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(54) **A COOLING DEVICE**

KÜHLVORRICHTUNG

DISPOSITIF DE REFROIDISSEMENT

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Description

[0001] The present invention relates to a cooling device comprising shelves for using the interior volume effectively.

[0002] In cooling devices, preferably in refrigerators, one or more of the shelves are dislodged or their places are changed for storing tall sized food or beverage containers. In the state of the art, foldable or telescopic shelf assemblies are used in order to create flexible usage volume providing containers of several sizes to be stored. These types of shelf systems should also be practical.

[0003] In the state of the art United States of America Patent No US3264049, the refrigerator comprises an extensible and movable shelf having a pair of legs, which bear against the lower shelf with the purpose of providing flexible usage, allowing for storage of articles of various sizes inside the refrigerator compartment.

[0004] Another embodiment known in the technique is explained in the International Patent Application No WO2008065161. In this application, a bottle holder is explained which comprises at least two leafs, connected to each other successively, and articulately fastened to the rails from the headmost and the rear ends. The leafs define a volume wherein the bottle can be placed by being angularly positioned with respect to each other in the open position of loading the bottle. The holder can be folded under the shelf when not in use. A cooling device according to the preamble of claim 1 is known from patent number US4528825.

[0005] The aim of the present invention is the realization of a cooling device wherein the interior volume can be used efficiently.

[0006] The cooling device comprises at least one storage member that is mounted under at least one of the shelves, which enables to define a storing volume under the shelf when desired.

[0007] The storage member comprises two suspenders, a first plate and a second plate all movably connected to each other. Accordingly, the storage member can be moved between a storage position wherein a volume is defined under the shelf and an inactive position by becoming at least parallel to the shelf and occupying the least amount of space under the shelf.

[0008] The first plate is foldably secured to the second plate along one of their sides such that this side becomes the rotational axis. The suspenders provide the first plate and the second plate connected thereto to be suspended under the shelf. The suspenders are rotatably connected to the shelf such that a pivot form connection is provided between the front side of the shelf and the front side of the first plate.

[0009] The cooling device furthermore comprises a cover that composes a closed volume under the shelf by closing the front face of the storage member remaining between the suspenders. The cover is mounted removably to the side whereto the first plate is secured to the second plate. The cover is connected to the front side of the shelf, to be rotatable around this side, from the side opposite to the side wherefrom it is secured to the first plate. The cover is dismounted from the side fastened on the first plate and is opened by rotating around the side connected on the shelf.

[0010] When the storage member is in the storage position, the first plate and the second plate, successively compose the base of the storage member. The cover closes the front surface remaining between the storage member and the shelf in a collapsible manner.

[0011] When the storage member is changed to the inactive position, the second plate becomes parallel to the rear wall of the cooling device and the cover and the first plate under the shelf become parallel to the shelf.

[0012] When the storage member is changed to the inactive position, the cover and the suspenders become cleaved underneath the shelf by rotating around the front side of the shelf towards under the shelf. In the meantime, the first plate, whereto they are fastened, moves forward and becomes parallel to the underside of the shelf just behind the cover.

[0013] The storage member furthermore comprises two pins enabling the second plate, secured in a foldable manner to the first plate from one side, to be also fastened to the cooling device side walls from its side walls, to be rotatable around a stationary point. The pin rotates in the sockets situated on the cooling device side walls.

[0014] While the storage member changes from the storage position to the inactive position, the force exerted by pushing the first plate over the second plate causes the connected side of the first plate and the second plate to slide backwards. During this movement, the pin rotates inside the socket and as the second plate becomes parallel to the rear wall of the cooling device, the first plate moves towards the position of the second plate under the shelf.

[0015] The storage member comprises a lock at the dismountable end of the cover on the first plate and which enables the cover to be changed to the closed position by affixing on the first plate.

[0016] The shelf comprises at least one recess wherein the protrusion formed at the connection point of the cover, the suspenders and the first plate is seated thereby positioning the cover, the suspenders and the first plate parallel to the shelf when the storage member is in the inactive position.

[0017] The storage member furthermore comprises a handle arranged on the cover. The handle enables the user to move the cover by easily holding thereof during opening and closing of the cover.

[0018] The model embodiments relating to the cooling device realized in order to attain the aim of the present invention are illustrated in the attached figures, where:

[0019] Figure 1 - is the schematic view of a cooling device when the storage member is in the storage position.

[0020] Figure 2 - is the schematic view of a cooling device when the storage member is in the inactive posi-

tion.

[0021] Figure 3 - is the perspective view of the shelf and the storage member when the storage member is in the storage position and the cover is open.

[0022] Figure 4 - is the perspective view of the shelf and the storage member when the storage member is in the storage position and the cover is closed.

[0023] Figure 5 - is the perspective view of the shelf and the storage member while the storage member is changed from the storage position to the inactive position.

[0024] Figure 6 - is the perspective view of the shelf and the storage member when the storage member is in the inactive position.

[0025] Figure 7 - is the sideways view of the shelf and the storage member when the storage member is in the storage position and the cover is open.

[0026] Figure 8 - is the sideways view of the shelf and the storage member when the storage member is in the storage position and the cover is closed.

[0027] Figure 9 - is the sideways view of the shelf and the storage member while the storage member is changed from the storage position to the inactive position.

[0028] Figure 10 - is the perspective view of the shelf and the storage member when the storage member is in the inactive position.

[0029] The elements illustrated in the figures are numbered as follows:

1. Cooling device
2. Shelf
3. Storage member
4. Cover
5. First plate
6. Second Plate
7. Suspender
8. Pin
9. Hinge
10. Lock
11. Recess
12. Handle

[0030] The cooling device (1) comprises at least one shelf (2) used for emplacing objects thereon and at least one storage member (3) mounted under at least one of the shelves (2) and enables to define a storage volume under the shelf (2) when desired.

[0031] The storage member (3) has

- a storage position (SP) wherein a volume is composed under the shelf (2) and
- an inactive position (IP) occupying the least amount of space under the shelf (2) by becoming at least partially parallel to the shelf (2) (Figure 1 and Figure 2).

[0032] The storage member (3) comprises two suspenders (7), a first plate (5) and a second plate (6) movably attached to one another.

[0033] When the storage member (3) is in the storage position (SP), the first plate (5) and the second plate (6) are disposed successively forming the base of the storage member (3), the suspenders (7) are fastened rotatably to both sides of the front side of the first plate (5) maintaining the first plate (5) and the second plate (6) to be suspended under the shelf (2) (Figure 3). On the other hand, when the storage member (3) is in the inactive position (IP), the second plate (6) becomes parallel to the rear wall of the cooling device (1) and the suspenders (7) and the first plate (5) become parallel to the shelf (2) just underneath the shelf (2) (Figure 6). In order to allow for this motion, the total length of the first plate (5) and the second plate (6) is equal to the length of the shelf (2) whereas the lengths of the second plate (6) and the suspenders (7) are almost equal to one another.

[0034] The space under the shelf (2) whereto the storage member (3) is mounted while in the inactive position (IP) enables storing of, for example long objects in its widest arrangement.

[0035] On the other hand, when the storage member (3) is changed to the storage position (SP), a secondary volume is formed under the shelf (2) wherein items to be cooled can be emplaced. Accordingly, multi-pieced items such as breakfast foods etc. can be stored easily in a closed space and when not in use, this space can be removed.

[0036] The cooling device (1) furthermore comprises a cover (4) that composes a closed space under the shelf (2) by closing the front face of the storage member (3) between the suspenders (7) (Figure 4).

[0037] The cover (4), the first plate (5) and the second plate (6) are rotatably fastened to one another along one of their sides such that these sides become the rotational axes (A, B). These rotational axes (A, B) make a translatory movement at the same time as the storage member (3) is changed from the storage position (SP) to the inactive position (IP). In other words, these axes (A, B) are movable axes. When a force is exerted on the cover (4) for changing the storage member (3) from the storage position (SP) to the inactive position (IP), the side (A) where the cover (4) and the first plate (5) joins, moves backwards under the shelf (2) and upwards by rotating, the side (B) where the first plate (5) and the second plate (6) joins also moves backwards under the shelf (2) and upwards (Figure 5).

[0038] On the other hand, the cover (4) is rotatably fastened to the front side of the shelf (2) from its free side, opposite the side joined to the first plate (5), such that this side becomes the rotational axis (C). The second plate (6) is fastened rotatably from its free side, opposite the side joined with the first plate (5), to the cooling device (1) body from the rear walls or the rear side of the side walls such that the said side (D) is the rotational axis. These rotational axes (C, D) do not move while the storage member (3) is changed from the storage position

(SP) to the inactive position (IP). In other words, these axes (C, D) are fixed axes.

[0039] The suspenders (7) maintain the first plate (5) and hence the storage member (3) to be kept suspended under the shelf (2) when the cover (4) opens, while the storage member (3) is in the storage position (SP). The cover (4) is settled between the suspenders (7) when closed, and while the storage member (3) is changed from the storage position (SP) to the inactive position (IP), the suspenders (7) and the cover (4) move together.

[0040] The storage member (3) comprises one pin (8) each, on the side walls of the second plate (6) at the rear ends. The cooling device (1) comprises one socket each arranged on the side walls of its body, wherein the pins (8) rotate while the storage member (3) is moved between the storage and inactive positions (SP - IP).

[0041] The storage member (3) comprises a hinge (9) that fastens the sides of the first plate (5) and the second plate (6) facing one another such that they are allowed to rotate.

[0042] The cover (4) is rotatably mounted on the front side of the shelf (2) such that this side is the rotational axis. The cover (4) remains between two suspenders (7) in the closed position and is configured with the shape and size to close between the shelf (2) and the first plate (5) that is, the front face of the storage member (3).

[0043] The storage member (3) comprises a lock (10) situated at the end of the cover (4) extending to the first plate (5), which maintains the cover (4) to be secured on the first plate (5) in the closed position by engaging on the front side of the first plate (5). The lock (10) is preferably disposed all along the lower side of the cover (4) and is shaped arcuately such that it is seated tight fittingly on the front side of the first plate (5).

[0044] The shelf (2) comprises at least one recess (11) wherein the protrusion formed at the connection point of the cover (4), the suspenders (7) and the first plate (5) is seated therein so that the cover (4), the suspenders (7) and the first plate (5) can become entirely parallel to the shelf (2) when the storage member (3) is in the inactive position (IP).

[0045] The storage member (3) furthermore comprises a handle (12) arranged on the cover (4) that enables the user to open and close the cover (4) by holding thereof.

[0046] When the storage member (3) is in the storage position (SP), the first plate (5) and the second plate (6) are almost in the parallel position to the shelf (2) and compose the base of the storage member (3). In this position, when the cover (4) is desired to be opened, the user pulls the cover (4) upwards by means of the handle (12). As the lock (10) is released from the first plate (5), the cover (4) moves upwards and opens by rotating around the points whereto it is fastened on the front side of the shelf (2). In this position, the user can access into the storage member (3), thereby emplacing items on the first and second plates (5, 6) or take the items therefrom. Thereafter, if the cover (4) is pushed downwards by again holding from the handle (12), the lock (10) is seated on the front side of the first plate (5) when the lower side of the cover (4) is aligned with the first plate (5). Consequently, the cover (4) is thus closed (Figure 7 and Figure 8).

[0047] When the user wants to change the storage member (3) from the storage position (SP) to the inactive position (IP), this time s/he pushes the cover (4) forward by means of the handle (12). With this pushing force, the cover (4) and the suspenders (7) rotate toward under the shelf (2) such that the side whereto they are fastened on the shelf (2) is the rotational axis. The side wherefrom the first and second plates (5, 6) are joined to one another rises upwards. At the same time, by means of the hinge (9) disposed on this side, joining the first and second plates (5, 6) to one another, the second plate (6) moves toward a position vertical to the first plate (5) and parallel to the rear wall of the cooling device (1). When the movement is completed, they come to a position parallel to the shelf (2) and under the shelf (2) such that the cover (4) and the suspenders (7) are in the front and the first plate (5) is at the back. The second plate (6) comes to a position parallel to the rear wall of the cooling device (1). In the preferred embodiment of the present invention, the cooling device (1) comprises a fixing mechanism for securing the storage member (3) in the inactive position (IP) (Figure 9 and Figure 10).

[0048] By means of the present invention, a closed storing space can be composed by the storage member (3) under the shelf (2) when desired or the storage member (3) can be folded under the shelf (2) when not desired such that effective usage of the cooling device (1) interior is not inhibited and thereby allowing the user to utilize the interior volume of the cooling device (1) flexibly.

[0049] It is to be understood that the present invention is not limited to the embodiments disclosed above an expert in the technique can easily introduce different embodiments. These should be considered as long as they are within the scope of the protection postulated by the claims of the present invention.

Claims

1. A cooling device (1) that comprises at least one shelf (2) used for emplacing objects thereon and at least one storage member (3) mounted under at least one of the shelves (2), enabling to define a closed storage volume under the shelf (2) when desired and **characterized by** a storage member (3) having two suspenders (7), a first plate (5) and a second plate (6) movably attached to one another, a storage position (SP) wherein the first plate (5) and the second plate (6) are disposed successively forming the base and the suspenders (7), fastened rotatably to the front side of the shelf (2) and to both ends of the front side of the first plate (5), thereby maintaining the first plate (5) and the second plate (6) to be suspended under the shelf (2) and an inactive position (IP) wherein the

second plate (6) becomes parallel to the rear wall of the cooling device (1) and the suspenders (7) and the first plate (5) become parallel to the shelf (2) just underneath the shelf (2) thereby occupying the least amount of space under the shelf (2).

2. A cooling device (1) as in Claim 1, **characterized by** the storage member (3) comprising a cover (4) that composes a closed space under the shelf (2) by closing the front face of the storage member (3) between the suspenders (7).

3. A cooling device (1) as in Claim 1 or 2, **characterized by** the storage member (3) comprising one pin (8) each, on the side walls of the second plate (6) at the rear ends and one socket each, wherein the pins (8) rotate while the storage member (2) is moved between the storage and inactive positions (SP - IP).

4. A cooling device (1) as in any one of the above Claims, **characterized in that** the total length of the first plate (5) and the second plate (6) being equal to the length of the shelf (2).

5. A cooling device (1) as in any one of the above Claims, **characterized in that** the lengths of the second plate (6) and the cover (4) being equal to one another.

6. A cooling device (1) as in any one of the above Claims, **characterized by** the storage member (3) comprising a hinge (9) that fastens the sides of the first plate (5) and the second plate (6), facing one another such that they are allowed to rotate.

7. A cooling device (1) as in any one of the above Claims, **characterized in that** the cover (4) is rotatably mounted on the front side of the shelf (2) such that this side is the rotational axis.

8. A cooling device (1) as in any one of the above Claims, **characterized in that** the cover (4) remains between two suspenders (7) in the closed position and is configured with the shape and size to close between the shelf (2) and the first plate (5), that is the front face of the storage member (3).

9. A cooling device (1) as in any one of the above Claims, **characterized by** the storage member (3) comprising a lock (10) situated at the end of the cover (4) extending to the first plate (5), which maintains the cover (4) to be secured on the first plate (5) in the closed position by engaging on the front side of the first plate (5).

10. A cooling device (1) as in any one of the above Claims, **characterized by** the shelf (2) comprising at least one recess (11) wherein the protrusion formed at the connection point of the cover (4), the suspenders (7) and the first plate (5) is seated therein so that the cover (4), the suspenders (7) and the first plate (5) can become entirely parallel to the shelf (2) when the storage member (3) is in the inactive position (IP).

11. A cooling device (1) as in any one of the above Claims, **characterized by** the storage member (3) comprising a handle (12) arranged on the cover (4) that enables the user to open and close the cover (4) by holding thereof.

Patentansprüche

1. Kühlvorrichtung (1), die wenigstens ein Regal (2) umfasst, das zum Abstellen von Gegenständen benutzt wird, und wenigstens ein Speicherelement (3), das unter wenigstens einem der Regale (2) angebracht ist und bei Bedarf einen geschlossenen Speicherraum unter dem Regal (2) begrenzen kann, und **gekennzeichnet durch** ein Speicherelement (3) aufweisend

- aufweisend zwei Aufhänger (7), eine erste Platte (5) und eine zweite Platte (6) aufweist, die beweglich aneinander angebracht sind,
- eine Speicherposition (SP), in der die erste Platte (5) und die zweite Platte (6) aufeinander folgend angeordnet sind und die Basis bilden, und die Aufhänger (7) drehbar an der Vorderseite des Regals (2) und an beiden Enden der Vorderseite der ersten Platte (5) befestigt sind, wodurch sie die erste Platte (5) und die zweite Platte (6) unter dem Regal (2) aufgehängt halten, und
- eine inaktive Position (IP), in der die zweite Platte (6) parallel zur Rückwand der Kühlvorrichtung (1) angeordnet ist und die Aufhänger (7) und die erste Platte (5) parallel zum Regal (2) unmittelbar unterhalb des Regals (2) angeordnet sind, wodurch sie am wenigsten Platz unter dem Regal (2) einnehmen.

2. Kühlvorrichtung (1) nach Anspruch 1, **dadurch gekennzeichnet, dass** das Speicherelement (3) eine Abdeckung (4) umfasst, die einen geschlossenen Raum unter dem Regal (2) bildet, indem sie die Vorderfläche des Speicherelements (3) zwischen den Aufhängern (7) schließt.

3. Kühlvorrichtung (1) nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** das Speicherelement (3) jeweils einen Stift (8) an den hinteren Enden an den Seitenwänden der zweiten Platte (6) und jeweils eine Aufnahme umfasst, in der sich die Stifte (8) drehen, während das Speicherelement (3) zwi-

schen der Speicher- und der inaktiven Position (SP-IP) verschoben wird.

4. Kühlvorrichtung (1) nach einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** die Gesamtlänge der ersten Platte (5) und der zweiten Platte (6) gleich der Länge des Regals (2) ist.

5. Kühlvorrichtung (1) nach einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** die Länge der ersten Platte (5) und der Abdeckung (4) gleich ist.

6. Kühlvorrichtung (1) nach einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** das Speicherelement (3) ein Scharnier (9) umfasst, das die Seiten der ersten Platte (5) und der zweiten Platte (6) befestigt, die einander derart zugewandt sind, dass sie sich drehen können.

7. Kühlvorrichtung (1) nach einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** die Abdeckung (4) drehbar an der Vorderseite des Regals (2) angebracht ist, derart, dass diese Seite die Drehachse ist.

8. Kühlvorrichtung (1) nach einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** die Abdeckung (4) in der geschlossenen Position zwischen zwei Aufhängern (7) bleibt und in einer Form und Größe zum Verschließen der Vorderfläche des des Speicherelements (3) zwischen dem Regal (2) und der ersten Platte (5) ausgebildet ist.

9. Kühlvorrichtung (1) nach einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** das Speicherelement (3) einen Riegel (10) umfasst, der am Ende der Abdeckung (4) angeordnet ist und sich zur ersten Platte (5) hin erstreckt, und der die Abdeckung (4) in der geschlossenen Position an der ersten Platte (5) gesichert hält, indem er mit der Vorderseite der ersten Platte (5) in Eingriff steht.

10. Kühlvorrichtung (1) nach einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** das Regal (2) wenigstens eine Vertiefung (11) umfasst, in der der Vorsprung, der am Verbindungspunkt der Abdeckung (4), des Aufhängers (7) und der ersten Platte (5) ausgebildet ist, sitzen, derart, dass die Abdeckung (4), die Aufhänger (7) und die erste Platte (5) vollständig parallel zum Regal (2) angeordnet sein können, wenn sich das Speicherelement (3) in der inaktiven Position (IP) befindet.

11. Kühlvorrichtung (1) nach einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** das Speicherelement (3) einen Griff (12) umfasst, der an der Abdeckung (4) angeordnet ist und der es dem Benutzer ermöglicht, durch Halten desselben die Abdeckung (4) zu öffnen und zu schließen.

Revendications

1. Un dispositif de refroidissement (1) qui comprend au moins une étagère (2) sur laquelle des objets sont placés et au moins un membre de stockage (3) monté sous au moins une des étagères (2), permettant de définir un volume de stockage fermé sous l'étagère (2) quand on le désire et **caractérisé par** un membre de stockage (3) ayant

- deux dispositif de suspension (7), une première plaque (5) et une deuxième plaque (6) qui sont attachées l'une à l'autre de façon mobile,
- une position de stockage (SP) où la première plaque (5) et la deuxième plaque (6) sont disposées successivement pour former la base et où les dispositifs de suspension (7), qui sont fixés de façon rotative au côté avant de l'étagère (2) et aux deux extrémités du côté avant de la première plaque (5), permettent à la première plaque (5) et à la deuxième plaque (6) d'être suspendues sous l'étagère (2) et
- une position inactive (IP) où la deuxième plaque (6) devient parallèle à la paroi arrière du dispositif de refroidissement (1) et où les dispositifs de suspension (7) et la première plaque (5) deviennent parallèles à l'étagère (2) juste en dessous l'étagère (2), donc tout en occupant un minimum d'espace sous l'étagère (2).

2. Un dispositif de refroidissement (1) selon la Revendication 1, **caractérisé par** un membre de stockage (3) comprenant un couvercle (4) qui compose un espace clos sous l'étagère (2) en fermant la face avant du membre de stockage (3) entre les dispositifs de suspension (7).

3. Un dispositif de refroidissement (1) selon la Revendication 1 ou 2, **caractérisé par** le membre de stockage (3) comprenant une goupille (8) sur chacune des parois latérales de la deuxième plaque (6) aux extrémités de derrière et des cavités dans lesquelles les goupilles (8) tournent alors que le membre de stockage (3) est déplacé entre la position de stockage et la position inactive (SP - IP).

4. Un dispositif de refroidissement (1) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** la longueur totale de la première plaque (5) et la deuxième plaque (6) est égale à la longueur de l'étagère (2).

5. Un dispositif de refroidissement (1) selon l'une quelconque des revendications précédentes, **caractéri-**

sé en ce que la longueur de la deuxième plaque (6) et celle du couvercle (4) sont égales l'une à l'autre.

6. Un dispositif de refroidissement (1) selon l'une quelconque des revendications précédentes, **caractérisé par** le membre de stockage (3) comprenant une charnière (9) qui attache les côtés face à face de la première plaque (5) et la deuxième plaque (6) l'un à l'autre de telle sorte qu'elles peuvent tourner.

7. Un dispositif de refroidissement (1) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** le couvercle (4) est monté sur la côté avant de l'étagère (2) de façon rotative de telle sorte que ce côté est l'axe de rotation.

8. Un dispositif de refroidissement (1) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** le couvercle (4) reste entre les deux dispositifs de suspension (7) en position fermée et est configuré en la forme et la taille à combler l'espace entre l'étagère (2) et la première plaque (5), c'est-à-dire la face avant du membre de stockage (3).

9. Un dispositif de refroidissement (1) selon l'une quelconque des revendications précédentes, **caractérisé par** le membre de stockage (3) comprenant un verrou (10) situé à l'extrémité du couvercle (4) s'étendant vers la première plaque (5), qui permet au couvercle (4) d'être fixé sur la première plaque (5) en position fermée en s'engageant sur la face avant de la première plaque (5).

10. Un dispositif de refroidissement (1) selon l'une quelconque des revendications précédentes, **caractérisé par** l'étagère (2) comprenant au moins un évidement (11) dans lequel la protubérance formée au point de raccordement du couvercle (4), des dispositifs de suspension (7) et de la première plaque (5) est placée de telle sorte que le couvercle (4), les dispositifs de suspension (7) et la première plaque (5) peuvent devenir entièrement parallèle à l'étagère (2) lorsque le membre de stockage (3) est dans la position inactive (IP).

11. Un dispositif de refroidissement (1) selon l'une quelconque des revendications précédentes, **caractérisé par** le membre de stockage (3) comprenant une poignée (12) disposé sur le couvercle (4) qui permet à l'utilisateur d'ouvrir et fermer le couvercle (4) en la tenant.

Figure 1

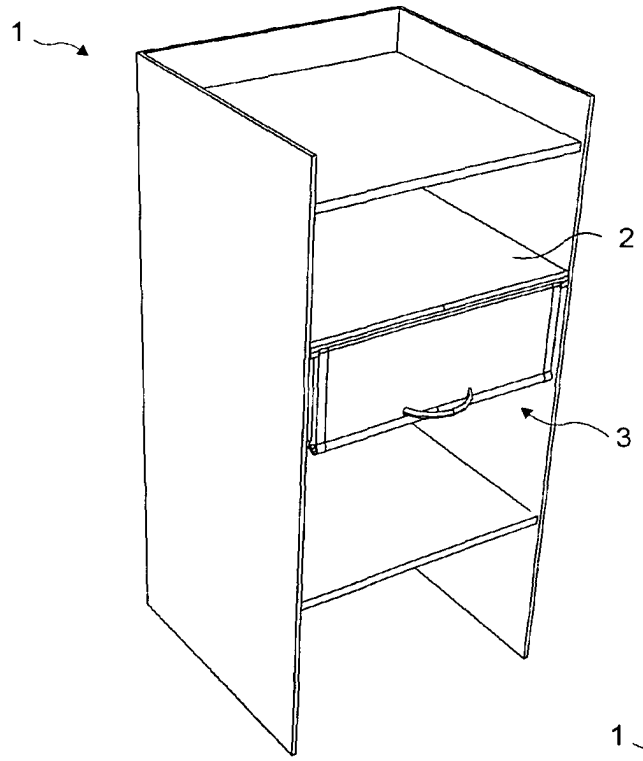


Figure 2

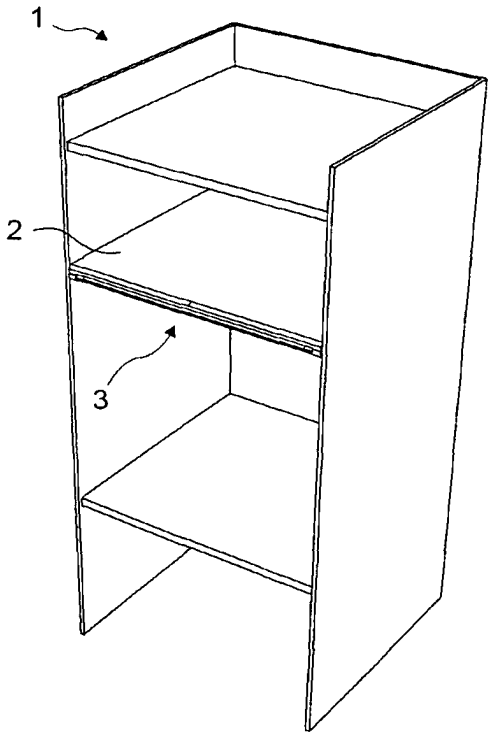


Figure 3

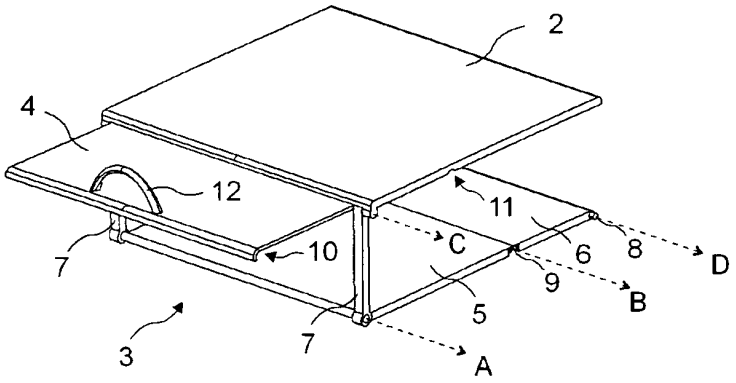


Figure 4

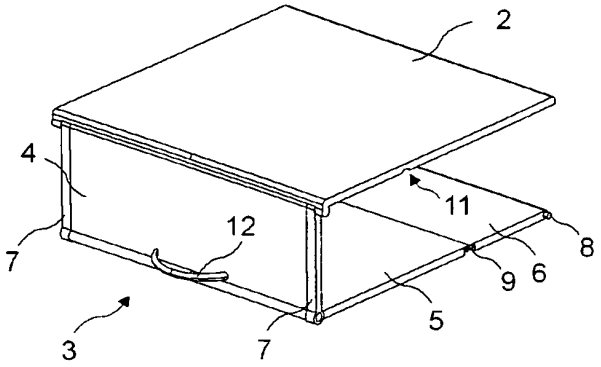


Figure 5

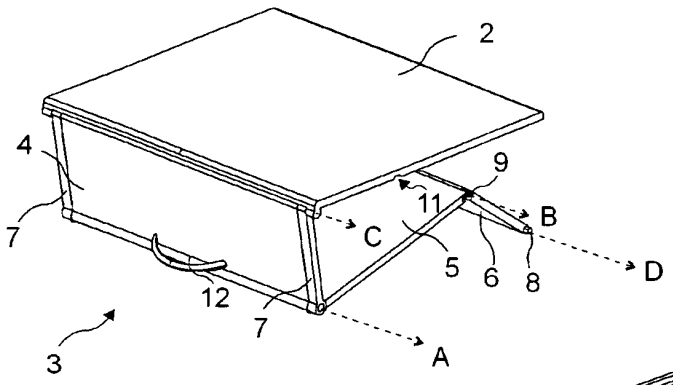


Figure 6

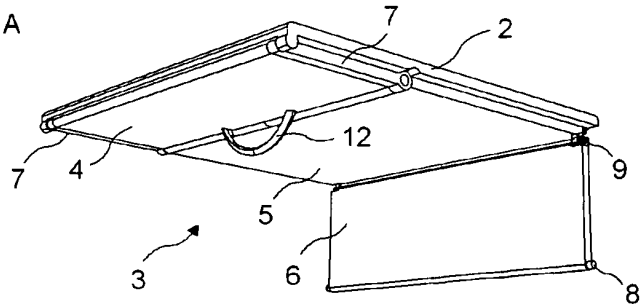


Figure 7

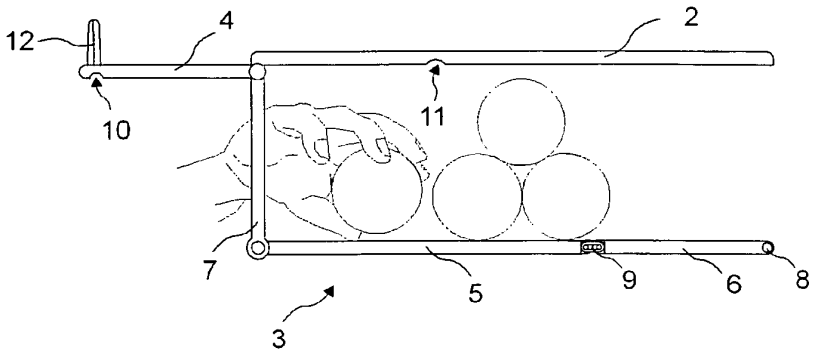


Figure 8

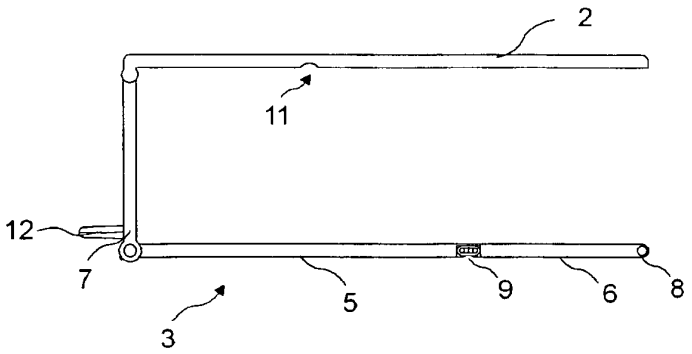


Figure 9

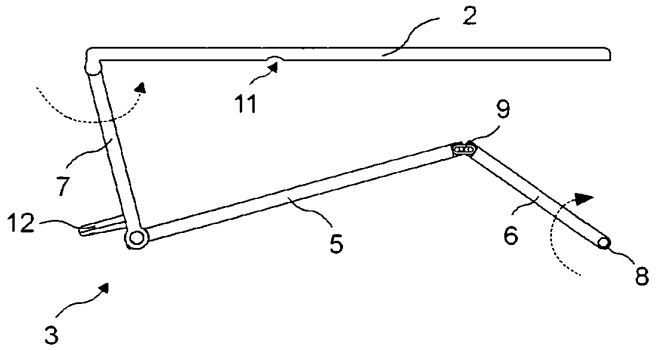
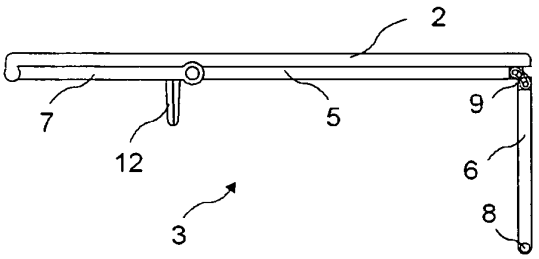


Figure 10



REFERENCES CITED IN THE DESCRIPTION

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