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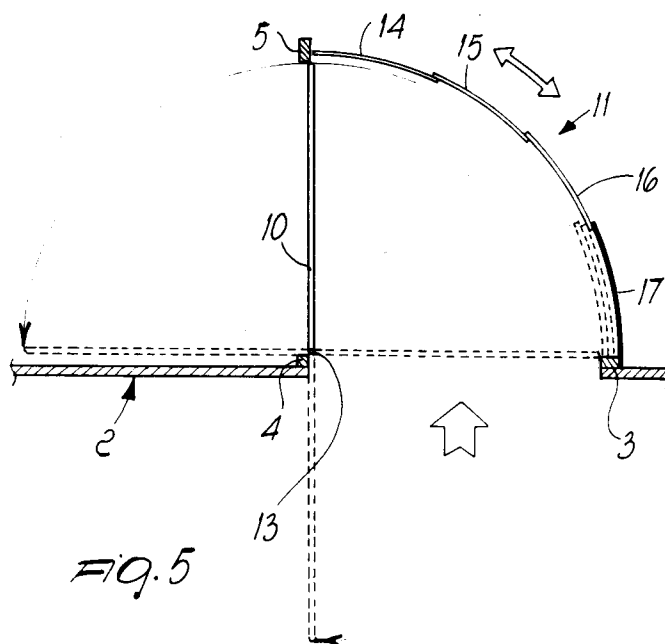
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I-21047 Saronno (Varese)(IT)**(54) **Automatic door structure.**

(57) The present invention relates to an automatic door structure constituted by a frame (3,4,5) which supports a first swinging door (10) and a second door (11) with one or more wings (14,15,16) which can slide along an arc of a circle. The first swinging door (10) is allowed to rotate axially through at least two hundred and seventy degrees. The wings

(14,15,16) have a curved configuration and can be moved along mutually parallel planes to a position, proximate to an upright (3) of the frame (3,4,5), where the wings (14,15,16) are protected by a fourth fixed wing (17). A motor-driven mechanism and sensors are provided for automatic operation of the door structure.

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The present invention relates to an automatic door structure and in particular to an automatic door with differentiated openings.

Swinging doors with automatic movement are currently known, and some disadvantages can be observed therein: during the opening step, said doors occupy a space which is equal to the transit space.

This implies the possibility that people who are entering may collide with people who are going out or vice versa.

As a partial solution to this disadvantage, the use of devices for actuating the opening and closure of the door which are controlled by appropriate sensors is known; even in this case, however, disadvantages are observed, due to the structural complexity of the devices and to the need to create passage-ways which appropriately guide people towards an area falling within the operational range of the sensors.

High manufacturing costs are also incurred during the production of said devices.

The aim of the present invention is to eliminate the disadvantages described above in known types by providing an automatic door structure which allows the transit of people in the maneuvering space of the door in optimum safety conditions, which therefore limit the possibility of accidental collisions.

Another object of the invention is to provide an automatic door structure which achieves good protection for people in transit, while occupying a modest space.

A further object of the invention is to provide an automatic door structure which is easy to install.

Another important object of the invention is to provide an automatic door structure wherein people are guided so as to transit through a passage-way.

Yet another object of the invention is to provide an automatic door structure which is structurally simple so as to allow rapid and easy maintenance.

Not least object of the invention is to provide an automatic door structure which associates with the preceding characteristics that of being reliable and safe in use.

The above described aim and objects, as well as others which will become apparent hereinafter, are achieved by an automatic door structure characterized in that it comprises a frame with a first swinging door and a second door having at least one wing, said at least one wing being slidable along an arc of a circle defined by said first door, means being provided for motorising at least one of said first door and said second door.

Advantageously, said first door is rotatable through an angle of at least two hundred and seventy degrees about its pivoting axis.

Further characteristics and advantages of the

invention will become apparent from the detailed description of a particular embodiment, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

5 figure 1 is a front perspective view of the automatic door structure accommodated in the entrance of a shop-window;

figure 2 is a front view of the automatic door structure;

10 figure 3 is a view of the automatic door structure taken along the sectional plane III-III of figure 2;

figure 4 is a view of the automatic door structure taken along the sectional plane IV-IV of figure 3;

15 figure 5 is a detail view of the automatic door structure, taken along the sectional plane V-V of figure 2;

figure 6 is a view of the mechanical devices of the automatic door structure, taken along the sectional plane VI-VI of figure 2.

20 With reference to the above figures, the automatic door structure, generally indicated by the reference numeral 1, is arranged at the entrance of a shop-window 2 in the particular embodiment.

25 The structure 1 is constituted by a frame having a first upright 3, a second upright 4 and a third upright 5 which are arranged on a first plane 6 and a second plane 7. The planes 6,7 are mutually orthogonal and intersect one another at the second upright 4.

30 Above the first, second and third uprights there is a covering element 8 which connects them and accommodates means 9 for moving a first swinging door 10 and a second door 11.

35 A platform 12 is provided below the first, second and third uprights for connecting them.

40 The first swinging door is pivoted at a first pivot 13 associated with the second upright 4: the interspace between the second upright and the first upright is naturally equal to the interspace which is present between the second upright and the third upright and therefore to the dimensions of the first swinging door 10.

45 Said swinging door 10 can rotate about the first pivot 13 through at least two hundred and seventy degrees, so as to become arranged behind the shop-window 2, between the second upright and the third upright, between the second upright and the first upright and perpendicular to the first plane 6.

50 The second door 11 is constituted by a plurality of wings which are slidable along an arc of a circle which connects the first upright and the third upright; a first wing 14, a second wing 15 and a third wing 16 are illustrated in the particular embodiment.

55 Said wings have a curved configuration, are arranged on mutually parallel planes and can be packed together proximate to the first upright 3 so

that they are protected by a fourth fixed wing 17.

The dimensions of the first, second and third wings are such that once they are opened out as illustrated in figure 5 the interspace between the first upright and the third upright is closed.

The means 9 (sensors, motors, etc.) for the automated actuation of said first swinging door 10 and of said second door 11 are accommodated inside the covering element 8.

The rotary motion performed by the leaf of said first door 10 is activated by a motorized means which interacts with the first pivot 13 which pivots said leaf.

In a different manner, the means 9 suitable for interacting with the second door allow the sliding of the three wings; said means are advantageously constituted by a gearmotor 23, and a lever 24 is keyed to the motorized axis of said gearmotor and actuates three arms 25a, 25b and 25c which are pivoted to said lever at one end. Obviously, other suitable power-assisted means and kinematic means may be used.

Said three arms have different lengths, and each one is pivoted, at the other end, at one of three rods 26, 27 and 28.

Said rods are in turn pivoted together at one end to a second pivot 29 which is arranged parallel to the second upright 4.

At the other end, the rods 26, 27 and 28 interact with means for the sliding and support of said wings 14, 15 and 16.

Said sliding means are constituted by three first rollers, indicated by the numerals 28a, 28b and 28c, which are freely pivoted at the ends of the rods 26, 27 and 28 and can run on a guide 30 defined on the curved side 31 of the covering element 8, which connects the first upright and the third upright.

The supporting means are constituted by three arms, indicated by the numerals 32a, 32b and 32c, which protrude from the rods 26, 27 and 28, proximate to the ends thereof which are pivoted to the first rollers 28a, 28b and 28c.

One of the wings 14, 15 and 16 is associable with each of said three arms; said arms furthermore have, at their ends, second rollers which are indicated by the numerals 33a, 33b and 33c and can run on the guide 30.

The three wings are free to slide along a circumference, preferably at mutually different speeds, due to the above-cited kinematic system.

Advantageously, the lengths of the respective arms 25a, 25b and 25c and their points of application or coupling are such as to allow the arrival at the stroke limit to be identical for all of the three wings 14, 15 and 16, which are gathered and superimposed in the portion occupied by the fourth fixed wing 17.

The operation of the automatic door structure 1 is as follows: the first swinging door 10, which is freely anchored on a pivot 13 adjacent to the upright 4, rotates freely about said pivot through at least two hundred and seventy degrees and can thus assume four distinct positions.

A first position which said first swinging door 10 can assume indifferently is the safety-door position, which allows people who are inside the premises to exit freely; in this position, the plane of the leaf of the first door 10 is orthogonal to the corresponding external plane of the window.

A second position which is reached is the closing position, in which the plane of the leaf of said first door 10 obstructs the entrance of the premises.

A third position which is reached is the position for opening the premises, wherein the plane of the leaf of said first door 10 connects the second upright and the third upright to one another.

The opening of the leaf of the first door 10 affects the opening of the second three-wing door 14, 15 and 16.

A person entering the premises in fact passes through the entry threshold and is inside a vestibule-region shaped like a ninety-degree cylindrical sector.

In order to gain access to the premises, a person is therefore in a delimited region in which the means suitable for indicating his instantaneous presence, such as sensors, can be activated instantly and pertinently.

Said sensors activate the gearmotor 23, which actuates the sliding of the three wings 14, 15 and 16 of the second door at the guide 30: due to the particular kinematic system, the individual wings are moved at mutually different speeds so that arrival at the stroke limit both when opening and when closing is identical for all of the wings.

A last position which the first door 10 can assume is the emergency position: in case of failure of the motorized automation system of the first door 10, the plane of its leaf in fact defines a supplemental angle with respect to the plane of the internal window, freeing access to the inside of the premises though the second door is closed.

Therefore, this particular structure with differentiated openings allows better safety in operation, since the actuation space of said automatic door structure is contained inside the threshold of the premises, leaving absolute freedom of transit in the immediate vicinity of the entrance of said premises.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the scope of each element

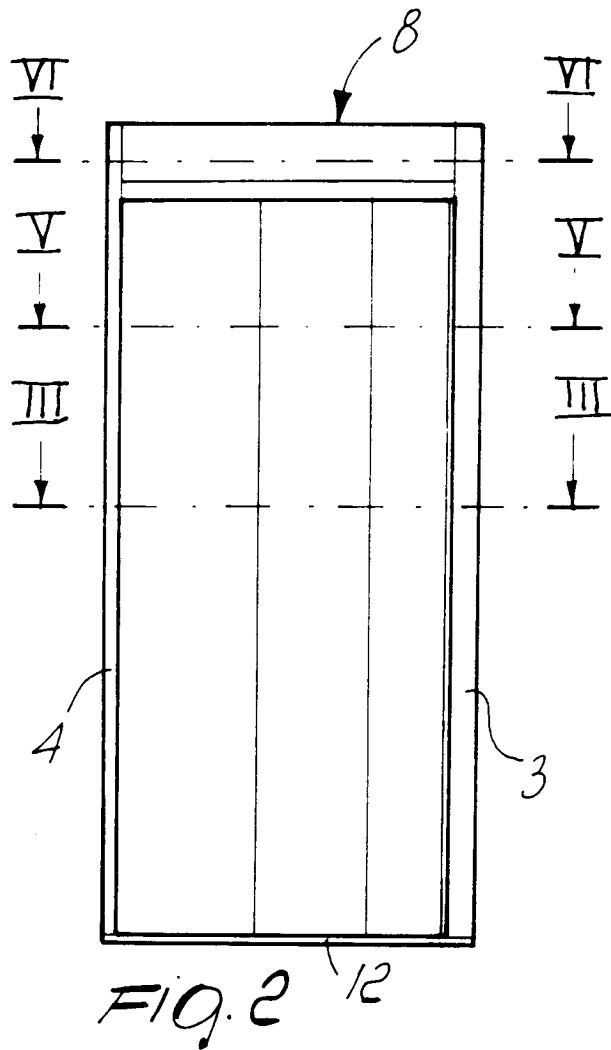
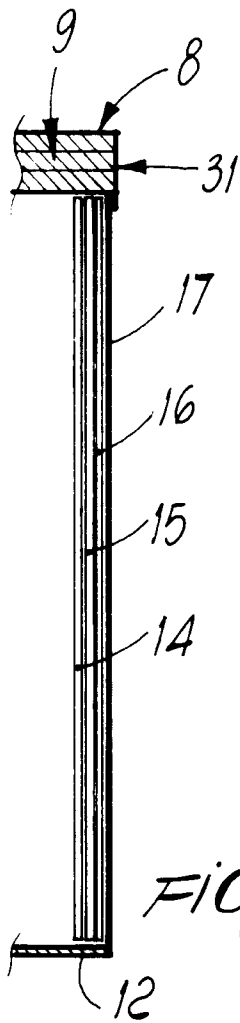
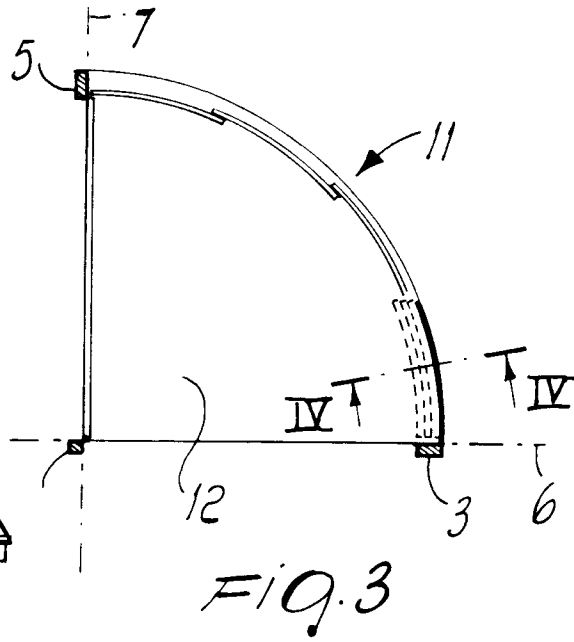
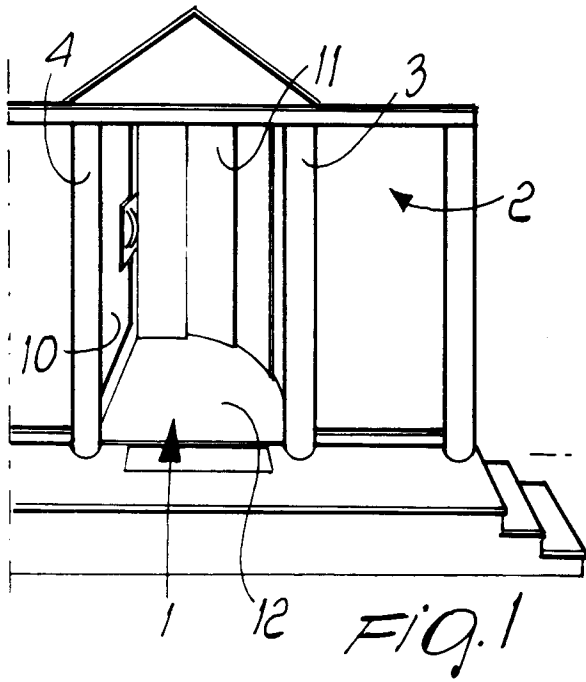
identified by way of example by such reference signs.

Claims

1. Automatic door structure, characterized in that it comprises a frame with a first swinging door and a second door having at least one wing, said at least one wing being slidable along an arc of a circle defined by said first door, means being provided for motorizing at least one of said first door and said second door. 5
2. Automatic door structure according to claim 1, characterized in that said first swinging door is allowed to rotate about its own pivoting axis through at least two hundred and seventy degrees. 10
3. Automatic door structure according to claims 1 and 2, characterized in that it comprises a frame having a first upright, a second upright and a third upright which are arranged on a first plane and on a second plane, said planes being mutually orthogonal and intersecting one another at said second upright. 15
4. Automatic door structure according to claims 1 and 3, characterized in that above said first, second and third uprights there is a covering element for connecting said uprights, said covering element accommodating means for moving said first swinging door and said second door, a platform being present below said first, second and third uprights for downwardly connecting said uprights. 20
5. Automatic door structure according to claims 1 and 4, characterized in that said first swinging door is pivoted at a first pivot which is associated with said second upright, the interspace between said second upright and said first upright being equal to the interspace which is present between said second upright and said third upright and therefore to the dimensions of said first swinging door, said swinging door being allowed to rotate about said first pivot through at least two hundred and seventy degrees, so as to assume four different positions starting from the position which is perpendicular to said first plane. 25
6. Automatic door structure according to one or more of the preceding claims, characterized in that said second door is constituted by a first wing, by a second wing and by a third wing, said wings being slidable along an arc of a circle which connects said first upright and 30

said third upright, said first, second and third wings having a curved configuration, being arranged on planes which are mutually parallel, being arrangeable in a pack proximate to said first upright and being protected by a fourth wing which is fixed and adjacent to said first upright. 35

7. Automatic door structure according to claims 1 and 6, characterized in that means for the automated actuation of said first swinging door, by means of the motorization of said first pivot, and of said second door, are present inside said covering element, said means comprising a gearmotor, a lever keyed to the motorized shaft of said gearmotor and actuating three arms which are separately pivoted thereto at one end, said three arms having different lengths, each arm being pivoted, at the other end, at one of three rods. 40
8. Automatic door structure according to claims 1 and 7, characterized in that said three rods are pivoted together, at one end, to a second pivot which is arranged parallel to said second upright. 45
9. Automatic door structure according to claims 1 and 8, characterized in that said rods interact, at the other end, with sliding and supporting means for said wings, said sliding means being constituted by three first rollers which are freely pivoted at the ends of said three rods and can run on an adapted guide which is defined on a curved side of said covering element, said curved side connecting said first upright and said third upright, and preferably wherein said supporting means are constituted by three arms which protrude radially to said rods proximate to the ends which are pivoted to said first rollers. 50
10. Automatic door structure according to claims 1 and 9, characterized in that one of said wings is associable with each of said three arms, second rollers being provided at the ends which are not coupled to said rods and being slidable on said guide, and preferably wherein the differentiated lengths of said arms and the arrangement of their points of application or coupling allow the simultaneous arrival at the stroke limit of all three of said wings. 55



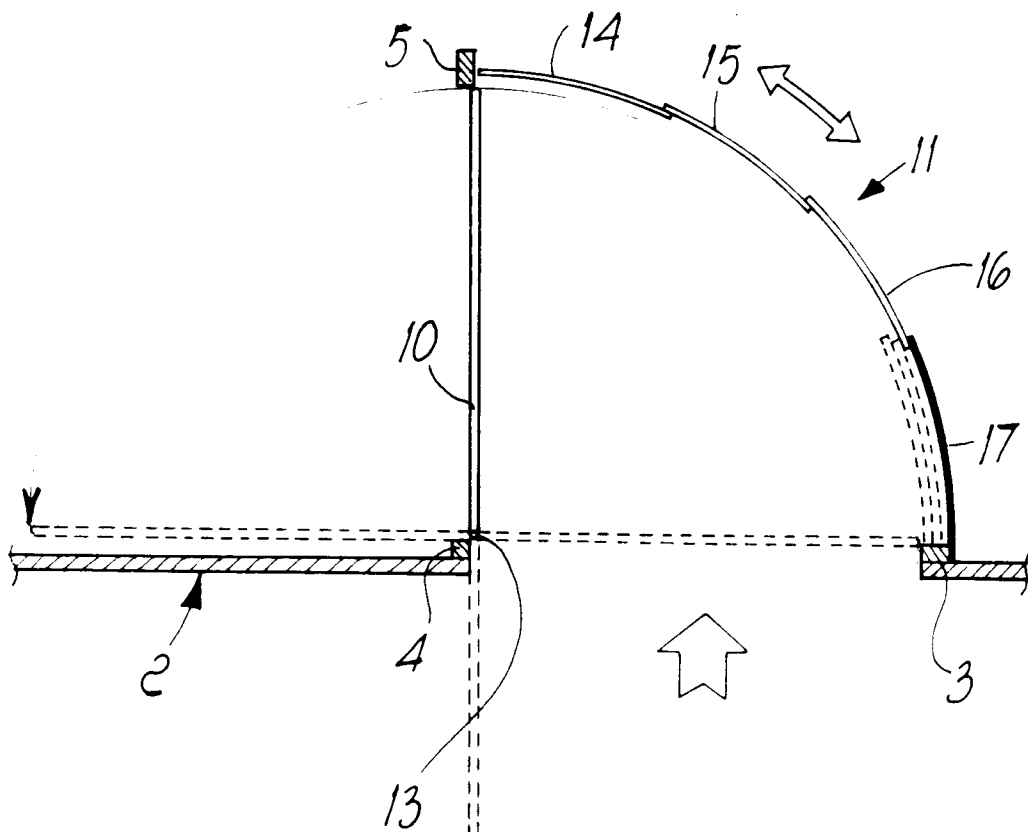


Fig. 5

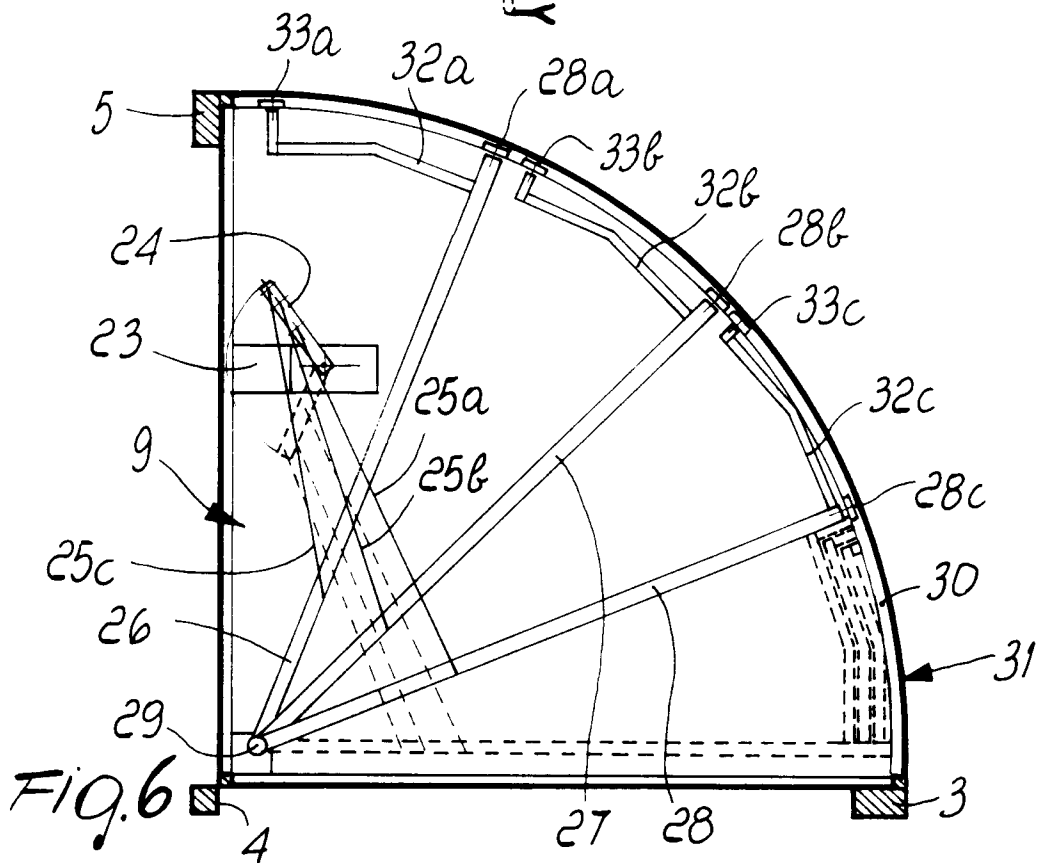


Fig. 6



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EUROPEAN SEARCH REPORT

Application Number

EP 91 10 1492

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	EP-A-0 171 369 (TONALI S.P.A.) * page 5, line 17 - page 7, line 25; figures 2,3 *	1	E06B3/90 E06B3/92 E06B5/00 E06B3/50
A	--- US-A-2 662 253 (WINKLER) * the whole document *	2-5	
A	--- DE-U-8 507 810 (ONI-METALLWARENFABRIKEN GÜNTHER GMBH & CO) * page 3, line 20 - page 4, line 21; figures 1-3 *	6	
A	--- CH-A-109 837 (TOBLER) * the whole document *	7-9	
A	--- FR-A-2 642 108 (CAMBOULIVES) * page 2, line 15 - page 3, line 39; figures 1-4 *	9	

			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			E06B E05G
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 10 JANUARY 1992	Examiner BLOMMAERT 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	