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(54) SHOCK-ABSORBING SELF-CLOSING DEVICE FOR MOVING PARTS OF FURNITURE

(57) Shock-absorbing self-closing device for moving parts of furniture, of the type having a trolley with guided displacement with an activating trigger locking its displacement in the armed position, in which the impulse spring is tensioned and, when activated, generates the self-closing energy with a speed controlled by the existence of a shock absorber, wherein the activating trolley (3) is connected to the end of the spring unit (7) by a transmitter wire (10) configured as a loop of a pulley block (11) between respective fixed pulleys (4a) and movable pulleys (4b) linked to the active end of the spring unit (7), producing proportionality between the active travel (15a) of the activating trigger (2) and the elongation travel (15b) of the spring unit (7).

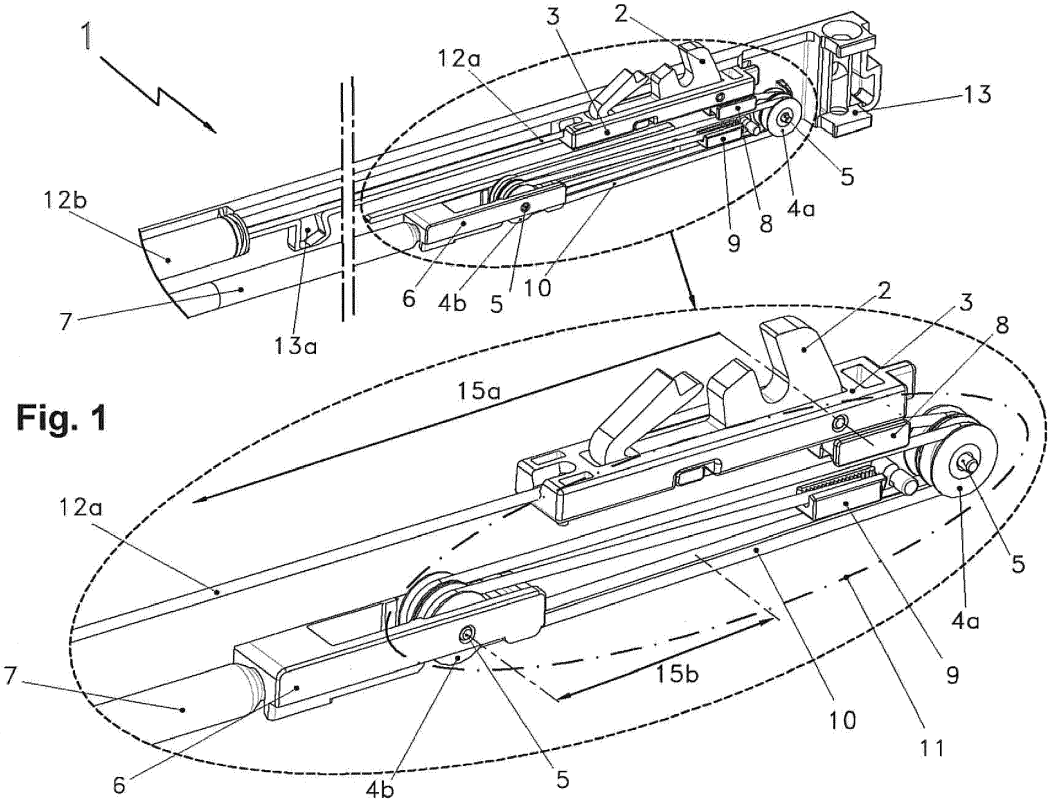


Fig. 1

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Description

FIELD OF THE INVENTION

[0001] This invention relates to a shock-absorbing self-closing device for moving parts of furniture incorporating an actuating element, a spring unit or spring and a shock absorber, particularly applicable to the closing of sliding doors or drawers.

PRIOR ART

[0002] In this field there are known self-closing devices for moving parts of furniture such as drawers and/or sliding doors.

[0003] The first means for assisting the closing of drawers were based solely on making a recess on the guides of the drawers, so that when the wheels of the drawer reached that point they dropped down through their own weight, closing the drawer in its final section of travel. Systems of this type did not ensure that the drawer closed correctly since it was necessary to displace said drawer until practically the end of the travel and, furthermore, because of the recesses, in the case of heavy drawers (like those used in kitchen furniture), the wheels dropping into the recesses made a noise irritating to users.

[0004] Another type of self-closer designed to ensure that the drawer or door closes correctly if the final position has not been reached, are those incorporating a spring and trigger linked to a catch on the drawer or the door. When the spring was displaced into its open position, traction was applied thereto and it was fixed by the trigger. In its reverse movement, the trigger came out of its fixed position, releasing the accumulated energy in the spring that was displacing the drawer to its final, closed position. However, this composition of the device caused an irritating knocking sound when the drawer reached the closed position.

[0005] Devices with an activating trigger that are directly linked to the shock absorber and spring are also known. However, when attempts were made, in devices with an activating trigger, to reach the furthermost position, in which the spring is subject to maximum traction, it was necessary to include a part that, by being displaced together with the activating trigger, would resolve the problem of connecting the spring and the shock absorber together with said activating trigger. Said part is called a slider or trolley and allows the actuating element to take up the desired extreme position.

[0006] Nowadays it is very common to find self-closing devices on the market incorporating a trigger, activator, spring, slider or trolley and shock absorber. The incorporation of the shock absorber allows the high speed generated by the spring in contraction to be absorbed by the shock absorber in the final section of the drawer's travel, allowing smooth, gradual closing.

[0007] However, if it is wished to produce a self-closing device with an activating trigger that has a long stroke, allowing the automatic closing system to be activated much earlier, the solution of linking said activating trigger directly to the shock absorber and the spring unit by means of the slider does not give a good result. Since the self-closing device is activated during the manoeuvre of opening the sliding element, a long activating trigger stroke would hugely increase the force to be applied during opening in order to activate the device, since the force to be exerted on the spring, which is what opposes opening, is proportional to its elongation. Once a spring unit goes past an elongation of some 25% of its initial length, the force to be exerted thereon increases considerably. Therefore, it is not appropriate to use a self-closing device on which a great force has to be exerted in order to activate it. If springs with a greater length were to be used in order not to exceed this 25% increase in their initial length, the self-closing devices would be too large, making it difficult to install them.

EXPLANATION OF THE INVENTION AND ADVANTAGES

[0008] In view of this situation, the present invention refers to a shock-absorbing self-closing device for moving parts of furniture, of the type having a trolley with guided displacement with an activating trigger locking its displacement in the armed position, in which the impulse spring is tensioned and, when activated, generates the self-closing energy with a speed controlled by the existence of a shock absorber. In said self-closing device, the activating trolley is connected to the end of the spring unit by a transmitter wire configured as a pulley block loop between respective fixed pulleys and movable pulleys linked to the active end of the spring unit, producing proportionality between the active travel of the activating trigger and the elongation travel of the spring unit.

[0009] Thanks to this configuration a self-closing device is achieved that goes into operation much earlier than the complete closing of the moving parts of the furniture. Because a pulley block of the spring or spring unit is linked to the activating trolley, it is possible to have a self-closing device that has an activating trigger with a very long arming stroke or active travel, which allows the automatic closing system to be activated much earlier than the complete closing of the moving part of the furniture. Owing to the introduction of said pulley block, it is also possible to reduce the force required, during the active travel of the device, to overcome the resistance exerted by the spring unit during opening. Depending on the number of pulley block loops over which the transmitter wire passes, the force to be applied in order to tension the spring unit and the distance covered by the activating trigger during the arming path will vary. The greater the number of pulley wheels in the pulley block, the less will be the force with which the spring unit opposes the movement of the activating trigger and the greater will be the distance that said activating trigger can cover in its active travel until it reaches a critical elon-

gation in the spring unit, which is close to 25% of its initial length.

[0010] Owing to the active stroke of the shock absorber in traction, the service life of the mechanism is increased. Since this involves a self-closing device with a long stroke, the shock absorber shaft, which is linked to the movement of the activating trigger through the activating trolley, will be longer and will have a smaller cross-section, and it is therefore essential that the shock absorber should have its active stroke in traction, thus preventing said shock absorber from working in compressing and the possible occurrence of sagging, causing permanent deformations in the shaft of the shock absorber.

[0011] Another characteristic of the invention is that the support incorporates a reinforcing shell.

[0012] This configuration results in a more robust self-closing device, since because it involves a longer device than is usual in this type of element, it is necessary to incorporate an outer shell or shield, and this improves its structural properties.

[0013] Another characteristic of the invention is that the pulley block mechanism is formed by at least one fixed pulley wheel and one movable pulley wheel.

[0014] Owing to this configuration, it is anticipated that at least both the elongation travel and the force to be exerted during opening will be reduced by half.

DRAWINGS AND REFERENCE NUMERALS

[0015] To get a better understanding of the nature of the invention, the attached drawings illustrate an industrial embodiment solely by way of explanatory, non-restrictive example.

Fig. 1 is an isometric view showing the inside of the self-closing device (1) when the moving part of the furniture is in the closed position. Said Fig. 1 also shows an enlargement of the pulley block mechanism (11) that links the activating trolley (3) to the spring unit (7) and the moving elements that form the mechanism, and the difference in lengths between the active travel (15a) and the elongation travel (15b) of the spring unit (7) can be seen.

Fig. 2 is an isometric view showing the inside of the self-closing device (1) when the sliding element of the furniture is in the open position, with an enlarged detail of the activating trigger (2) in the locked position.

Fig. 3a is a view in section of the shock absorber (12) at the time of starting the active travel (15a), with an enlarged detail of the valve.

Fig. 3b is a view in section of the shock absorber (12) at the time of return of the active travel (15a), with an enlarged detail of the valve.

Fig. 4 is an isometric view of the pulley block (11) that links the activating trigger (2) to the spring unit (7).

Fig. 5 is an isometric view of the self-closing device (1) including all the components of which it is formed.

1.- Self-closing device.
2.- Activating trigger.
3.- Activating trolley.
4a.- Fixed pulley.
4b.- Moveable pulley.
5.- Pulley shaft.
6.- Pulley block trolley.
7.- Spring unit.
8.- Flange of activating trolley (3).
9.- Fixed flange.
10.- Transmitter wire.
11.- Pulley block.
12.- Shock absorber.
12a.- Shaft of shock absorber (12).
12b.- Body of shock absorber (12).
12c.- Valve piston.
12d.- Valve cap.
13.- Support.
13a.- Locking cavity.
14.- Reinforcing shell.
15a.- Active travel.
15b.- Elongation travel.

PRESENTATION OF A PREFERRED EMBODIMENT

[0016] Shock-absorbing self-closing device for moving parts of furniture, of the type having a trolley with guided displacement with an activating trigger locking its displacement in the armed position, in which the impulse spring is tensioned and, when activated, generates the self-closing energy with a speed controlled by the existence of a shock absorber. Said self-closing device (1) has the characteristic that the activating trolley (3) is connected to the end of the spring unit (7) by a transmitter wire (10) configured as a loop of a pulley block (11) between respective fixed pulleys (4a) and movable pulleys (4b) linked to the active end of the spring unit (7), producing proportionality between the active travel (15a) of the activating trigger (2) and the elongation travel (15b) of the spring unit (7).

[0017] Fig. 1 shows the internal mechanism constituting the self-closing device (1), with the activating trigger (2) at rest, in contact with the activator positioned on the moving part of the furniture. Once opening starts, the activator drags the activating trigger (2) and the active travel (15a) starts in the self-closing device (1). The activating trolley (3) is displaced via the channels provided on the support (13), pulling the transmitter wire (10) that runs over the pulley block (11). For the self-closing device (1) in Fig. 1, since it has two fixed pulley wheels (4a) and two movable pulley wheels (4b), the active travel (15a) covered by the activating trolley (3) is four times greater than the elongation travel (15b) covered by the pulley block trolley (6), which is joined to one end of the spring unit (7). Thus, the force required to tension said spring unit (7) is four times less.

[0018] As can be seen in Fig. 2, once the activating trolley (3) completes the active travel (15a), the activating trigger (2) locks the self-closing device (1), becoming partly inserted into the locking cavity (13a) provided on the support (13). When the activating trigger (2) locks the self-closing device (1), the activator positioned on the moving part of the furniture continues to open, becoming detached from said self-closing device (1), which has its spring unit (7) tensioned, accumulating the energy required for automatic closing. During said active travel (15a) the shock absorber shaft (12a), which is linked to the activating trolley (3), is inserted without resistance into the shock absorber body (12a). As can be seen in Fig. 3a, from the start of the active travel (15a), the valve piston (12c) and the valve cap (12d) are in the maximum opening position, allowing the fluid present inside the shock absorber (12) to pass easily from one chamber to another.

[0019] Once the closing manoeuvre of the moving part of the furniture starts, when the activator again meets the activating trigger (2), the latter unlocks the self-closing device (1), and starts the return of the activating trolley (3) via the active travel (15a). The spring unit (7) pulls the pulley block trolley (6), covering the return path of the elongation travel (15b). By means of the transmitter wire (10) that runs over the pulley block (11), this movement reaches the activating trolley (3), which is dragged to its initial position. For controlled, progressive self-closing, the shock absorber (12) controls the speed of release of the spring unit (7). As can be seen in Fig. 3b, from the start of the return via the active travel (15a), the valve piston (12c) and the valve cap (12d) of the shock absorber (12) are in the position that allows the minimum flow of fluid from one chamber to another, and this situation is maintained throughout the movement, controlling said transfer of fluid and the speed of closing.

[0020] It should be pointed out that with the aim of improving the structural properties of the self-closing device (1), a reinforcing shell (14) is incorporated into the outer part of the support (13) thereof. A more robust and wear-resistant product is produced thereby.

Claims

1. Shock-absorbing self-closing device for moving parts of furniture, of the type having a trolley with guided displacement with an activating trigger locking its displacement in the armed position, in which the impulse spring is tensioned and, when activated, generates the self-closing energy with a speed controlled by the existence of a shock absorber, **characterised in that** the activating trolley (3) is connected to the end of the spring unit (7) by a transmitter wire (10) configured as a loop of a pulley block (11) between respective fixed pulleys (4a) and movable pulleys (4b) linked to the active end of the spring unit (7), producing proportionality between the active travel (15a) of the activating trigger (2) and the elongation travel (15b) of the spring unit (7).

2. Shock-absorbing self-closing device for moving parts of furniture, according to claim 1, **characterised in that** the pulley block (11) mechanism is formed by at least one fixed pulley wheel (4a) and one movable pulley wheel (4b).

3. Shock-absorbing self-closing device for moving parts of furniture, according to claim 1, **characterised in that** at the start of the return of the active travel (15a), the shock absorber (12) has its shock absorber shaft (12a) in the position where it emerges least from the shock absorber body (12b) and with its valve piston (12c) and valve cap (12d) in the position of greatest constriction during the extension displacement, its active stroke consequently being in traction.

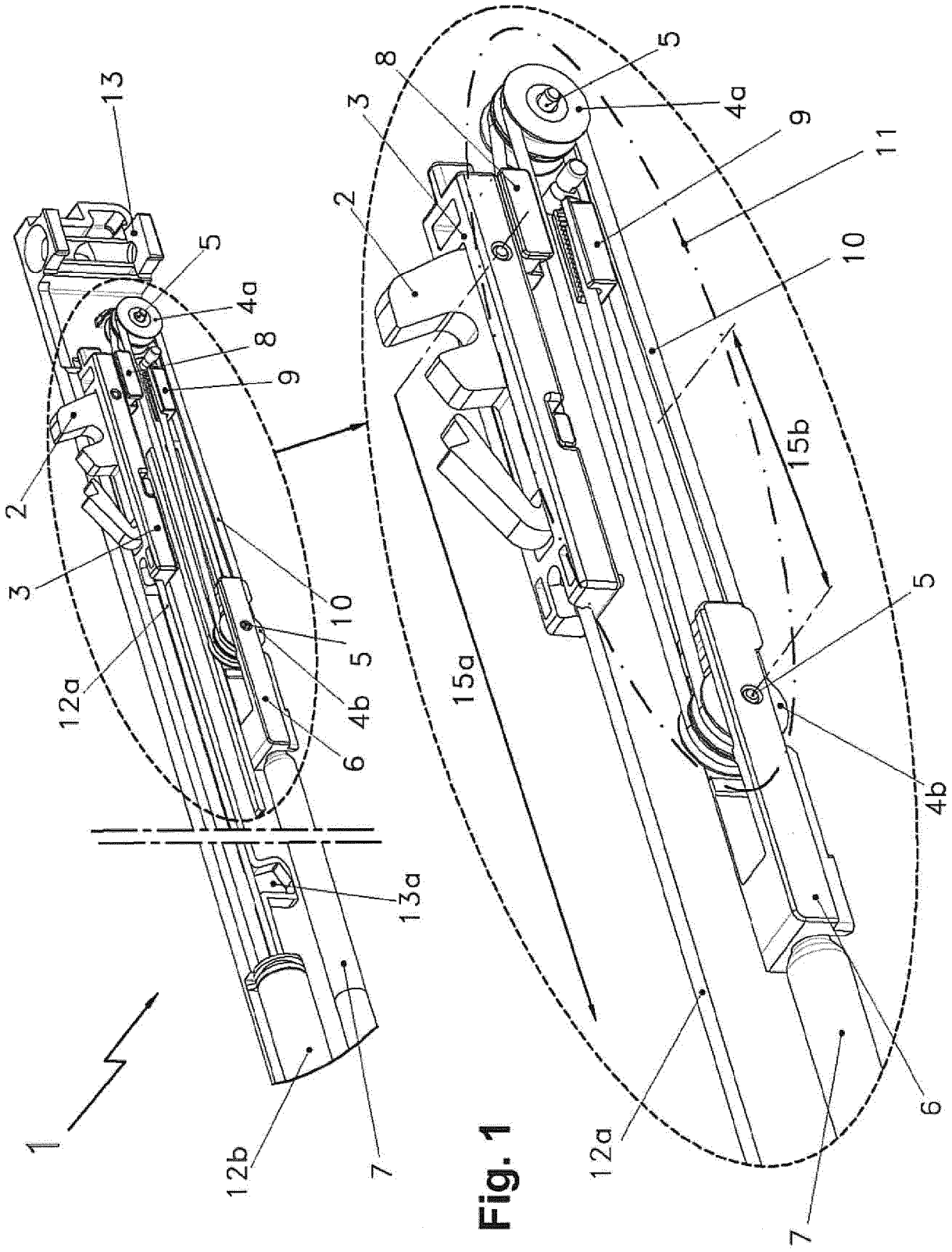


Fig. 1

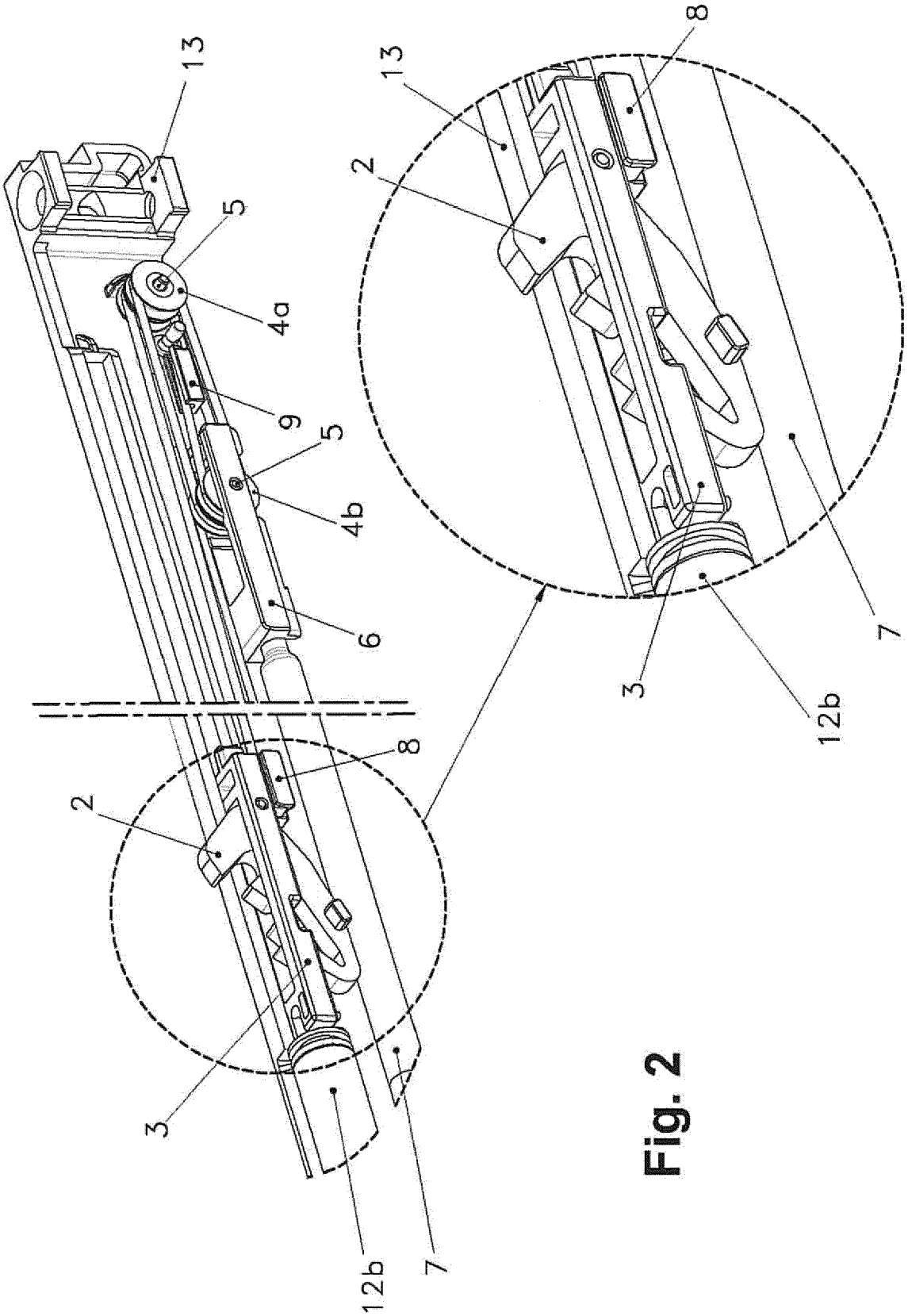


Fig. 2

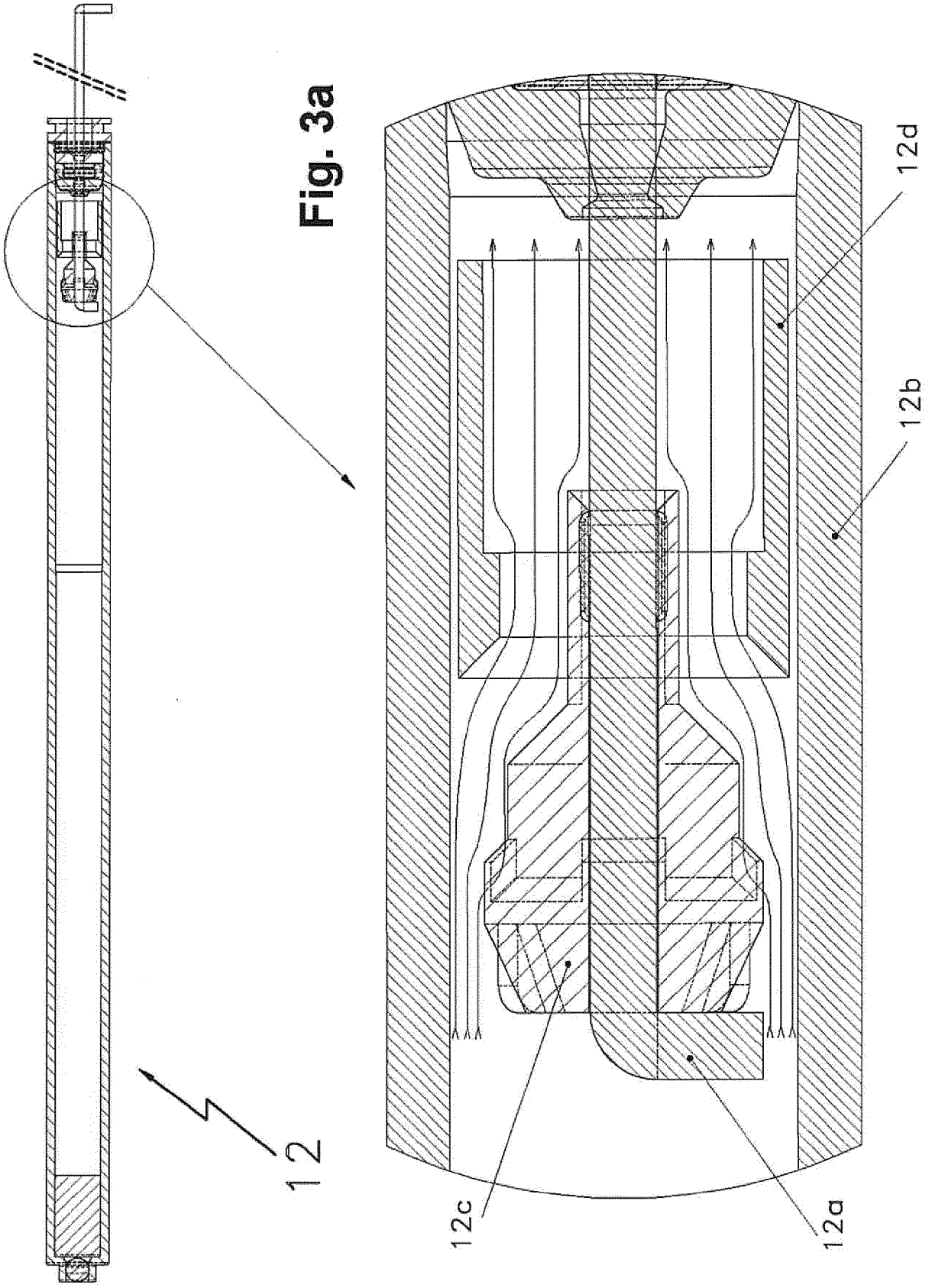
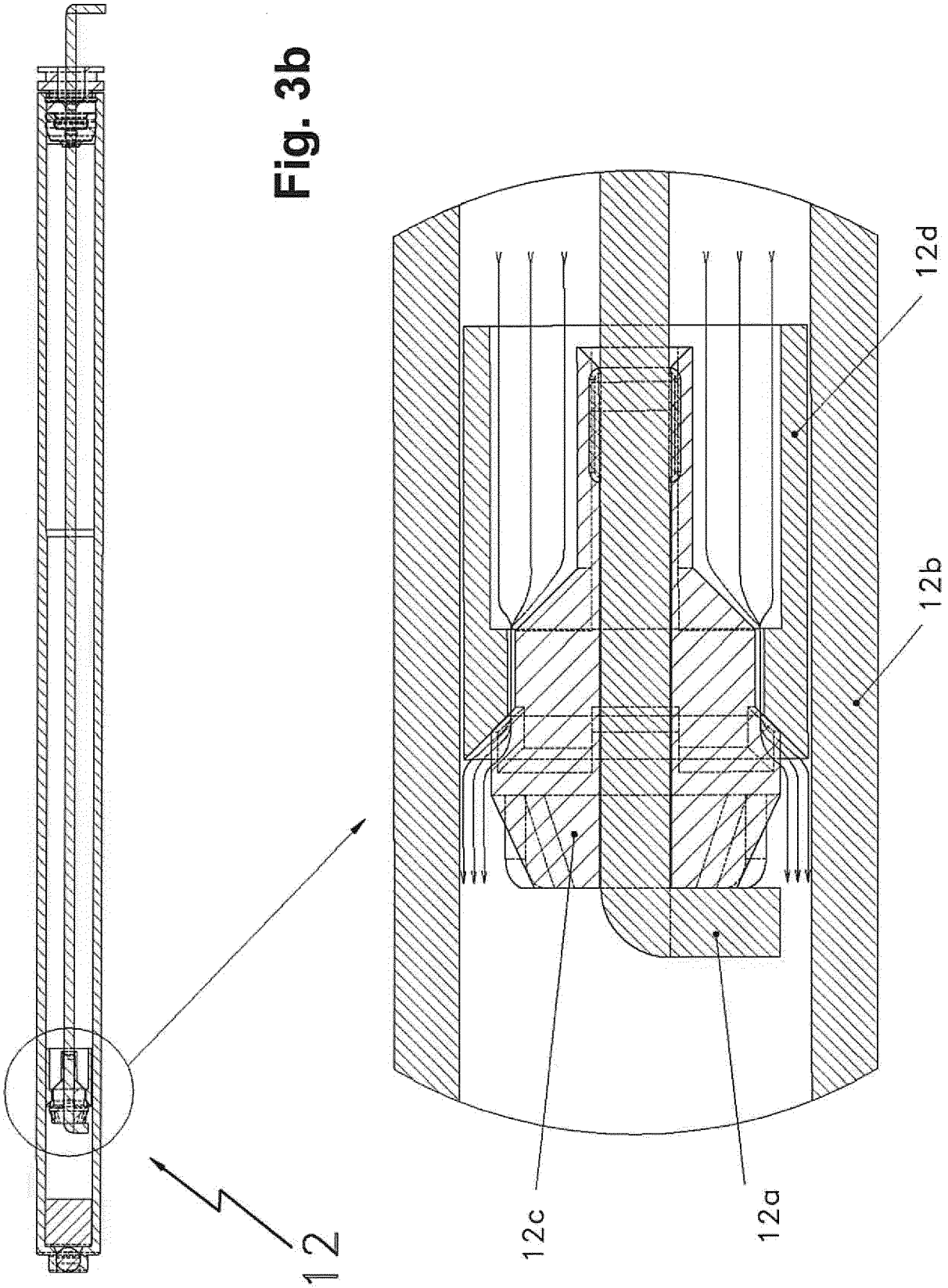


Fig. 3a

Fig. 3b



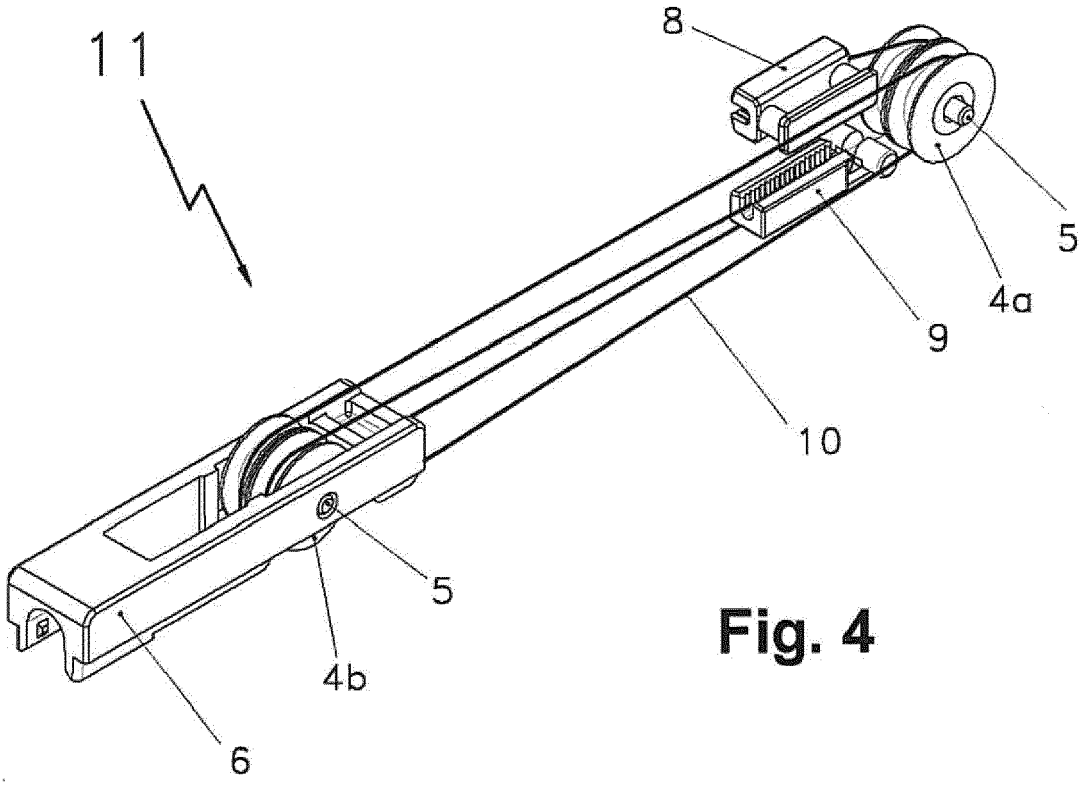


Fig. 4

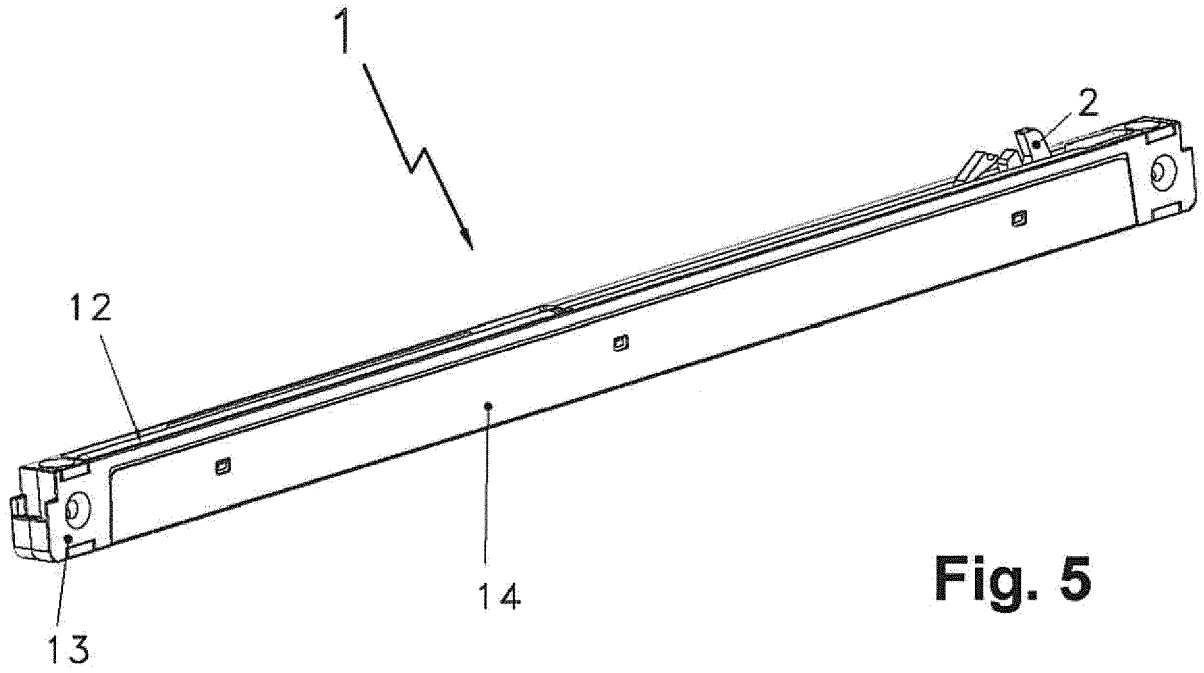


Fig. 5

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EUROPEAN SEARCH REPORT

Application Number
EP 16 17 0386

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 4 003 102 A (HAWKS NATHANIEL) 18 January 1977 (1977-01-18) * figures 6-7 * * column 6, lines 25-47 * -----	1-3	INV. A47B88/04 E05F1/16 F16F9/10
X	EP 1 865 136 A2 (TOTE L IND CORP) 12 December 2007 (2007-12-12) * figures 4,8.9 * * paragraphs [0012], [0014] * -----	1-3	

TECHNICAL FIELDS SEARCHED (IPC)

A47B
E05F
F16F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	19 September 2016	de Cornulier, P

CATEGORY OF CITED DOCUMENTS

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 16 17 0386

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