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(54) **INTERLOCKING SYSTEM**

(57) According to the invention, the interlocking system consists essentially of two Nitinol springs (1) and (2) attached to one end of the fixed plate (3), and at the other end of the movable plate (4) with the locking element (5), whose bi-directional displacement obtained by heating the springs, controls the position of two cams (6) and (7)

by means of guiding grooves (8', 8'') 9), (9'), (9'') and leads to the locking or unlocking of the mobile element (12).

The abstract of the invention will be published together with Figure 1.

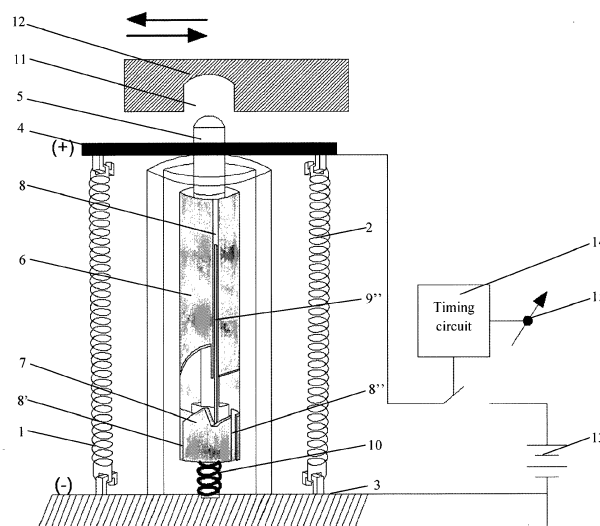


Fig. 2

Description

[0001] The invention relates to an interlocking system made on the basis of two Nitinol elastic elements (shape-memory material), intended to lock doors, shutters in order to secure constructions or installations.

[0002] In order to realize an interlocking system, a solution is known (APOSTU, C. *Dispozitiv de blocare*, Invention Patent RO108993, OSIM Bucuresti), consisting mainly of a housing, which has a latch and a locking mechanism, and which is inserted through a bezel from the mobile construction into a bezel from the fixed construction, and when the bezels are approximately coaxial, its retention is provided by means of a ball that enters a recess that can be found in the fixed structure or on mobile construction.

[0003] The disadvantages of the described solution are related to the complexity of the execution, which leads to the increase of the cost and the decrease of the operational safety.

[0004] The technical problems that the invention solves consist in the constructive simplicity of the interlocking system as well as the increase in the precision with which the locking element is controlled.

[0005] According to the invention, the interlocking system removes the disadvantages represented by the fact that it consists essentially of two elastic elements from Nitinol modelled as springs which control an element that is inserted into a channel provided in the fixed structure, thus blocking it the mobile one.

[0006] The invention has the following advantages:

- constructive simplicity;
- safety in exploitation;
- reduced gauge;
- the ability to remotely command.

[0007] An embodiment of the invention will now be described with reference to Figure 1 and Figure 2 which are as follows:

- a lateral view of the interlocking system in closed position;
- a lateral view of the interlocking system in open position.

[0008] According to the invention, the interlocking system (figure 1 and figure 2) consists essentially of two Nitinol springs 1 and 2 attached at one end of the fixed plate 3 and at the other end of the movable plate 4 which is one with the locking element 5, whose bi-directional axial displacement commanded by the Nitinol springs 1 and 2, controls the movement of two cams 6 and 7 by means of the slot guides 8, 8', 8" on the grooves 9, 9', 9".

[0009] The cam 7 is provided with a spring 10 supported at one end on the fixed plate 3, which is designed to achieve the pretension of the drive system. In the locked position of the system, the Nitinol springs 1 and 2 are

unstrained and the locking element 5 is positioned in the channel 11 provided in the movable locking element 12. To release the system, the Nitinol springs 1 and 2 are supplied from the DC voltage source 13, voltage applied over a certain period of time through the adjustable timing circuit 14 and the period is sufficient to heat the springs by Joule effect till a temperature that changes their elastic constant to enable firm actuation of the locking element.

[0010] The Nitinol springs are compressed, the locking element 5 moves the two cams 6 and 7 until the cam 7 exits the slot guides 8, 8', 8" and remains locked on the grooves 9, 9', 9" until the springs cooling, similar with a pen mechanism. The timing mechanism allows manual switching of time by a switch 15 or by means of a temperature sensor that reads the ambient temperature and ensures the heating of the springs to the required switching temperature. Returning to the locked position of the locking system is made by a new feeding command to the two Nitinol springs 1 and 2, their compression and rebound (similar with the pen mechanism).

[0011] The interlocking system according to the invention can be reproduced with the same characteristics and performances whenever necessary, which is an argument in favour of respecting the industrial applicability criterion.

Claims

1. Interlocking system **characterized in that** it consists essentially of two Nitinol springs (1) and (2) attached to one end of the fixed plate (3), and at the other end of the movable plate (4) which is one with the locking element (5) whose bi-directional axial displacement commanded by the Nitinol springs (1) and (2), controls the movement of two cams (6) and (7) by means of the slot guides (8), (8'), (8") on the grooves (9), (9'), (9"); the entire drive system being pretension by means of the spring (10) attached at one end to the cam (7) and supported on the fixed plate (3).

2. Interlocking system according to claim 1, **characterized in that** in the locking position the Nitinol springs (1) and (2) are unstrained, the locking element (5) is positioned in the channel (11) provided in the movable locking element (12), and to unblock the system, the Nitinol springs (1) and (2) are supplied with voltage from the DC voltage source (13), voltage applied by the adjustable timing circuit (14) in sufficient time to make it is possible to firmly actuate the interlocking element by heating the springs through Joule effect and changing their elastic constant; the return of the interlocking system to a locked position is accomplished by a new feeding command of the two springs with Nitinol (1) and (2) similar to a pen mechanism.

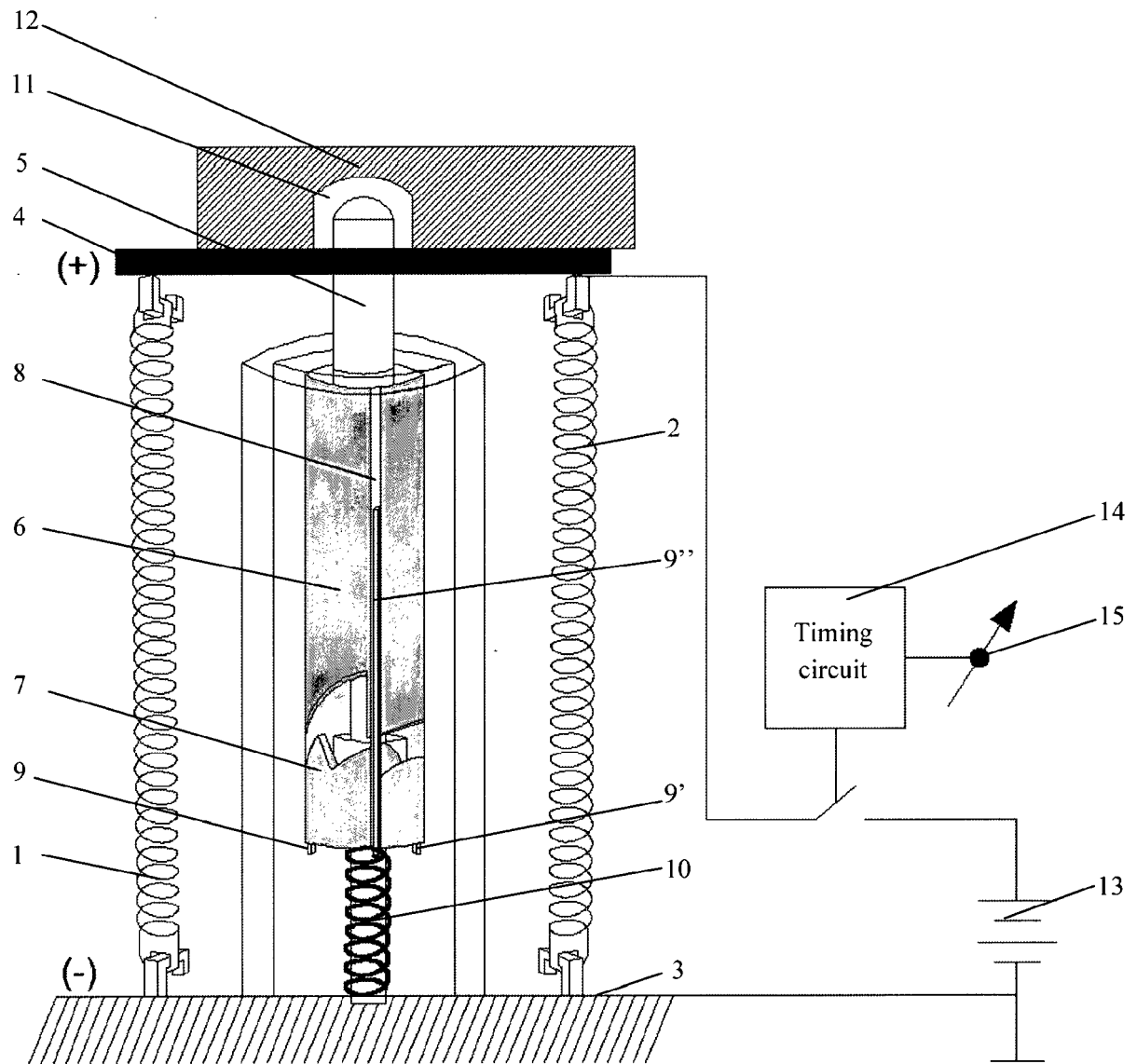


Fig. 1

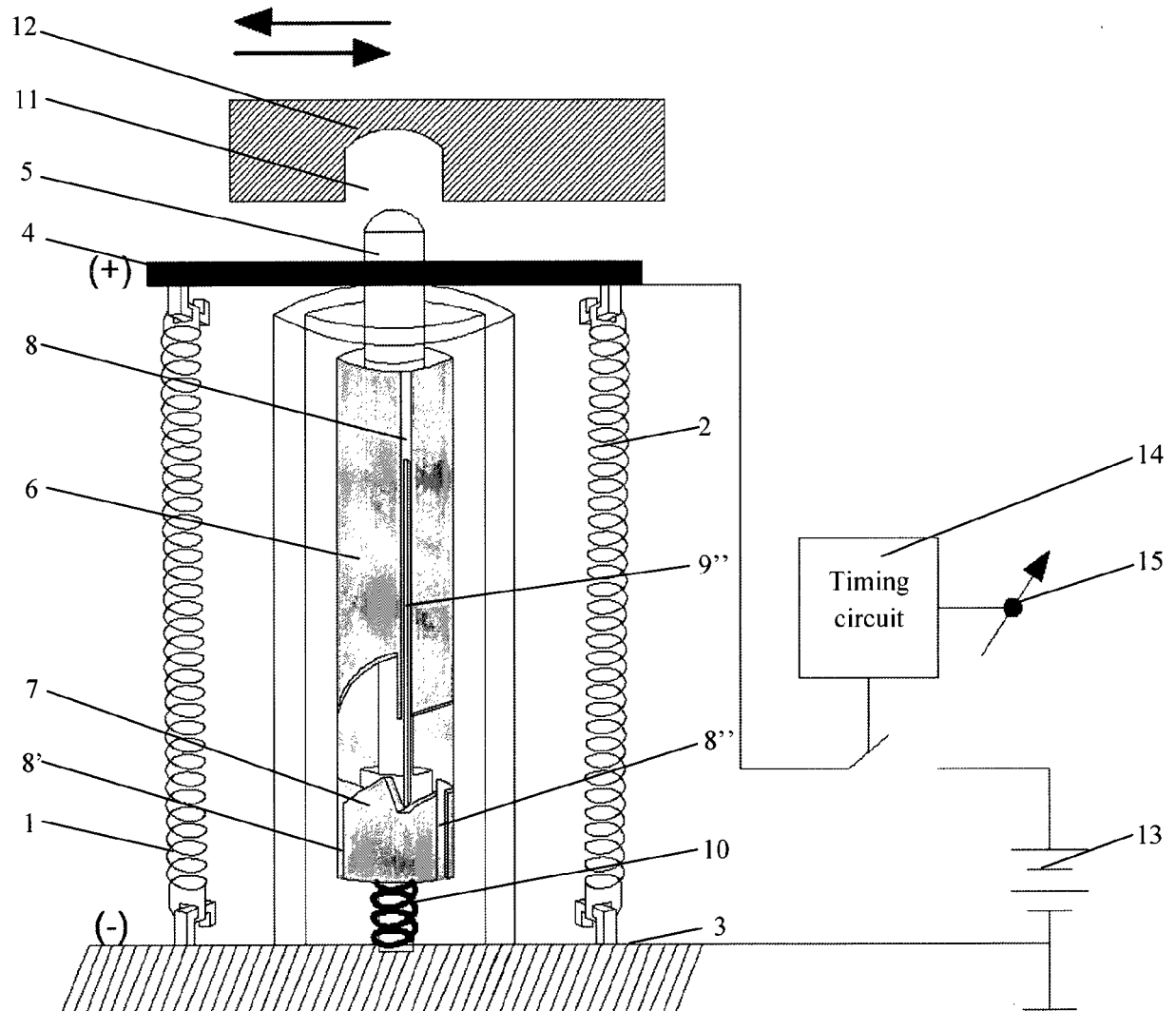


Fig. 2



EUROPEAN SEARCH REPORT

 Application Number
EP 19 46 4001

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DOCUMENTS CONSIDERED TO BE RELEVANT			
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A	US 2016/281389 A1 (CHOW LESLIE HO LEUNG [CN]) 29 September 2016 (2016-09-29) * the whole document *	1,2	
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A	WO 2014/192032 A1 (CISA SPA [IT]) 4 December 2014 (2014-12-04) * the whole document *	1,2	
			TECHNICAL FIELDS SEARCHED (IPC)
			E05B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 22 July 2019	Examiner Geerts, Arnold
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	

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 19 46 4001

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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