The device may be installed into a wall by making an opening in the either the solid wall or the outer wall of a cavity wall. The device contained within the housing may be inserted into the hole in the wall, and secured using mortar, cement or similar. The removably attachable vented front section may then be attached in place, thereby preventing build up of debris within the device and the hole in the wall.

**[0028]** The device may be substantially the same size as a house brick or share substantially similar dimensions to the bricks used to create the wall to be treated, such that the number of bricks that have to be removed in order to create the hole into which the device is to be inserted is kept to a minimum.

**[0029]** The at least one motor to drive the at least one removable fan may be powered by electricity, solar power, or magnetic power. The motor may comprise a power switch. In the situation where a fan motor is to be powered directly by electricity, a loop of mains cable can be passed around the house and fastened to the external walls, or can e.g. pass along the length of a cavity in the wall, such that the power leads attached to a fan motor can be readily attached to the mains power cable, for example through splicing, or with the aid of spikes which allow the lead to tap into the main power supply and

drive the motor and the fan. The use of solar panels to power the fans of the device is also envisaged and these are well known to a person skilled in the art. The fans may be controlled through individual power switches, or through the use of a timing device - for example they may be set to operate for a designated time period per day, or at a certain time of the day, for example when it is hottest (e.g. around midday). The fans of the device may be controlled by a control unit located inside the building under treatment, such that a user may centrally operate the one or more devices installed in the walls of the building from inside. Timing devices are not new and will be well known to a person skilled in the art.

**[0030]** According to a second aspect of the present invention, there is provided a kit of parts comprising a housing having an air guide means, at least one removable fan, at least one motor to drive the at least one removable fan, and an additional at least one removable fan and motor, characterised in that the device can be applied in a hole in a wall, the hole having a front at its exterior portion and a back at its interior portion, the air guide means defining an air guide channel between at least first and second openings, the at least one fan being positioned in the at least first and second openings, such that air driven by the first fan through the first opening flows through the air guide channel and through the second opening, thereby carrying off moisture originating from said wall.

**[0031]** The kit of parts may comprise one or more devices together with replacement fans and motors, spare parts, or components thereof, and thus provide a user with everything required in order to treat a damp within a solid or cavity wall.

**[0032]** The kit of parts may contain a device according to the second aspect of the present invention in which the air guide means is removable from the housing.

**[0033]** The kit of parts may contain a device according to the second aspect of the present invention in which the housing additionally comprises a removable vented front section.

**[0034]** The kit of parts may contain a device according to the second aspect of the present invention in which the housing additionally comprises a non-vented front section.

**[0035]** According to a third aspect of the present invention there is provided a method of treatment of damp in a wall or similar, the wall defining internal and external surfaces, comprising the steps of:

- i) Removing at least one brick from the external surface of the wall to realise a hole in the wall,
- ii) Installing a device to abstract moisture from the wall or similar, the device comprising a housing having a removable air guide means, an at least one removable fan, an at least one removable motor to drive the at least one removable fan, and a removable vented front section, the air guide means defining an air guide channel between at least first and

second openings, the at least one fan being positioned in the at least first and second openings, such that air driven by the first fan through the first opening flows through the air guide channel and through the second opening, thereby carrying off moisture originating from the wall,

iii) Ventilating said wall using said at least one removable fan.

**[0036]** When the damp is under control or has been satisfactorily treated, the components of the device may be removed to leave the housing in the hole in the wall. A non-vented front section may be attached to the housing of the device to seal up the hole in the wall, circumventing the requirement to remove the housing and fill in the hole with bricks and mortar. If the damp problem resurfaces, the device may be reassembled by removing the non-vented front section and installing the air guide means, at least one fan and motor and a vented front section.

**[0037]** A preferred embodiment of the invention shall now be described, by way of example only, with reference to the accompanying drawings in which:

Figure 1 shows a device to abstract moisture from a cavity wall in (A) cross section, (B) plan view, and (C) front elevation; and

Figure 2 shows a device to abstract moisture from a solid wall in (A) cross section, (B) plan view, and (C) front elevation;

**[0038]** Referring to Figures 1 and 2 of the drawings, a device (10) to abstract moisture from a cavity wall (20) or solid wall (30) comprises an air guide means (40), an at least one removable fan (50), an at least one motor (60) to drive the at least one removable fan, a power switch (65), and a housing (70) comprising a removable vented front section (80), characterised in that the air guide means is removably positioned within the housing, and the housing is applied in a hole (90) in a wall, defining an air guide channel (100) between at least first and second openings (110, 120), the at least one fan (50) being positioned in the at least first and second openings (110, 120), such that air driven by the at least one fan (50) through the first opening (110) flows through the air guide channel (100) and through the second opening (120), thereby carrying off moisture originating from the cavity wall (20) or solid wall (30).

**[0039]** The operation of the device (10) is based on the fact that the powered removable fan (50) in a first opening (110), operated by a power switch (65) draws air into the device (10) (flow F1), which is channelled through the air guide channel (100) and blown out of the device (10) by the fan (50) in the second opening (120) (flow F2), thereby creating a drying effect. The moisture from the cavity wall (20) or the solid wall (30) saturates the air in the hole, and this humid air is sucked out of

the hole (90) and blown out of the device by a fan (50) positioned in a second opening (120).

**[0040]** Access to a hole (90) in either a cavity wall (20) or solid wall (30) may be obtained by removing the vented front section (80) from the housing (70) of the device (10) and removing the at least one fan (50) and motor (60), and the air guide means (40). The hole (90) may be inspected for damp, or cleaned, or components of the device (10) may be replaced or maintained. If the damp requires further treatment, the device may be re-assembled and treated as described previously. If the treated wall requires no further treatment, the hole (90) in the wall (20, 30) may be sealed off by attaching a non-vented front section (not shown) to the housing (70) of the device (10). This non-vented front section may be removed at a later stage to check the status of the previously treated wall, and should the wall require further treatment, the various components of the device (10) may be assembled within the housing (70), and the wall ventilated as described previously.

#### Claims

1. A device to abstract moisture from a wall or similar comprising a housing having an air guide means, an at least one removable fan, an at least one motor to drive the at least one removable fan, **characterised in that** said device can be applied in a hole in a wall, said hole having a front at its exterior portion and a back at its interior portion, said air guide means defining an air guide channel between at least first and second openings, said at least one fan being positioned in said at least first and second openings, such that air driven by said first fan through said first opening flows through said air guide channel and through said second opening, thereby carrying off moisture originating from said wall.
2. A device as claimed in claim 1, said air guide means being removable from said housing.
3. A device according to either of the preceding claims, said housing additionally comprising a removable vented front section.
4. A device as claimed in any of the preceding claims, comprising first and second openings, said first and second openings each comprising at least one removable fan and at least one motor to drive said removable fan.
5. A device as claimed in any of the preceding claims wherein said air guide means comprises a vertically separating wall, preferably extending over the full or nearly full height of said device, which divides said hole into two adjacent chambers, whereby a

passage is left between said two chambers.

6. A device as claimed in claim 1 comprising first and second openings, said first opening comprising a first removable fan and a motor and said second opening comprising a second removable fan and a motor, said air guide means comprising a vertically separating wall, preferably extending over the full or nearly full height of said device, which divides said hole into two adjacent chambers, whereby a passage is left between said two chambers, wherein said first fan is positioned in said first opening to draw air into and through said air guide channel and said second fan is positioned to draw air through said air guide channel and out of said second opening, thereby carrying off moisture originating from said wall. 5
7. A device as claimed in any of the preceding claims wherein said wall is a cavity wall or a solid wall. 10
8. A device as claimed in any of the preceding claims wherein said at least one motor to drive said at least one removable fan is powered by electricity, solar power, wind power, or magnetic power. 15
9. A kit of parts comprising a housing having an air guide means, an at least one removable fan, an at least one motor to drive the at least one removable fan, and an additional at least one removable fan and motor, **characterised in that** said device can be applied in a hole in a wall, said hole having a front at its exterior portion and a back at its interior portion, said air guide means defining an air guide channel between at least first and second openings, said at least one fan being positioned in said at least first and second openings, such that air driven by said first fan through said first opening flows through said air guide channel and through said second opening, thereby carrying off moisture originating from said wall. 20
10. A kit of parts as claimed in claim 9, said air guide means being removable from said housing. 25
11. A kit of parts as claimed in either of claims 9 or 10, said housing additionally comprising a removable vented front section. 30
12. A kit of parts as claimed in any of claims 9-11, said housing additionally comprising a removable non-vented front section. 35
13. A method of treatment of damp in a wall or similar, said wall defining internal and external surfaces, comprising the steps of: 40

i) Removing at least one brick from said exter-

nal surface of said wall to realise a hole in said wall,

ii) Installing a device to abstract moisture from said wall or similar, said device comprising a housing having a removable air guide means, an at least one removable fan, an at least one removable motor to drive the at least one removable fan, and a removable vented front section, said air guide means defining an air guide channel between at least first and second openings, said at least one fan being positioned in said at least first and second openings, such that air driven by said first fan through said first opening flows through said air guide channel and through said second opening, thereby carrying off moisture originating from said wall.

iii) Ventilating said wall using said at least one removable fan.

14. A method of treatment of damp in a wall or similar comprising the steps of:

i) Realising a hole in a wall, installing a device and ventilating said wall according to steps (i)-(iii) of claim 13,

ii) Removing from said housing said vented front section, said air guide means, said at least one removable fan, and said at least one motor,

iii) Attaching a non-vented front section to said housing of said device so as to completely seal said hole in said wall.

Figure 1A

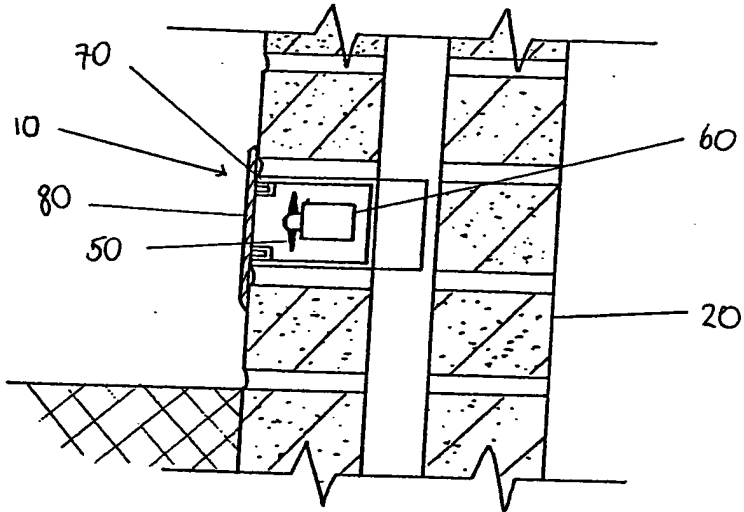


Figure 1B

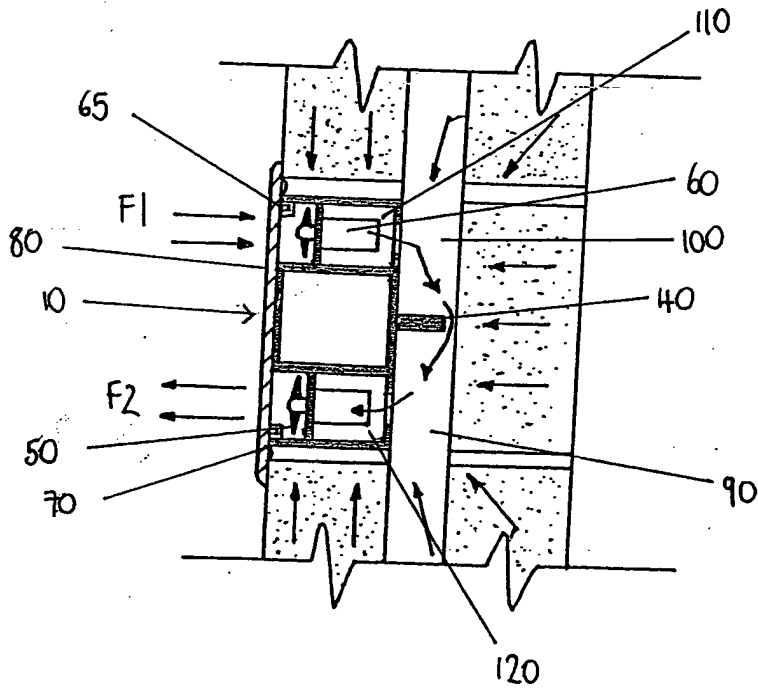


Figure 1C

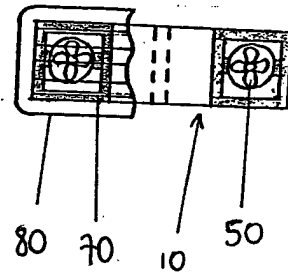


Figure 2A

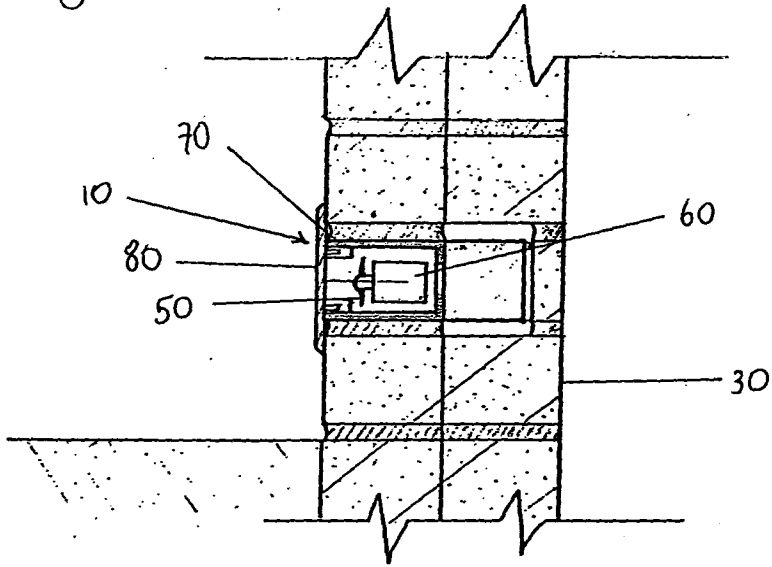


Figure 2B

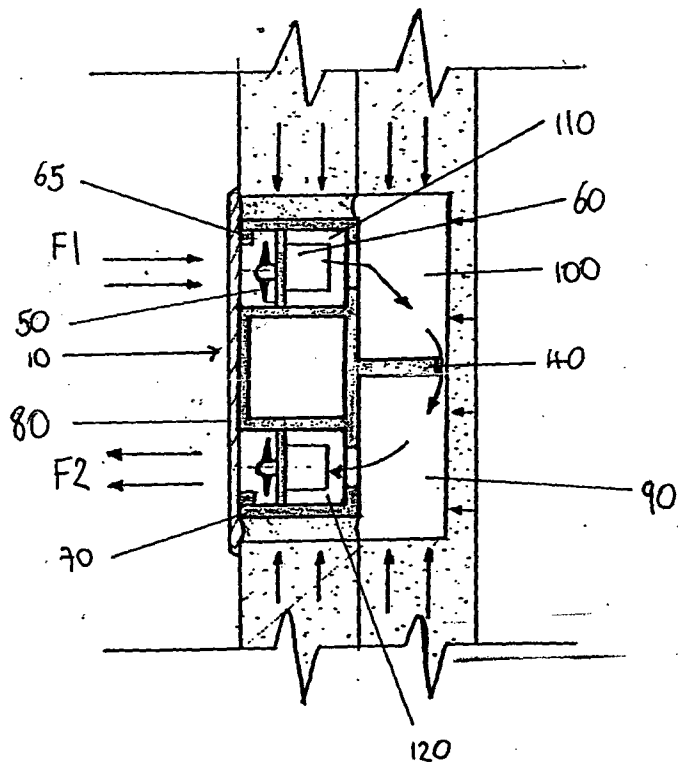


Figure 2C

