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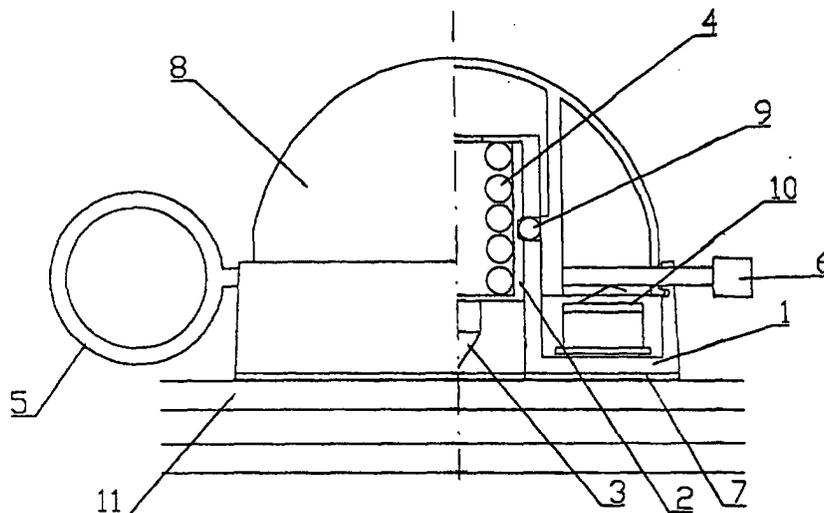
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(54) **HAMMER FOR BRAKING TEMPERED SAFETY GLASS**

(57) A fragmenting striking device for tempered safety glasses for the controlled fracturing of emergency exits of vehicles, premises and the like. It basically comprises: a support (1) fixed to the glass (11) by mechanical or chemical processes (7), a push button (8), a potential energy activating spring (4), a piston (2), a striker (3), a safety pin (5) and a seal (6). On removing the pin (5) and activating the push button (8), the retainers (9) of the piston (2) are released. The potential energy of the spring (4) is released producing displacement of the piston (2) and the striker (3) towards the glass, causing

a high concentration impact over the glass, provoking its total fragmentation. This device technically solves safety, if necessary, when fragmenting a tempered glass (emergency exits) since it is interlocked to the same, inviolable, theft-proof and of easy handling. Optionally, it incorporates an electronic circuit (10) which is activated on removing the pin (5) producing an optic and/or acoustic signal. Another option, with/without electronic circuit, consists in that the impact is directly produced by the piston (2) and the striker (3) interlocked to the push button (6), achieving glass fragmentation on removing the pin (11) and striking the push button (6).



**FIGURE.- 1**

**Description****OBJECT OF THE INVENTION**

[0001] The object of the present application for patent of invention is a fragmenting breaking device for tempered safety glass, having important advantages and novelties compared with current methods used for the same or similar purposes.

[0002] More specifically, a system has been conceived which easily, safely and quickly permits to control breakage of any safety glass, including double glazing.

[0003] The present invention has a wide field of application, like for example, in emergency exit windows of public transport vehicles, such as railways, coaches, buses, underground trains and protection for fire fighting systems, alarms, shop doors, glazing in buildings, etc., provided they, as usual, have glass tempered by chemical or thermal processes.

[0004] Two alternatives of the invention are shown: that corresponding to Figure 3 permits the fragmentation of any tempered monolithic glass, while the alternative corresponding to Figure 1 permits fragmentation in double glazing.

**BACKGROUND OF THE INVENTION**

[0005] At present, and as a reference to the state of the art, it should be mentioned that to open emergency windows in public transport vehicles and which are constructed in tempered glass, small hammers with a sharp metallic tip are used, with different locations depending on the characteristics of the vehicle or carriage area. Except for the case of public transport vehicles, in which the regulations oblige their installation, in other applications like buildings, shop premises, accesses, etc. their lack is obvious.

[0006] The current system, characterised by manual hammers and installed in transport vehicles, is not operative on some occasions mainly due to problems of not being found during the confusion produced when something occurs, obliging the breakage of emergency windows or accesses, the bad use of hammers on hitting with insufficient force and with unsuitable striking direction, absence of said hammers from their places or the difficulty of their location, due to the lack of criterion determining the latter, which at times is far away from the place of use.

**DESCRIPTION OF THE INVENTION**

[0007] The fragmenting striking device for tempered glass, object of the present invention, comprises a mechanism holding support fixed to any point of the glass by mechanical or chemical means. A piston with a striking tip is housed inside, which keeps a spring compressed assuring the potential energy necessary for the later operation of the device.

[0008] It also comprises a support which besides preventing possible damage and failures in the device, due to access of aggressive or contaminating environmental components, permits the incorporation of a safety pin preventing the accidental or improper use of the fragmenting striking device.

[0009] On removing the safety pin and slightly moving the push button, the potential energy of the spring is instantaneously released, producing displacement of the piston towards the glass, which with its sharp tip striker generates a high intensity impact over the glazing, provoking its total breakage in small fragments.

[0010] The device may incorporate a permanently lit signalling system and/or an acoustic alarm which operates once removal of the safety pin has commenced.

[0011] Therefore, the present invention provides an extremely simple and practical means to facilitate the opening of emergency windows, exits, protectors for objects or accesses made in tempered glass by means of total breakage.

[0012] To complete the description to be made below and to permit a better understanding of its features, the present specification is accompanied by a set of drawings in whose figures the most significant details of the invention are shown in an illustrative and non-limiting manner.

**DESCRIPTION OF THE DRAWINGS**

[0013]

Figure 1 shows a side view sectioned along its symmetry axis of the device assembly,

Figure 2 shows a front view of the device assembly, and

Figure 3 shows a side view partially sectioned along its symmetry axis of an alternative embodiment of the invention.

**DESCRIPTION OF A PREFERRED EMBODIMENT (FOR DOUBLE GLAZING)**

[0014] In Figure 1, a practical embodiment of the fragmenting striking device for tempered glasses according to the invention may be observed, comprising: a support (1) fixed to the tempered glass (11) by means of a chemical or mechanical system (7). The support (1) in turn performs the functions of a sleeve for displacement of a piston (2), incorporating a breaking tip called striker (3). The piston (2) houses an energy accumulating component inside, consisting of a spring (4). The piston (2) has a machined portion serving as a housing for metallic spherical balls called retention components (9) which permit the spring (4) to be maintained under compression between the piston (2) and the support (1).

[0015] The support (1) also permits the coaxial positioning and displacement of the push button (8) towards the glass. This push button (8) performs the function of

a releasing component of the retaining components (9) when a slight axial displacement towards the glass is produced and due to the stepping of its internal machined portion.

**[0016]** The mentioned support (1) optionally permits the housing of an electronic device (10) inside, to incorporate to the device a luminous indicator allowing its fast location even in circumstances of adverse visibility and/or to incorporate a system producing an acoustic signal when removal of the safety pin (5) is started.

**[0017]** The support (1) permits to assure the tightness and protection of the device mechanisms against contaminating agents and maintains the push button (8) in an operative position. Moreover, and by means of two radial holes, it allows placing of the safety pin (5), which, on crossing this component and the push button (8), assures system non-operation, blocking all movements of the push button (8) until said safety pin (5) is removed from its housing.

**[0018]** The safety pin (5) may incorporate a tampering evidence seal (6) or be constructed so that if any attempt of removal had been made, it is visually obvious.

**[0019]** The use of the device is very simple, since it is enough to remove the safety pin (5) and slightly strike the push button (8). The displacement of the push button (8) permits the release of the retaining components (9) causing the accumulated energy of the spring (4) to produce the displacement of the breaking piston (2) and striker (3) towards the glass (11) producing over the glass a high energy impact concentrated in one point causing the total fragmentation thereof.

**[0020]** The safety pin (5) may be optionally constructed with excised materials or shapes to obtain resilience and resistance at calculated shearing. In this way, in the case of emergency it permits that even without being removed, on strongly striking the push button (8), the pin (5) is fractured and the device acts as mentioned above.

#### **ALTERNATIVE EMBODIMENT (MONOLITHIC TEMPERED GLASS)**

**[0021]** In figure 3, an alternative embodiment may be seen in which the device may produce the fragmentation of tempered glass without using the spring but by the own energy conferred to the push button. In this alternative, the device consists of the components mentioned in the previous description: support (1), piston (2), striker (3), spring (4), pin (5), seal (6), adhesive (7) and push button (8). The support (1) undergoes variations eliminating the housing of the retaining components and the final ledge to retain the compression spring.

**[0022]** The piston (2) is interlocked with the push button (8) and is maintained in operative position by means of a light spring (4).

**[0023]** Finally, it should be mentioned that the materials used in the manufacture of the components of the proposed systems will be independent from the object

of the invention, as well as the shapes, dimensions, and all the accessory details that may be presented, provided they do not affect its scope.

#### **Claims**

1. A fragmenting striking device for tempered safety glasses (Figure 1) destined to the controlled breakage of tempered glasses corresponding to emergency windows of public transport vehicles, access protections, doors and the like, **characterised in that** it is a component interlocked to the glass consisting of a support (1) fixable by mechanical or chemical means to the tempered glass (11), said support (1) performing in turn sleeve functions for the displacement of the piston (2), incorporating a breaking tip called striker (3) and which moreover is a support for an energy accumulator consisting of a spring (4) and which at least incorporates three holes in a radial direction and with a 120° offset, permitting the housing of small metallic balls which serve as retention components (9) of the piston (2) in its compression state. Also the push button (8) which in turn performs the function of releasing component of the retention components (9) when an axial displacement is produced towards the glass and due to the stepping adjacent to the retention zone of the retention components (9), and the support (1) which, besides aesthetic purposes and device tightness, permits the push button (8) to be kept in an operational position and besides permits the location of the safety pin (5) which, on crossing this component and the push button (8), assures the non-operation of the system, blocking all movements of the push button (8) until its removal is produced.
2. A fragmenting striking device for tempered safety glasses (Figure 3) destined to the controlled breakage of tempered glasses corresponding to emergency windows of public transport vehicles, access protections, doors and the like, **characterised in that** it is a component interlocked to the glass consisting of a support (1) fixable by mechanical or chemical means to the tempered glass (11), said support (1) in turn performing sleeve functions for displacement of the piston (2) which incorporates a breaking tip called striker (3) and which is maintained in its operational position by a spring (4). Also **characterised by** a push button (8) which, once the pin (5) is removed, on being struck, produces the displacement of the piston (2) towards the glass producing across its striker (3) the fragmentation thereof. Also **characterised in that** the support (1), besides aesthetic purposes and device tightness, permits the push button (8) to be maintained in operational position as well as the location of the safe-

ty pin (5) which, on crossing this component and the push button (8), assures system non-operation, blocking all movements of the push button (8) until its removal is produced.

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3. A fragmenting striking device for tempered safety glasses according to claims 1 and 2, **characterised in that** inside the support (1) there is an optional electronic circuit (10) consisting of an integrated circuit powered by its own battery and which may emit a permanent luminous signal, permitting rapid location of the device even under circumstances of adverse visibility, and/or **in that** the system is further provided with a transducer and a micro-switch which is kept in an open position by means of the safety pin (5), so that, on being removed, the micro-switch remains in a closed position and the transducer is activated producing an acoustic alarm and/or luminous signal. 10 15 20
4. A fragmenting striking device for tempered safety glasses according to claims 1 and 2, **characterised in that** due to its sizing, shape or manufacturing material features, the safety pin (5) has controlled resilience and shearing, so that it may be fragmented on producing a strong blow over the push button (8) permitting operation of the device even without needing to remove the pin (5). 25
5. A fragmenting striking device for tempered safety glasses according to claims 1 and 2, **characterised in that** the piston (2) and the striker (3) are made of a single piece. 30
6. A fragmenting striking device for tempered safety glasses according to claims 1 and 2, **characterised in that** the support (1) and/or the push button (8) and/or the pin (5) are manufactured with phosphorescent material to permit their location in the dark. 35 40
7. A fragmenting striking device for tempered safety glasses according to claims 1 and 2, **characterised in that** in its visible front part, the push button (8) incorporates a logo like that shown in figure 2 illustrating the object intended for the device. 45

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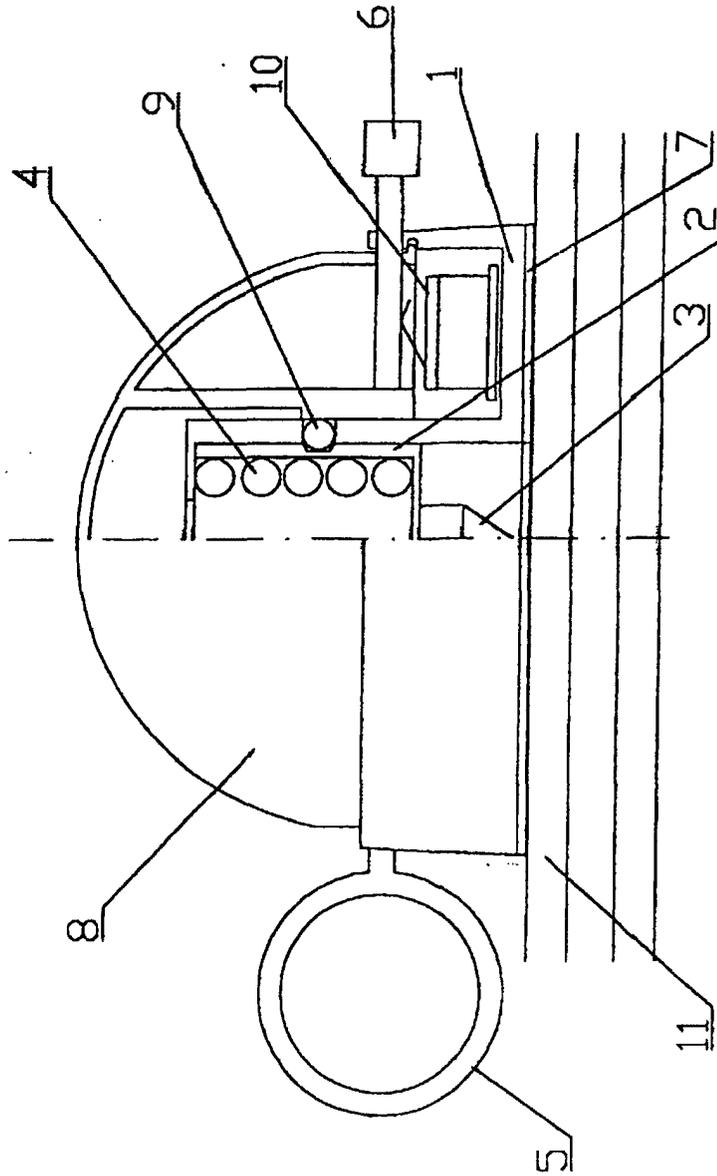


FIGURE.- 1

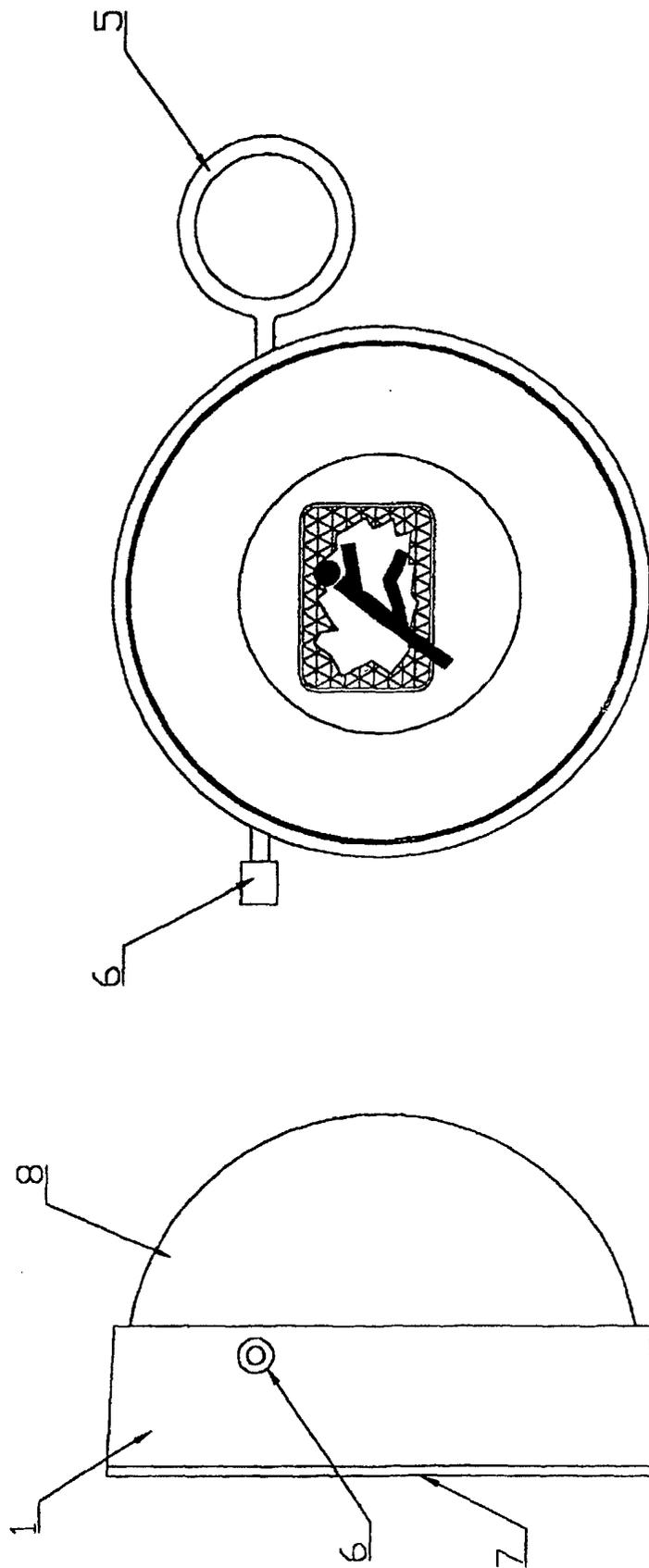
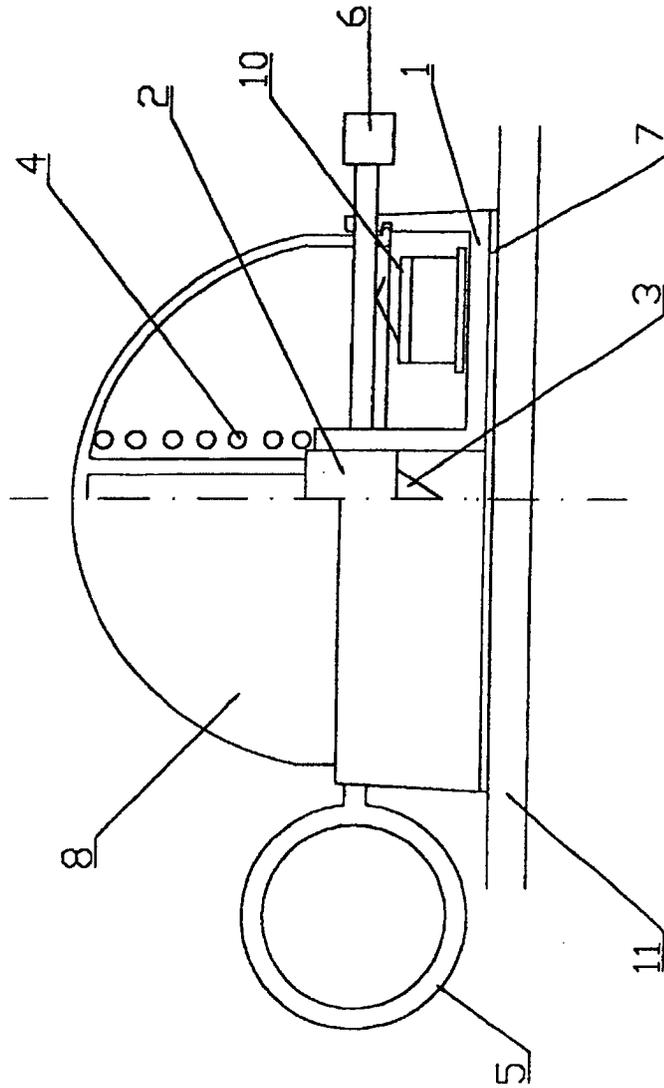


FIGURE.- 2



**FIGURE.- 3**

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/ES 00/00168

A. CLASSIFICATION OF SUBJECT MATTER IPC7 A62B 3/00, E06B 7/28 According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) IPC7 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 practicable, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	GB 2173237 A (TAYLOR); 08.10.1986 Abstract, figures 1 and 2.	1,2,5,7
Y	GB 2263930 A (YOUNG); 11.08.1993 Abstract, figures 1-3.	1,2,5,7
A	GB 2264324 A (ZEDBEND LTD.); 25.08.1993 Abstract, figures.	2-7
A	GB 2265406 A (SMITH); 29.09.1993 Fig. 2	7
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 31 July 2000 (31.07.2000)		Date of mailing of the international search report 3 August 2000 (03.08.2000)
Name and mailing address of the ISA/ S. P. T. O. Facsimile No.		Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (July 1992)

**INTERNATIONAL SEARCH REPORT**  
 Information on patent family members

International Application No  
 PCT/ ES 00/00168

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 2173237	08.10.1986	NONE	
GB 2263930	11.08.1993	NONE	
GB 2264324	25.08.1993	NONE	
GB 2265406	29.09.1993	NONE	