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(54) **AN IMPROVED EXPLOSION-SENSING SECURITY CONTAINER CASSETTE FOR VALUES SUCH AS BANKNOTES AND FOR AN AUTOMATED TELLER MACHINE (ATM)**

(57) The present disclosure relates to security systems for container cassettes containing values such as banknotes, such as container cassettes which are suitable for automated teller machines (ATM). More specifically, the present disclosure relates to security systems which involve the neutralization of the values contained in such cassettes when a theft attempt occurs, such theft attempt involving the usage of an explosion dimensioned to break a vault in which security container cassettes are provided. The solutions disclosed herein innovatively improve the knowledge of the art, by enabling that a dimensioned explosion to access a security container cassette (10) provided within a vault of an ATM is detected but without being affected by vibrations as piezo-electric-based systems are, being immune to vibrations and, thus, avoiding said false positives. The cassette (10) has an enclosure (20) in which a flexible membrane (11) is provided.

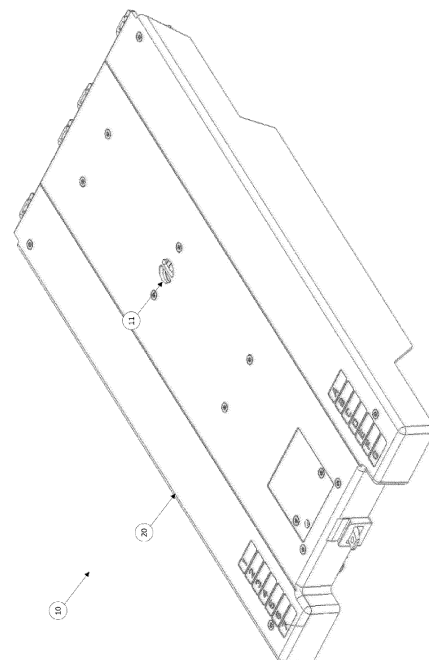


Figure 1

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Description

FIELD OF THE DISCLOSURE

[0001] The present disclosure relates to security systems for container cassettes containing values such as banknotes, such as container cassettes which are suitable for automated teller machines (ATM). More specifically, the present disclosure relates to security systems which involve the neutralization of the values contained in such cassettes when a theft attempt occurs, such theft attempt involving the usage of an explosion dimensioned to break a vault in which security container cassettes are provided.

PRIOR ART

[0002] In case of a theft attempt to an ATM involving an explosion, the burglars seek to access security container cassettes without damaging the values provided within such cassettes.

[0003] To do so, they use dimensioned explosions, which seek to break the vault just enough to access the unaffected cassettes and the corresponding values.

[0004] The existing security solutions seek to detect such intrusions to, prior to the burglars acceding the cassettes and their contents, actuate neutralization systems provided within the cassettes, neutralizing the contained values.

[0005] These systems known in the art involve the usage of piezoelectric sensors, which allow to detect an explosion but are prone to vibrations and potentially lead to false positives, typically due to mishandling of the cassettes.

[0006] The solutions disclosed herein innovatively improve the knowledge of the art, by enabling that a dimensioned explosion is detected but without being affected by vibrations as piezoelectric-based systems are, being immune to vibrations and, thus, avoiding said false positives.

SUMMARY OF THE DISCLOSURE

[0007] The present disclosure refers to improved explosion-sensing security container cassette for values such as banknotes and for an automated teller machine (ATM). The security container cassette comprises an enclosure, the enclosure having a through opening, wherein the container cassette further comprises a flexible membrane provided within the enclosure, the flexible membrane being i) in air connection with the opening such that it hermetically seals the inside of the enclosure from the outside of the enclosure, and ii) such that it contains conductive tracks, wherein the membrane is configured such that a pressure gradient between the outside and the inside of the enclosure and above a preset pressure gradient ruptures the membrane and thereby the conductive tracks.

[0008] The present disclosure further refers to an automated teller machine (ATM) comprising a vault and one or more security container cassettes according to the present disclosure, the one or more security container cassettes being provided in the vault.

[0009] The present disclosure further refers to a method for the improved sensing of an explosion in an automated teller machine (ATM) wherein it comprises detecting an explosion through the rupture of conductive tracks provided in a flexible membrane, the flexible membrane being provided within an enclosure of a security container cassette of the ATM and in air connection with the inside and outside of the enclosure such that it hermetically seals the inside of the enclosure from the outside of the enclosure, the membrane being such that a pressure gradient between the outside and the inside of the enclosure and above a preset pressure gradient ruptures the membrane and thereby the conductive tracks.

DESCRIPTION OF DRAWINGS

[0010]

Figure 1 - a perspective representation from the outside of a security container cassette (10) for an automated teller machine (ATM) according to the present disclosure, in which the enclosure (20) is represented, in particular the through opening (11) of the enclosure (20). The represented through opening (11) is not to scale, as it is intended to be viewable. Possible maximum diameters for a through opening (11) according to the present disclosure are described in the next section.

Figure 2 - a side view representation of a detail of a security container cassette (10) for an automated teller machine (ATM) according to the present disclosure, in particular representing the through opening (11) across a wall of the enclosure (10), the channel (14) and the flexible membrane (6) provided in the channel (14), and hermetically sealing the enclosure (10), such that one side of the flexible membrane (6) is in contact with air inside the enclosure (9) and another one side of the flexible membrane (6) is in contact with air outside the enclosure (7). In the presented embodiment, the through opening is formed by several openings (12) which connect to the channel (14). The walls of the channel (5) are also viewable, wherein they may be formed by insulator gaskets.

Figure 3 - a top view representation of a detail of a security container cassette for an automated teller machine (ATM) according to the present disclosure, in particular representing the flexible membrane (6) comprising a substrate (4) which may consist of a Kapton PCB substrate, and also conductive tracks (2), which comprise wire or connector solder tabs (1). The solder tabs (4) may be in electrical connection with the control means. The flexible membrane (6)

may comprise a barometric pressure equalizer (3) centrally provided.

Figure 4 - a perspective representation from the inside of a security container cassette (10) for an automated teller machine (ATM) according to the present disclosure, in which the enclosure (11) is represented, in particular further presenting vent holes (12) provided between the channel and the flexible membrane and the inside of the enclosure, where the values are provided (not shown). The represented vent holes (12) are not to scale, as they are intended to be viewable.

DETAILED DESCRIPTION OF THE DISCLOSURE

[0011] The present disclosure refers to an improved explosion-sensing security container cassette for values such as banknotes and for an automated teller machine (ATM).

[0012] The container cassette comprises an enclosure in which a through opening is provided, thus providing access between an exterior side of a wall formed by the enclosure and an inside of such wall. Still, according to the present disclosure, the enclosure is still in hermetic seal. The container cassette further comprises a flexible membrane provided within the enclosure - thus within the said walls - which is configured such that it:

- i) is in air connection with the through opening such that it (the membrane) hermetically seals the inside of the enclosure from the outside of the enclosure, and
- ii) contains conductive tracks.

[0013] The hermetic sealing provided by the enclosure and the flexible membrane may be such that the flexible membrane allows a reduced passage of air between the inside and the outside of the enclosure, such that, for instance, pressure differences occurring during the opening and closure of the enclosure do not rupture the membrane.

[0014] Such may be provided through a cut provided in the flexible membrane, which may be designated as a barometric pressure equalizer, as the one presented in Figure 3.

[0015] Moreover, such cut may have a format which promotes a specific direction of the rupture of the membrane, to guarantee that the conductive tracks are also ruptured.

[0016] The associated goal is to guarantee that the rupture of the membrane occurs as a consequence of an explosion, and not of a more aggressive closure or opening of the enclosure.

[0017] The membrane is further configured, such that a pressure gradient between the outside and the inside of the enclosure and which is above a preset pressure gradient ruptures the membrane and thereby the conductive tracks.

[0018] The rupture of the conductive tracks may thus be detected and lead to the neutralization of values provided within the cassette.

[0019] The membrane and the provided conductive tracks thus operate as a barometric gradient sensor - which detects sudden barometric changes - which is immune to vibrations, overcoming such issue of prior art solutions, arising from mishandling of cassettes - which may be left to fall - or other vibrations occurring in an ATM or in transportation of the cassettes.

[0020] The cassette of the present disclosure, by having a membrane provided within the enclosure, which is part of the cassette which, in turn, is to be provided within a vault of an ATM, is not to be directly affected by an explosion which is a dimensioned explosion, but only indirectly, through the sudden change in pressure which creates a barometric gradient between the outside of the enclosure and the inside of the enclosure.

[0021] The enclosure of the cassette forms the external walls of the cassette.

[0022] The conductive tracks, which are also flexible, are also ruptured by such barometric gradient, when it overcomes a preset value.

[0023] Such preset value is adapted to each solution, and it may also be defined in terms of the diameter of the membrane, which may consist of a film.

[0024] The through opening is of reduced dimension, and it may have a maximum diameter and area which are lesser than a maximum diameter and area of the membrane, promoting its rupture.

[0025] The through opening may be formed as a single hole provided in the enclosure, which connects to the channel. This single hole or opening connects the channel to the outside of the enclosure. Moreover, a plurality of vent holes may be provided between the channel and an area of the enclosure in which the values are provided, as is represented in Figure 4.

[0026] As referred, dimensioned explosions are reduced intensity explosions which seek to only break the protection of a vault of an ATM, while keeping cassettes intact. Still, these dimensioned explosions create a barometric gradient which the solution of the present disclosure detects, by means of are pushed into the enclosure of a cassette.

[0027] The container of the present disclosure may further comprise a channel, the channel being aligned with the through opening of the enclosure and the flexible membrane being provided within the channel. The channel allows to, in a simple and useful manner, to provide the membrane in air(tight) connection with the opening.

[0028] The through opening, the channel and the membrane may be aligned.

[0029] The through opening may have a squared cross form. The squared cross form of the through opening allows to, in an enhanced manner, better rupture the membrane and corresponding conductive tracks when the preset barometric gradient occurs.

[0030] The through opening may have a maximum

diameter of 0.8-2 mm, optionally 1-1.5 mm.

[0031] The membrane may have a maximum diameter of 8-15 mm, optionally 10 mm.

[0032] The container cassette of the present disclosure may further comprise neutralization means and control means, the neutralization means being configured to neutralize values provided within the enclosure, and the control means being configured to, upon a detection of the rupture of the conductive tracks, issue a neutralization command to actuate the neutralization means and thereby neutralize values provided within the enclosure.

[0033] The neutralization means may comprise a neutralization agent - such as an adequate ink as known in the art - provided within a neutralization container, the neutralization agent being released towards values contained in the enclosure, thereby neutralizing such values. The values may be provided within one or more values containers, in turn provided inside the container.

[0034] The control means may be configured to cause an electric current to pass through the conductive tracks and to detect the rupture of the conductive tracks through a direct or indirect detection of the break of the passage of the electric current. For instance, a resistance of the conductive tracks may be measured, in order to determine a change which occurs due to the rupture of the conductive tracks.

[0035] The membrane may have a polyimide film used in which the conductive tracks are provided, the conductive tracks defining a flexible printed circuit.

[0036] The polyimide film may be a Kapton[®] film, i.e., a film with a composition such that it may be defined as a Kapton[®] film.

[0037] A polyimide film, in particular Kapton, allows to provide an enhanced membrane with conductive tracks.

[0038] The enclosure may be a plastic enclosure.

[0039] The walls of the channel may be elastomeric polymer walls, optionally ethylene-vinyl acetate (EVA) walls.

[0040] The method of the present disclosure may be such that the ATM is an ATM according to the present disclosure.

[0041] In various embodiments, the method, the ATM, the security container cassette, the control means and/or elements thereof include components for performing at least some of the example features and capabilities of the described method, whether by means of hardware components (such as memory and/or processor), software, or any combination thereof.

[0042] In various embodiments, the ATM, the security container cassette and/or the control means may comprise a microcontroller, with the ability to receive external data via inputs and provide triggering of outputs, based on configured rules and/or predefined programming.

[0043] An article for use with the method the ATM, the security container cassette and/or the control means such as a pre-recorded storage device or other similar computer-readable medium including program instructions

recorded thereon, or a computer data signal carrying computer-readable program instructions may direct a device to facilitate implementation of the methods described herein. It is understood that such apparatus, articles of manufacture and computer data signals are also within the scope of the present disclosure.

[0044] A "computer-readable medium" is understood as any medium that can store instructions for use or execution by a computer or other computing device, including read-only memory (ROM), erasable programmable read-only memory (EPROM) or flash memory, random access memory (RAM), a portable floppy disk, a hard disk drive (HDD), a solid state storage device (e.g., NAND flash or synchronous dynamic RAM (SDRAM)), and/or an optical disc, such as a Compact Disc (CD), Digital Versatile Disc (DVD), or Blu-Ray[™] Disc.

[0045] As will be evident to a person skilled in the art, the present disclosure should not be limited to the embodiments described herein, with a number of changes being possible, which remain within the scope of this disclosure.

[0046] Of course, the particulars disclosed herein are combinable, in the different possible forms, being avoided the repetition of all such combinations.

Claims

1. An improved explosion-sensing security container cassette for values such as banknotes and for an automated teller machine (ATM), the container cassette comprising an enclosure, the enclosure having a through opening, wherein the container cassette further comprises a flexible membrane provided within the enclosure, the flexible membrane being i) in air connection with the opening such that it hermetically seals the inside of the enclosure from the outside of the enclosure, and ii) such that it contains conductive tracks, wherein the membrane is configured such that a pressure gradient between the outside and the inside of the enclosure and above a preset pressure gradient ruptures the membrane and thereby the conductive tracks.
2. A container cassette according to the previous claim wherein it further comprises a channel, the channel being aligned with the through opening of the enclosure and the flexible membrane being provided within the channel.
3. A container cassette according to the previous claim wherein the through opening, the channel and the membrane are aligned.
4. A container cassette according to any of the preceding claims wherein the through opening has a squared cross form.

5. A container cassette according to any of the preceding claims wherein the through opening has a maximum diameter of 0.8-2 mm, optionally 1-1.5 mm.
6. A container cassette according to any of the preceding claims wherein the membrane has a maximum diameter of 8-15 mm, optionally 10 mm.
7. A container cassette according to any of the preceding claims wherein it further comprises neutralization means and control means, the neutralization means being configured to neutralize values provided within the enclosure, and the control means being configured to, upon a detection of the rupture of the conductive tracks, issue a neutralization command to actuate the neutralization means and thereby neutralize values provided within the enclosure.
8. A container cassette according to the previous claim wherein the control means are configured to cause an electric current to pass through the conductive tracks and to detect the rupture of the conductive tracks through a direct or indirect detection of the break of the passage of the electric current.
9. A container cassette according to any of the preceding claims wherein the membrane has a polyimide film used in which the conductive tracks are provided, the conductive tracks defining a flexible printed circuit.
10. A container cassette according to the previous claim wherein the polyimide film is a Kapton film.
11. A container cassette according to any of the claims 2-10 wherein the enclosure is a plastic enclosure.
12. A container cassette according to any of the preceding claims wherein the walls of the channel are elastomeric polymer walls, optionally ethylene-vinyl acetate walls.
13. An automated teller machine (ATM) comprising a vault and one or more security container cassettes according to any of the claims 1-12, the one or more security container cassettes being provided in the vault.
14. A method for the improved sensing of an explosion in an automated teller machine (ATM) wherein it comprises detecting an explosion through the rupture of conductive tracks provided in a flexible membrane, the flexible membrane being provided within an enclosure of a security container cassette of the ATM and in air connection with the inside and outside of the enclosure such that it hermetically seals the inside of the enclosure from the outside of the enclosure, the membrane being such that a pressure gradient between the outside and the inside of the enclosure and above a preset pressure gradient ruptures the membrane and thereby the conductive tracks.
15. A method according to the previous claim wherein the ATM is according to claim 13.

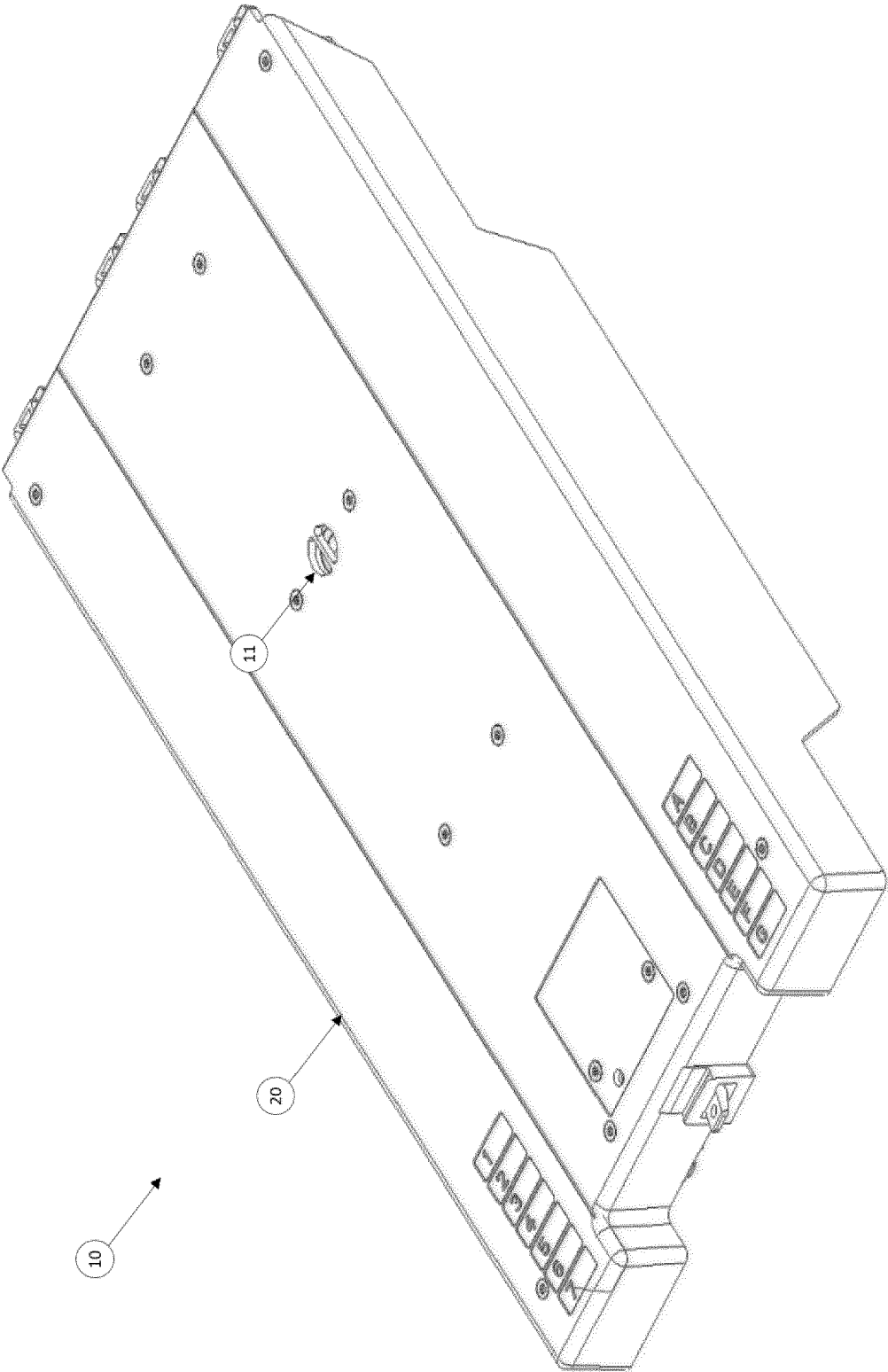


Figure 1

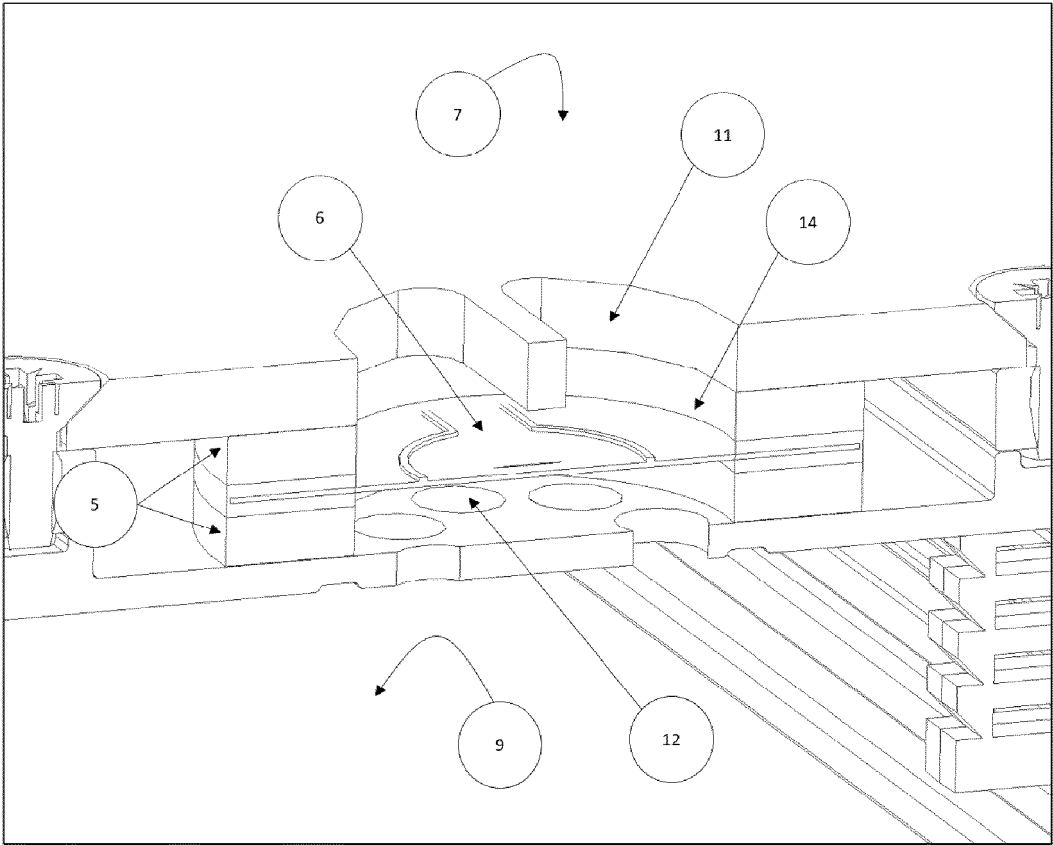


Figure 2

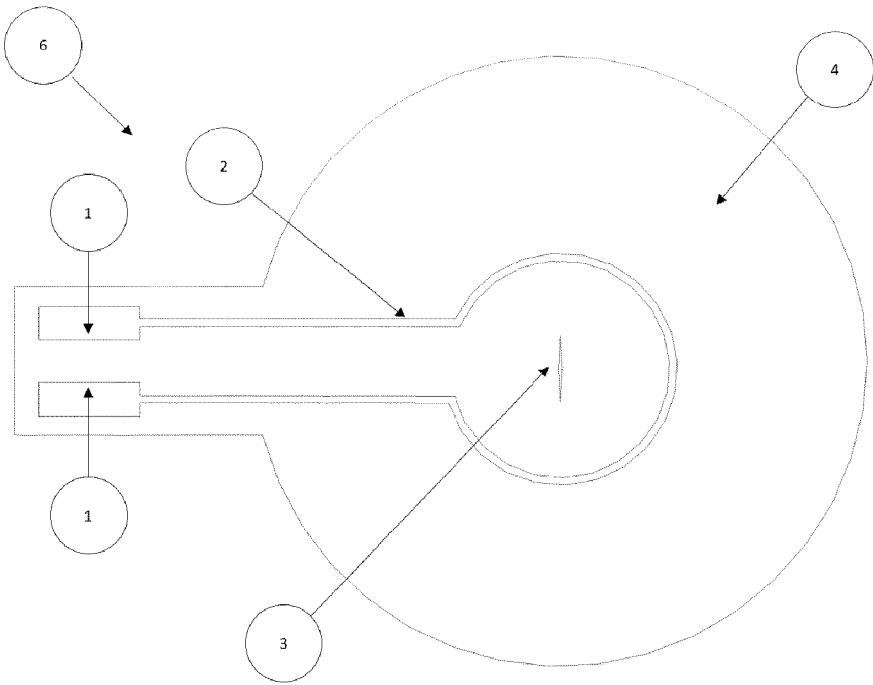


Figure 3

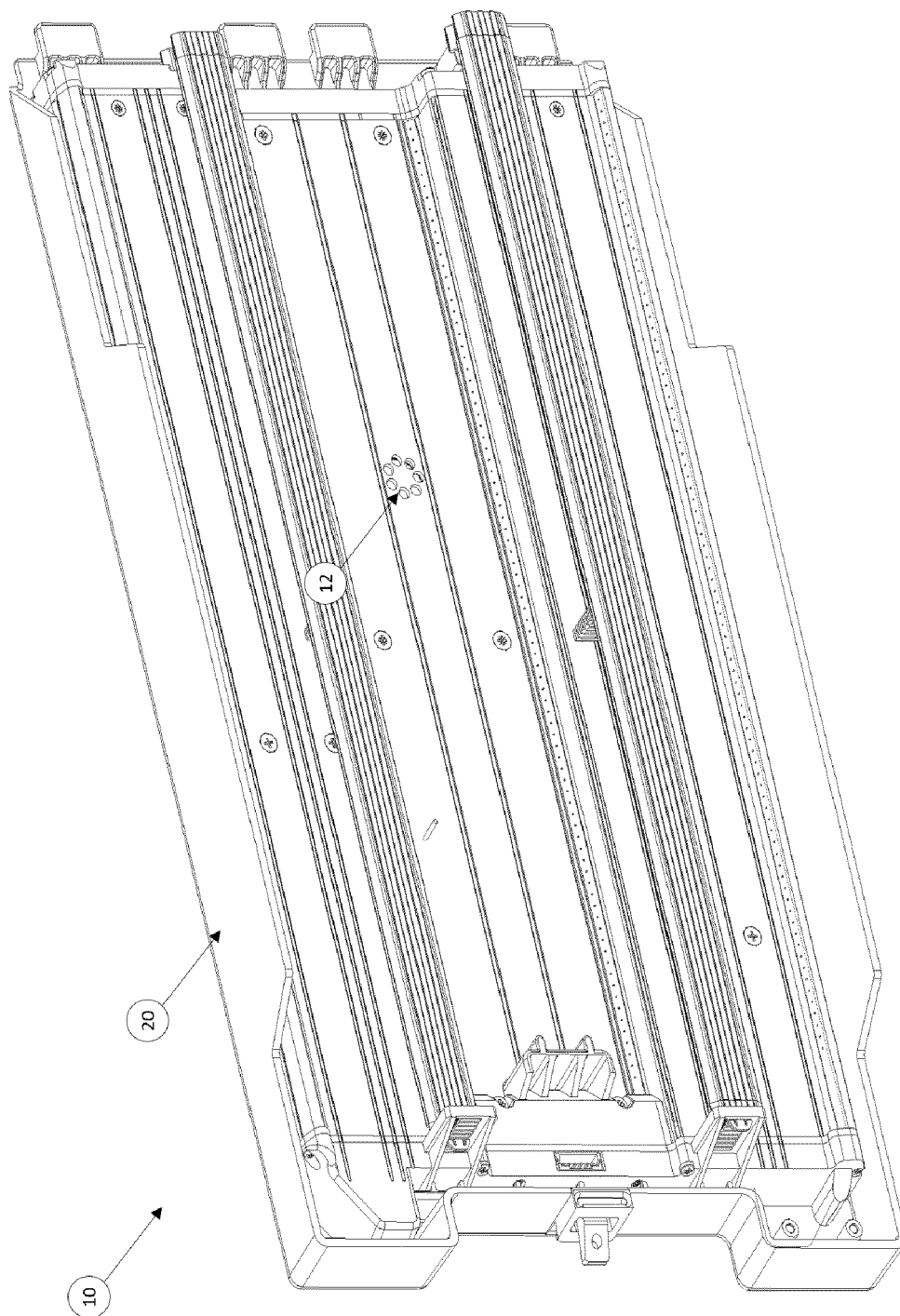


Figure 4



EUROPEAN SEARCH REPORT

Application Number

EP 23 19 0687

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 1 643 068 A2 (NCR INT INC [US]) 5 April 2006 (2006-04-05) * paragraphs [0004], [0023], [0025], [0027], [0040] * * figures 1, 2 *	1-4, 7-15	INV. G07D11/12 G07D11/125
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			TECHNICAL FIELDS SEARCHED (IPC)
			G07D
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		29 January 2024	Schikhof, Arnout
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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