Improvements in Windows

A window (10), comprising first and second halves (12, 14) which overlie one another to form the completed window and releasable locking means, locking said first and second halves together wherein once the window is installed, the locking means becomes inaccessible, and at least part of the window must be removed, in order that the locking means may subsequently be made accessible.
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— as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(U))
— of inventorship (Rule 4.17(iv))

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IMPROVEMENTS IN WINDOWS

Field of the Invention

The invention relates to windows.

Review of Art known to the Applicant

There is a wide variety of known windows.

Fitted windows often have an inside facing portion and an outside facing portion. Clearly, the two portions face different challenges, chiefly of an environmental and an aesthetic nature. Thus, the outside facing portion ought properly to be hard wearing, in order that it is able to survive such environmental challenges as weather conditions and pollution, whilst the inside facing portion will not face such problems to as great an extent, instead forming, for example, a part of a living or working environment. It will therefore be tasked, amongst other uses, with being pleasing to the eye.

A solution to this problem is to make a window of mixed materials.

Mixed materials windows, where the inside and outside facing portions are of different materials, are widely used. Whilst addressing the problems outlined above, the mixing of materials has a variety of attendant problems.
One major problem relates to the means by which they are fitted together. The use of conventional adhesives to fit portions together often does not take into account the compressibility and expandability of different materials. Wood in particular has a tendency to shrink, expand and even warp in relation to environmental factors. Conventional adhesives do not take account such properties, which can lead to the failure of the adhesive and therefore the compromise of the structural integrity of the window itself. Alternatively, it may lead to damage to the portions themselves, which may create structural problems, or lesser problems of an aesthetic variety.

A further problem is that adhesive has a tendency to fail over time. Maintenance and repair is costly, often to the extent that new windows are bought instead. This is a cause of pollution, as well as having an economic cost.

There is also danger inherent in the notion of parts of windows becoming detached from other parts, due to the failure of adhesion. Clearly, a falling window could do considerable damage to property or passers by.

A further problem with adhesion in mixed materials windows is that the life-spans of the different portions are naturally different. Parts will need replacing at different times. The removal of a part bonded to another can be time consuming and even damage the parts which remain.

It is an object of the present invention to attempt to provide a solution to these and other problems.

**Summary of the invention**

In its broadest aspect, the invention comprises a window, comprising first and second halves which overlie one another to form the completed window and releasable locking means, locking said first and second halves together wherein once the window is installed, the locking means becomes inaccessible, and at least part of the window must be removed, in order that the locking means may subsequently be made accessible.
This configuration is advantageous in that it allows for the removal of all or part of the window in order to facilitate repairs or replacement as desired. The possibility of replacing windows in this way is desirable for both economic and environmental reasons - it saves money and energy to replace parts, rather than the whole window.

The provision of first and second halves allows for the mixing and matching of different components, which means the configuration of the window halves may be adjusted to optimally suit the environment into which it is integrated.

An advantage of releasable locking means is that when the window comes to the end of its life, it may be separated easily into its two parts for the purposes of disposal, and in particular for recycling. This is, of course, particularly relevant if the first and second halves are formed from different materials.

This configuration is further advantageous in that the inaccessibility of the locking means upon installation provides the advantage over other windows with releasable locking means that the means cannot be released when it is installed, thereby preventing all but the most committed tamperer from taking the window apart, whatever his or her motivation for so doing.

A still further advantage is that because the locking means are not exposed to the exterior, they will not be damaged by external factors and should therefore stay operative for longer. In particular, this is an advantage over a lock and key mechanism.

In a first subsidiary aspect, the first and second halves are formed from different materials.

The provision of this feature allows a material to be chosen for each of the halves, with properties chosen in order to combat challenges it faces from a given environment and/or a given user or users. In the case of windows fitted to moving structures such as caravans, a variety of such challenges may be envisaged.

Preferably, the whole window must be removed from the opening into which it is installed in order to make the locking means accessible.
In a second subsidiary aspect, the locking means comprises at least one cam and at least one channel so located and fashioned as to receive one or more cams.

This is advantageous in that the cam secures the two halves in such a way that two halves of different materials may shrink and expand relative to each other.

Preferably, the cam is attached to that half which, in use, will face inward of the installed window.

This is particularly advantageous in that if a subject attempts to pull the outward facing half away. The cam, remaining as it does on the inward facing half, will be useful in fitting the outward facing half.

The outward facing half is more likely to be exposed to environmental problems and therefore is likely to be replaced more frequently than the inward facing half. By attaching the cam to the inward facing half, there will be a less frequent need to provide a replacement.

In embodiments where only a part of the window needs to be removed from a given opening in order to operate the cam, and where the part that requires removal is the outward facing half, the provision of the cam on the pre-installed, inward facing section will allow for easier installation.

In a third subsidiary aspect, the locking means further comprises one or more gaskets joined to the second half and a groove in the first half, so fashioned and so located as to receive one or more gaskets.

The provision of gaskets is advantageous because it provides supplementary means of attaching the first frame half to the second half.

The provision of one or more gaskets is also useful in that they may be used to ensure the fit between halves does not let water, or other undesirable elements, into the interior of the window.
Preferably, the gaskets are made of a deformable material.

The deformability of the gaskets will allow for the sealing of frame to be done with greater efficacy.

More preferably, the gasket is attached to the second half at a line of weakness.

This is advantageous in that it allows for the second half to be pulled away from the first half, with reduced resistance from the gasket.

This is further advantageous in that the line of weakness may act as a means to increase the malleability of the joint between the second half and the gasket.

This will further allow for the flexible movement of the gasket in relation to the second half and in relation to any surround, glazing or infill panel introduced to it in such a way that it applies a force.

More preferably still, the cam is integral to the construction of the first half.

The cam will therefore have a relatively strong attachment to the first half. If the second half is pulled away, the cam is more likely to remain a part of the first half.

In a fourth subsidiary aspect, first and second halves adhere wholly or primarily by virtue of the locking means.

In embodiments where the first and second halves adhere wholly by virtue of the locking means, without for example any supplementary adhesion or welding, the halves will be readily separable from each other, which will allow for the removal of one without damaging another and for the relatively quick and easy replacement of either half.

In a fifth subsidiary aspect, the first half is substantially wooden.

The first half will generally be the half in contact with an internal environment. The provision of a wooden first half will be particularly advisable from an aesthetic standpoint,
both because wood is widely considered an attractive substance per se, due in part to its being connotative of the natural world, but also because it readily takes coatings of substances such as paint.

The use of wood provides specific advantages over other materials such as aluminium, in that wood does not conduct heat as well. Clearly, windows are amongst the primary heat loss media constitutive of a structure. As such, it is a significant advantage that a window be constructed largely from a heat-retaining material.

In a sixth subsidiary aspect the second half is made of plastics.

The making of the second half out of plastics is particularly advantageous in that a plastics material may be imbued with enough elasticity so that it may expand and contract in relation to a wooden first half.

The second half will generally be the half in contact with an external environment, as opposed to the first half which will be in contact with the internal environment formed by the structure of which it forms a part. Forming this part out of plastics material will ensure that it is hard-wearing and, moreover, relatively cheap to replace. In embodiments where the gasket is an integral part of the second half, it will be relatively easy to form with some precision. This will be the case particularly if a plastics material, particularly that of a mouldable type, is used.

Included within the scope of the invention is a window substantially as described herein, with reference to and as illustrated by any appropriate combination of the accompanying text and drawings.

Brief description of the drawings

Embodiments of the invention will now be described in detail, by way of example only, with reference to the accompanying drawings, in which:
Figure 1 shows a diagrammatic cross sectional view of part of a window according to a first embodiment of the invention, shown in use within a structural member.

Figure 2 shows a diagrammatic cross sectional view of part of a window according to a second embodiment of the invention.

Figure 3 shows a diagrammatic cross sectional view of a first half according to a second embodiment of the invention.

Figure 4 shows a diagrammatic cross sectional view of a second half according to a second embodiment of the invention.

Figure 5 shows a diagrammatic perspective view of part of a window, according to a third embodiment of the invention.

Figure 6 shows a diagrammatic perspective view of a cam used to hold the halves together.

Figure 7 shows a diagrammatic perspective view of the cam.

Detailed description of the preferred embodiments

Figure 1 shows an embodiment of a window, indicated generally by 10. The window comprises a first half 12 and a second half 14. The first half 12 and the second half 14 are so arranged as to overlie each other. The first half 12 comprises a wooden material. The second half 14 comprises a plastics material such as PVC-u. Alternatively, materials known to the man skilled in the art may be used. In this embodiment, all four corners of the second half 14, are hermetically welded, for the purposes of insulating against water penetration. The window 10 is so constructed that the removal of the second half 14 will not affect the integrity of the window if it is forcibly removed.

Notably in this embodiment, first half 12 has a cross-sectional area many times that of second half 14. It is advantageous for a wooden material to be used in the larger first half 12, because the grain construction of wooden materials enables the user to customise the
fit of the first half 12 to a given surround or, for example, to receive a pane of glass (not shown).

Also shown in this embodiment is a glazing unit 16 which is not part of the invention. The first half 12 and the second half 14 are so fashioned that when they are joined they form a glazing unit receiving aperture. Said aperture is defined in part by first half gasket 18 and second half gasket 20. Alternatively, a surround receiving aperture may be formed in a manner known to the skilled man.

Also shown at Figure 1 are locking means 22, which in this embodiment is a cam. The cam 22 is formed from injection moulded plastic. This is advantageous because it lends particular strength to the construction of the window 10 and further, if an agent were to apply force to second half 14 so as to pull it away from first half 12, cam 22 would be sufficiently firmly attached to first half 12, being part of it, that it would sustain minimal damage and the possibilities of its being pulled off with second half 14 would also be minimised. Cam 22 is so fashioned as to be a good fit with the cam receiving portion of second half 14, which is defined by first jaw feature 58 and second jaw feature 62. In other embodiments, the cam may be attached to either first half 12 or second half 14 and further need not be integral.

This window is a tilt-and-turn sash window construction. Other envisaged uses are for conventional windows as well as those comprising transoms and/or mullions, although the mention of these specific applications should not be taken as limiting this technology to particular types of windows. Indeed it is envisaged that such technology may also be used for doors, or any other features which are characterised by a window and may be found either on buildings or otherwise, being for example on caravans or other forms of transport.

In this embodiment, the first half 12 and second half 14 are retained in the overlying position by cam 22. The contact between gasket 20 and glazing unit 16 and the arrangement of the two halves 12, 14 with glazing unit 16 is such that when the window 10 is installed, the cam 22 is inaccessible. This is due not only to the presence of the glazing unit 16 but also to the presence of a structure so arranged as to be in contact with point 24 of the second half 14 and point 26 of the first half 12.
Figure 2 shows at 30 a further embodiment of the invention. Here the gasket 20 is shown in a pre-deformed state. Gasket 20 may, for the purposes of enlightening the reader, be metaphorically "split" into three components. They are a primary tapered portion 32, a secondary tapered portion 34 and a protuberance 36. When a further part of the window, which in this case will be a sash, is introduced to the sash receiving aperture, here partially defined by gasket 20 and first half gasket 18, the gasket 20 is deformed so that primary tapered portion 32 and second tapered portion 34 form a substantially planar abutment with the sash. Said formation forces protuberance 36 into protuberance receiving groove 38 so as to provide a supplementary locking means of attaching second half 14 to first half 12. In this embodiment the gasket 20 is made of an elastomeric material formed by a co-extrusion process. The gasket 20 may be made of a co-extruded thermoplastic material or moulded EPDM, for example. Materials known to the skilled man may be substituted. The deformation of the gasket 20 in the manner discussed above also acts to form a seal against the ingress of water, borne, for example, by the weather. The gasket 20 further features a line of weakness 40. Said line of weakness 40 facilitates the removal of the second half 14.

Figure 5 shows, generally, a window 50 with a glazing unit mounted. The glazing unit is not part of the invention. Said window 50 comprises a cam 22. The cam 22 is mounted on a first half 12. The cam 22 has the following features: a tapered handle 52, a second half receiving portion 54 and a shaft 56. In this embodiment, the shaft is advantageously helically threaded so that, upon installation in the first half 12 the cam 22 may be screwed into the first half 12 as deeply or as shallowly as required, via a bore (not shown) which may be preformed, or alternatively formed by the introduction of the shaft. This feature is advantageous in that it may be used to take into account the relative properties of expansion and shrinkage predicted of the materials of the first and second halves 12, 14, by defining the relative distance between first and second halves, 12, 14, or if touching, the force with which they are held in contact. Thus, each may be provided with room to shrink and expand without damaging itself and/or the other. The first half receiving portion 54 of the cam 52 is so fashioned as to receive the first half 14. Here the first half 14 comprises a first jaw feature 58 and a second jaw feature 62, so proportioned as to be accepted by the first half receiving portion 54. Further lateral movement between first and second halves is accommodated by second half receiving portion 54 being free to move in the
channel defined by the first and second jaw features 58, 62. This configuration is so defined as in use to comprise a channel wherein the tapered handle 52 can be fitted when the window 50 is installed in its surround 60. Upon installation therefore the cam 22 which is constitutive of the releasable locking means is rendered inaccessible by the surround 60. Finally, it is worth noting that the half receiving portion of the cam 22 has bevelled cam receiving edges 54a, 54b so as not to damage the second half 14 on installation.

It should be noted that in this embodiment, each half 14 is formed from a single piece of material. This is particularly advantageous in that a one piece construction enhances structural integrity. An aspect of this structural integrity is that the use of single pieces stops the chance of penetration of water or other unwanted elements into the window, which may damage it. Finally, this is advantageous in that single piece halves will tend to be quicker and easier to install, which, particularly where buildings with large numbers of windows are concerned, is a very marked advantage indeed.

The completed second half 14 is welded at the corners, that is to say that the second half 14 comprises components joined together by weld, to ensure that there is no ingress of moisture or water. In particular, this would provide a notable advantage over existing multipart windows with aluminium frames, for example, where water does tend to leak into the corner joints.

This embodiment is further characterised in that at no point of contact between the first half 12 and the second half 14 or either of the halves 12, 14 and the cam 22 is any adhesion means including weld used. Notable also is the surface contact between first half 12 and second half 14 - it is interrupted only by the cam 22.

Reference to "halves" is not intended to carry the meaning that each of the two parts of the window labelled as such form 50% or approximately 50% of the totality of the window in any respect. Indeed, it will be noted in the examples that the first half tends to be substantially larger than the other.
In this specification, the word "window" should be taken to mean windows, window frames, sashes, and any combination of those elements, either with each other, or with other elements customarily used in the fabrication of windows.
CLAIMS

1. A window, comprising first and second halves which overlie one another to form the completed window;

and releasable locking means, locking said first and second halves together;

wherein once the window is installed, the locking means becomes inoperable, and at least part of the window must be removed, in order that the locking means may subsequently be made operable.

2. A window according to claim 1, wherein the first and second halves are formed from different materials.

3. A window according to either of the previous claims, wherein the whole window must be removed into which it is installed in order to make the locking means accessible.

4. A window according to any of the previous claims, wherein the locking means comprises at least one cam and at least one channel so located and fashioned as to receive one or more cams.

5. A window according to claim 4, wherein the cam is attached to that half which, in use, will face inward of the installed window.

6. A window according to any of the previous claims, wherein the locking means further comprises one or more gaskets joined to the second half and a groove in the first half, so fashioned and so located as to receive one or more gaskets.

7. A window according to claim 6 wherein the gaskets are made of a deformable material.

8. A window according to either of claims 6 or 7, wherein the gasket is attached to the second side at a line of weakness.
A window according to any of claims 6 - 8, wherein the gasket is integral to the construction of the first half.

A window according to any of the previous claims, wherein first and second halves adhere wholly or primarily by virtue of the locking means.

A window according to any of the previous claims, wherein the first half is substantially wooden.

A window according to any of the previous claims, wherein the second half is made of plastics.

A window according to any of the previous claims, wherein the second half is fully welded at its corners.

A window substantially as described herein with reference to and illustrated in any appropriate selection or combination of the description and/or drawings.
**INTERNATIONAL SEARCH REPORT**

**A. CLASSIFICATION OF SUBJECT MATTER**

INV. E06B3/30 E06B3/58

**According to International Patent Classification (IPC) and/or national classification and IPC**

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

E05C E06B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

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Further documents are listed in the continuation of Box C.

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**Date of the actual completion of the international search**

3 December 2008

**Date of mailing of the International search report**

10/12/2008

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Name and mailing address of the ISA/Authorized officer

Henkes, Roel and

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For the PCT/ISA/210 (second sheet) (April 2005)
DOCUMENTS CONSIDERED TO BE RELEVANT

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