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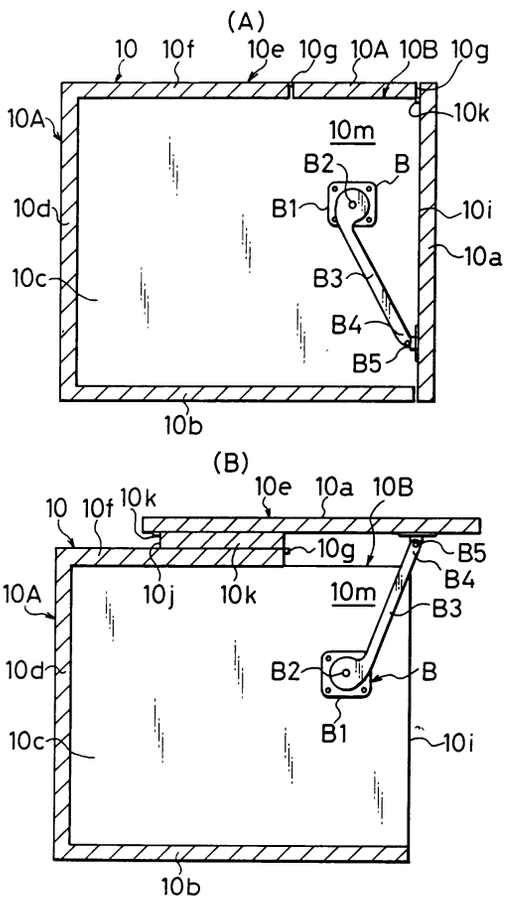
(54) Cabinet with upwardly swinging door

(57) In a cabinet with an upswing door adapted to be swung up to become open and placed at rest on the top of the cabinet main body, a major improvement lies in a unique link arrangement of the cabinet main body and the closure that eliminates the need of using a costly slide rail assembly. A metal arm unit B is secured to the inner surface 10m of a lateral wall of the cabinet main body 10 and the free end of a rotary arm B3 extending from the metal arm unit B is made to pivot on a pin B5 fitted to the upswing door 10a. As the upswing door 10a is operated to open by hand, a movable front top wall 10h and the upswing door 10a are sequentially folded on a fixed rear top wall 10f along a top wall hinge 10g and a door hinge and placed at rest there so that the door opening operation can be completed easily and smoothly without a slide rail assembly.

FIG. 1



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Description

BACKGROUND OF THE INVENTION

[Field of the Invention]

[0001] This invention relates to a cabinet with an upswing door adapted to be swung up to become open and placed at rest on the top of the cabinet main body.

[Related Background Art]

[0002] Japanese Patent Application Laid-Open No. 8-143507 (Japanese Patent Publication No. 9-303033) discloses a cabinet with an upswing door that provides a remarkable improvement to conventional cabinets of the type under consideration.

[0003] As discussed hereinafter, conventional cabinets having an upswing door are accompanied by a major drawback that a slide rail assembly has to be arranged on the rear surface of the door in order to allow the door to be swung and placed at rest on the top of the cabinet main body. The above patent document proposes a cabinet main body having a specific configuration in order to eliminate the need of arranging such a slide rail assembly and make the operation of opening and closing the door an easy one by using in combination a simple and specifically designed hinge unit and a conventional door damper unit.

[0004] The cabinet with an upswing door as disclosed in the above patent document will be described below particularly in terms of the conventional door damper unit it comprises because such a door damper unit is also applicable to a cabinet according to the present invention. Referring to FIGS. 15 through 18, an end of hinge 1c is rigidly fitted to the front edge 1b of the top wall 1a of the cabinet main body while the other end of the hinge 1c is secured to inner rail 1f of slide rail assembly 1e buried in the rear side of the upswing door 1d. With this arrangement, the door 1d can be swung up around pin 1g of the hinge 1c to become open by pulling up the lower end of the door 1d and then placed at rest on the top wall 1a of the cabinet main body as shown in FIG. 17 by pushing the door 1d as outer rail 1 h of the slide rail assembly 1e slides relative to the inner rail 1f.

[0005] As seen from FIGS. 16 and 18, door damper unit A comprises a fitting case 2 to be rigidly secured to the inner surface 1i of one of the lateral walls of the cabinet main body typically by means of screws 2a and a spring holder/slider 4 that is vertically movable relative to the fitting case 2 and urged downward by a given number of compression springs 3.

[0006] As shown in FIG. 18, the fitting case 2 includes a reinforcement cover plate 2b secured to inner surface 1i of the lateral wall and a fitting case main body 2c arranged within the cover plate 2b. In FIG. 18, reference symbol 2d denotes fitting holes bored in the reinforcement cover plate 2b for receiving a screw 2a and reference symbol 2e denotes through holes bored through the top wall 2f of the reinforcement cover plate 2b while reference symbol 2g denotes threaded fitting holes bored through the top wall 2h of the fitting case main body 2c. Thus, the fitting case 2 is assembled by snugly putting the fitting case main body 2c into the reinforcement cover plate 2b for mutual engagement and tightening screws (not shown) driven into the threaded fitting holes by way of the through holes 2e.

[0007] Referring further to FIG. 18, reference symbol 2i denotes lateral walls of the reinforcement cover plate 2b extending downward from the opposite ends of the top wall 2f along the fitting wall 2j thereof and reference symbol 2k denotes lateral walls of the fitting case main body 2c also extending downward from the opposite ends of the top wall 2h along the front wall 2m thereof. Thus, a containing room 2n for vertically movably containing the spring holder/slider 4 is defined within the fitting case main body 2c.

[0008] A pair of through holes 2p are bored through the respective lateral walls 2i of the reinforcement cover plate 2b and another pair of through holes 2q are bored through the respective lateral walls 2k of the fitting case main body 2c, through which a spring stopper pin 2r is arranged and held in abutment with the upper ends of the compression springs 3.

[0009] As shown, the spring holder/slider 4 has a box like profile with a front wall 4a, a rear wall 4b and oppositely disposed lateral walls 4c. Thus, it is open at the top. In the illustrated instance, the internal space of the spring holder/slider 4 is divided into three spring containing rooms 4e as defined by the paired lateral walls 4d and a pair of partition walls 4e running in parallel with the lateral walls 4d. The three compression springs 3 contained in the respective rooms are held at the upper end thereof in abutment with the spring stopper pin 2r and downwardly urges at the lower ends thereof the pressure receiving pin 4f rigidly secured to the lateral walls 4c of the spring holder/slider 4.

[0010] Thus, the spring holder/slider 4 is adapted to move upward to compress the compression springs 3 and downward to expand the compression springs 3 as its lateral walls 4c slide along the inner corresponding surfaces of the lateral walls 2k of the main body 2c of the fitting case 2.

[0011] As also shown in FIG. 18, the lateral walls 2k of the main body 2c of the fitting case 2 are provided on the inner surfaces thereof with respective vertical guide grooves 2s so that the spring holder/slider 4 may be vertically moved with its lateral walls 4c guided by the grooves 2s. Therefore, as the spring holder/slider is moved downward, it eventually hit the stoppers 2t formed by the lower ends of the guide grooves 2s so that its downward movement is limited by the stoppers 2t. Under this condition, the resilient force of the compression springs does not affect the member linked to them as will be described hereinafter.

[0012] A link arm 5 is fitted at the upper end thereof to the spring holder/slider 4 by means of a pin 5a so that it may pivot on the pin 5a. On the other hand, a rotary arm 6 is rotatably fitted to a lower portion of the fitting case 2 by means of an arm shaft 6a and the lower end of the link arm 5 is linked to the base section 6b of the rotary arm 6 at a position near the arm shaft 6a by means of another pin 5b so that the link arm may pivot on the both pins 5a, 5b.

[0013] The arm section 6c of the rotary arm 6 is extending from the base section 6b thereof and fitted to the upswing door 1d by means of an arm holder 7 that is rigidly secured to the upswing door 1d and a pin 6d.

[0014] It should be noted here that the pin 5a for anchoring the link arm 5a to the spring holder/slider 4 is received not by through holes but by downwardly open grooves 4g formed at a lower central parts of the front wall 4a and the rear wall 4b of the spring holder/slider 4 as shown in FIG. 18 so that the pin 5a may be vertically movable.

[0015] The rotary arm 6 has a gap 6e separating it into two wall portions to make it show a U-shaped cross section and the link arm 5a is inserted into the gap at the lower end thereof and secured to the base section 6b of the rotary arm 6 by means of the pin 5b to that it may pivot on the pin 5. The arm section 6c and the arm holder 7 linked together by the pin 6d in a similar manner.

[0016] In the illustrated arrangement, the arm shaft 6a is provided with a engaging projection 6f to be engagedly received in a corresponding engaging recess 6h formed in the shaft receiving hole 6h cut through the base section 6b of the rotary arm 6 in order to transmit the rotation motion of the rotary arm 6 to the arm shaft 6a. Then, the arm shaft 6a is coaxially secured to the rotary shaft 8a of the damper mechanism 8 arranged at a lower part of the fitting case 2.

[0017] Thus, as the rotary arm 6 is driven to rotate, the damper mechanism 8 exerts an effect of damping the closing or opening motion of the upswing door 1d by means of the viscous fluid (not shown) contained in the damper mechanism 8.

[0018] The illustrated damper mechanism 8 is already known. Referring to FIG. 18, it comprises, in addition to the above described rotary shaft 8a, a damper bearing section 8b arranged at the bottom of the fitting case main body 2c, a movable disk 8c movably fitted to the rotary shaft 8a, a fixed disk 8d arranged immovably vis-à-vis the movable disk 8c, a pair of O-rings 8e and 8f and a closure 8g for closing the damper mechanism 8 secured in position by means of screws (not shown) driven through the threaded holes bored through the reinforcement cover plate 2b.

[0019] What is essential to the above described arrangement is the selection of the position of the pivot P of the link arm 15 where it is linked to the base section 6b of the rotary arm 6 by means of the pin 5b.

[0020] When the upswing door 1d is closed, the pivot P is located closer to the upswing door 1d relative to the vertical line L connecting the pin 5a and the arm shaft 6a.

[0021] As a result, as seen from FIG. 15, the compression springs 3 are in a compressed state to exert their resilient force downwardly in FIG. 15 to the link arm 5. Therefore, the base section 6b of the rotary arm 6 is subjected to a rotary force trying to rotate it in the sense of arrow R1 in FIG. 15 so that the upswing door 1d is held to the closed state and would not be inadvertently opened.

[0022] Then, as the user pulls up the upswing door 1d, holding the lower end of the door, to open it from the closed state of FIG. 15, the pivot P rotates counterclockwise in FIG. 16 to eventually pass the change point located on the vertical line L where it is found highest and then move away from the door. Under this condition, the resilient force of the compression springs 3 is directed in the sense of arrow R3, which is opposite to the sense of arrow R1, to encourage the rotary motion of the rotary arm 6 trying to open the door. Therefore, the user can easily open the upswing door 1d with little effort until it gets onto and is held at rest on the top wall 1a.

[0023] When closing the upswing door 1d by moving it from the top wall 1a, the user simply needs to pull it toward him or her by hand only for a short period of time. After the initial effort of pulling the door on the part of the user, the door will automatically move to the closed position by its own weight if the user releases the closing door. More over, since the compression spring 3 are gradually compressed from the expanded state by the closing motion of the door, the closing motion of the door proceeds only slowly because the motion is buffered by the resilient force of the compression springs 3 until the door gets to the fully closed position as shown in FIG. 15, where it is held to the closed state once again by the resilient force of the compression springs 3 that are now compressed.

[0024] It may be so arranged by using a one-way clutch or some other means (not shown) that the damping effect of the damper mechanism 8 becomes effective only when the door is closed. Then, the closing motion of the door will proceeds more slowly and smoothly than ever. As a matter of course, it may alternatively be so arranged that the damping effect of the damper mechanism 8 is effective both when the door is closed and when it is opened. Then, while the resilient force of the compression springs 3 may exert an effect of braking the door opening motion, the effect of the damping mechanism for encouraging the door opening motion can be maximized by appropriately adjusting it. Then, the use of a one-way clutch is not necessary.

[0025] Additionally, as the spring holder/slider 4 is pushed and moved downward by the compression springs 2, it hits the stoppers 2t of the lateral guide grooves 2s before the door gets to the completely open state from the closed state of FIG. 15, when the resilient force of the compression springs 3 no longer affects the rotary arm 6.

[0026] Then, as a result, the upswing door 1d is com-

pletely released from the damper mechanism so that the user can easily push the door 1d on the top wall 1a from the state of FIG. 16. Meanwhile, as described above, the spring holder/slider 4 is provided with the downwardly open grooves 4g that are relatively long and the pin 5a is located at the uppermost positions in the grooves 4g when the door 1d is in the state of FIG. 16. However, as the door is pushed by hand, the pin 5a gradually moves downward in the grooves 4g to allow the upswing door 1d to be pushed until it becomes completely at rest on the top wall 1a as shown in FIG. 17 because the outer rail 1i slides relative to the inner rail if.

[0027] It may be needless to say that the above described effect of encouraging the opening motion of the door can be realized when a damper mechanism 8 having the above described configuration is used for the door damper unit A.

SUMMARY OF THE INVENTION

[0028] With a cabinet with an upswing door having a configuration as described above, the upswing door 1d can be easily moved to open and placed at rest on the top wall 1a under the effect of the door damper unit A. It can also be closed softly from the rest position on the top wall 1a under the effect of the door damper unit A. However, it has a drawback that the upswing door 1d cannot be opened nor closed simply by swingably fitting the upswing door 1 to the to wall 1a of the cabinet main body by means of a hinge 1c but a costly slide rail assembly 1e has to be buried in the rear surface of the door 1d and the inner rail 1f of the slide rail assembly 1e has to be linked to the hinge 1c.

[0029] Additionally, since the slide rail assembly 1e is buried in the rear surface of the upswing door 1d, the latter has to be made very flat. In other words, an upswing door having a curved profile cannot be used for such a cabinet. Then, the cabinet main body 1 is required to show a simple rectangularly parallelepipedic profile having an opening 1j to be closed by the upswing door 1d as shown in FIGS. 15 through 17. Since the opening 1j is located at the front of the cabinet and its size is limited, the user may feel it inconvenient to access the inside of the cabinet.

[0030] In view of the above identified problems of the prior art, therefore an of the invention is to provide a cabinet with an upswing door, wherein the door is not simply suspended from the top wall of the cabinet main body when it is closed as in the case of the above described known cabinet but one or more than one of the walls of the cabinet main body is made to provide part of the opening of the cabinet and the closure of the opening of the cabinet is realized by sequentially linking a plurality of wall plates including the upswing door to the stationary part of the cabinet main body with a plurality of hinges and by using a simple metal arm unit for articulating the cabinet main body and the upswing door so that the plurality of wall plates can be placed at rest as they are folded one on the other on the top wall of the cabinet main body. This object is achieved by the arrangement as defined in claim 1 of the appended claims. The arrangement does not involve the use of a slider rail and hence allows a remarkable cost reduction and an easy access to the inside of the cabinet.

[0031] According to the invention, the arrangement defined in claim 1 may be modified in various different ways. Therefore, another object of the present invention is to provide an arrangement as defined in claim 2 of the appended claims, wherein the top wall of the cabinet main body is divided into a fixed rear top wall located close to the rear wall and a movable front top wall to be used as part of the closure and the movable top wall is liked to the fixed top wall at an edge thereof by means of a top wall hinge so as to become vertically swingable and also to the upswing door at the other edge or the free edge thereof by means of a door hinge.

[0032] Still another object of the invention is to provide an arrangement as defined in claim 3 of the appended claims, wherein the upswing door is divided into an upper door and a lower door and the upper door is linked to the top wall by means of a hinge and also to the lower door by means of another hinge, or door link hinge, so that the upper and lower doors are suspended from the top wall when they are dosed.

[0033] Still another object of the invention is to provide an arrangement as defined in claim 4 of the appended claims, wherein the top wall is made shorter than the bottom wall to make part of the opening of the cabinet main body inclined while the door is divided into an upper door for closing the inclined part of the opening and a lower door for closing the vertical part of the opening and the upper door is linked to the top wall by means of a door hinge and also to the lower door by means of a door link hinge so that the upper and lower doors are suspended from the top wall then they are closed.

[0034] Still another object of the invention is to provide an arrangement as defined in claim 5 of the appended claims, wherein the top wall is linked to the rear wall or the lateral walls by means of one or two top wall hinge and also to the upswing door by means of a door hinge so that the upswing door is suspended from the top wall when they are closed.

[0035] Still another object of the invention is to provide an arrangement as defined in claim 6 of the appended claims, wherein a known door damper unit as described above in detail is secured to the inner surface of one of the lateral walls of the cabinet main body and linked to the upswing door by way of the rotary arm thereof while the top wall of the cabinet main body is divided into a fixed rear top wall located dose to the rear wall and a movable front top wall to be used as part of the closure and the movable top wall is liked to the fixed top wall by means of a top wall hinge so as to become vertically swingable and also to the upswing door at the free edge thereof by means of a door hinge in a manner as described above by referring to claim 2.

[0036] With this arrangement, when the door is full open, the movable top wall and the upswing door are sequentially placed at rest on the fixed top wall without using a conventional slide rail assembly so that the cabinet can be manufactured at low cost and allows an easy access to the user because part of the top wall is made open and placed on the fixed top wall to significantly expand the opening of the cabinet.

[0037] Still another object of the invention is to provide an arrangement as defined in claim 7 of the appended claims, wherein the door damper unit of the arrangement according to claim 6 is additionally provided with a damper mechanism having a configuration as described earlier so that the upswing door can be moved to become open and closed more softly than its counterpart of the arrangement according to claim 6. A further object of the invention is to provide an arrangement as defined in claim 8 of the appended claims, wherein the door damper unit of the arrangement according to claim 6 is additionally provided with grooves with and without stoppers so that so that the upswing door can be moved slowly by hand when it is placed at rest on the fixed top wall of the cabinet main body, whereas the closing motion of the upswing door can be triggered with little effort by hand so that the cabinet may be used highly conveniently.

[0038] A further object of the invention is to provide an arrangement as defined in claim 9 of the appended claims, wherein the door damper unit of the arrangement according to claim 8 is additionally provided with a damper mechanism as described earlier so that the upswing door can be moved to become open and closed more softly than its counterpart of the arrangement according to claim 8.

[0039] Still another object of the invention is to provide an arrangement as defined in claim 10 of the appended claims, wherein a door damper unit is used as in the case of the arrangement according to claim 6 while the upswing door is divided into an upper door and a lower door and the upper door is linked to the top wall by means of a hinge and also to the lower door by means of another hinge, or door link hinge, so that the upper and lower doors are folded one on the other and placed at rest on the top wall when the upswing door is fully opened as in the case of the arrangement according to claim 3. Then, the use of a slide rail assembly is no longer necessary so that the manufacturing cost can be remarkably reduced and the door damper unit is prevented from projecting forwardly from the opening of the cabinet main body to allow an easy access to the user.

[0040] The objects of providing arrangements as defined in claims, 11 through 13 are respectively similar to those of the arrangements according to claims 7 through 9 as described above in terms of claim 6.

[0041] Still another object of the invention is to provide an arrangement as defined in claim 14 of the appended claims, wherein a door damper unit is used as in the case of the arrangement according to claim 6 and the top wall is made shorter than the bottom wall to make part of the opening of the cabinet main body inclined while the door is divided into an upper door for closing the inclined part of the opening and a lower door for closing the vertical part of the opening and the upper door is linked to the top wall by means of a door hinge and also to the lower door by means of a door link hinge so that the upper and lower doors are folded and placed at rest on the top wall when they are fully opened as in the case of the arrangement according to claim 4. This arrangement also eliminates the use of a slide rail assembly and provides an easy access to the user.

[0042] The objects of providing arrangements as defined in claims 15, 16 and 17 are respectively similar to those of the arrangements according to claims 11, 12 and 13 as described above in terms of claim 10, which are achieved by adding respectively a damper mechanism, guide grooves with and without stoppers and a damper mechanism to the arrangement according to claim 9.

[0043] Still another object of the invention is to provide an arrangement as defined in claim 18 of the appended claims, wherein the top wall is linked to the rear wall or the lateral walls by means of one or two top wall hinge and also to the upswing door by means of a door hinge so that the upswing door is suspended from the top wall when they are closed as in the case of the arrangement according to claim 5 and, additionally, the door damper unit is fitted to a lateral wall at a position close to the rear wall. With this arrangement, the use of a slide rail assembly is no longer necessary and the movable top wall and the upswing door are placed at a position close to the rear wall to face each other and project upward from the top opening so that the cabinet allows a maximally easy access to the user.

[0044] The objects of providing arrangements as defined in claims 19 through 21 are respectively similar to those of the arrangements according to claims 7 through 9 as described above in terms of claim 6.

[0045] Thus, according to claim 1, the above object is achieved by providing a cabinet comprising a cabinet main body, an upswing door and a metal arm unit for opening and closing the cabinet secured to said cabinet main body and said upswing door, the closure of the cabinet being formed by sequentially linking a plurality of wall plates including said vertically rotatable upswing door to the stationary part of the cabinet main body by means of a plurality of hinges so as to make the closure to completely close the opening of the cabinet with the upswing door suspended from above, said metal arm unit for opening and closing the cabinet including a fitting section rigidly secured to the inner surface of a lateral wall of the cabinet main body and a rotary arm linked at an end thereof to said fitting section by means of a shaft and at the free end thereof to said upswing door by means of a pin so as to pivot on the opposite ends thereof, a vertical motion of opening said upswing door from the closed position causing said linked wall plates to be

folded by way of said plurality of hinges and placed at rest as layers on said stationary part of the cabinet main body to fully open the cabinet.

[0046] According to claim 2, there is provided a cabinet comprising a cabinet main body, an upswing door and a metal arm unit for opening and closing the cabinet secured to said cabinet main body and said upswing door, said cabinet main body having a bottom wall, a pair of lateral walls, a rear wall and a top wall, said top wall being divided into a fixed rear top wall and a movable front top wall linked to said fixed rear top wall by means of a top wall hinge so as to be vertically swingable, said upswing door being linked to the front edge of said movable front top wall by means of a door hinge so as to be suspended therefrom to close the opening of said cabinet main body, said metal arm unit for opening and closing the cabinet including a fitting section rigidly secured to the inner surface of a lateral wall of the cabinet main body and a rotary arm linked at an end thereof to said fitting section by means of a shaft and at the free end thereof to said upswing door by means of a pin so as to pivot on the opposite ends thereof, a vertical motion of opening said upswing door from the closed position causing said movable top wall and said upswing door to be sequentially folded respectively by way of said top wall hinge and said door hinge and placed at rest as layers on said fixed wall to fully open the cabinet.

[0047] According to claim 3, there is provided a cabinet comprising a cabinet main body, an upswing door and a metal arm unit for opening and closing the cabinet secured to said cabinet main body and said upswing door, said cabinet main body having a bottom wall, a pair of lateral walls, a rear wall and a top wall, said upswing door including an upper door linked to the front edge of said front wall by means of a door hinge so as to be suspended therefrom to close the opening of said cabinet main body and a lower door linked to said upper door by means of a door link hinge so as to be suspended therefrom and swingable to also open and close the opening of said cabinet main body, said metal arm unit for opening and closing the cabinet including a fitting section rigidly secured to the inner surface of a lateral wall of the cabinet main body and a rotary arm linked at an end thereof to said fitting section by means of a shaft and at the free end thereof to said lower door of said upswing door by means of a pin so as to pivot on the opposite ends thereof, a vertical motion of opening said upswing door from the closed position causing said upper door and said lower door of said upswing door to be sequentially folded respectively by way of said door hinge and said door link hinge and placed at rest as layers on said top wall to fully open the cabinet.

[0048] According to claim 4, there is provided a cabinet comprising a cabinet main body, an upswing door and a metal arm unit for opening and closing the cabinet secured to said cabinet main body and said upswing door, said cabinet main body having a bottom wall, a pair of lateral walls, a rear wall and a top wall shorter than the bottom wall to make part of the opening of the cabinet main body inclined, said upswing door being divided into an inclined upper door for closing the inclined part of the opening linked to the front edge of said short top wall by means of a door hinge and a lower door for closing the vertical part of the opening linked to said inclined upper door by means of a door link hinge so as to be suspended therefrom and swingable to open and close the opening, said metal arm unit for opening and closing the cabinet including a fitting section rigidly secured to the inner surface of a lateral wall of the cabinet main body and a rotary arm linked at an end thereof to said fitting section by means of a shaft and at the free end thereof to said lower door of said upswing door by means of a pin so as to pivot on the opposite ends thereof, a vertical motion of opening said upswing door from the closed position causing said inclined upper door and said lower door of said upswing door to be sequentially folded respectively by way of said door hinge and said door link hinge and placed at rest as layers on said short top wall to fully open the cabinet.

[0049] According to claim 5, there is provided a cabinet comprising a cabinet main body, an upswing door and a metal arm unit for opening and closing the cabinet secured to said cabinet main body and said upswing door, said cabinet main body having a bottom wall, a pair of lateral walls, a rear wall and a top wall linked to said rear wall or said lateral walls by means of one or two top wall hinge so as to be swingable to open and close the top opening of the cabinet main body, said upswing door being linked to the front edge of said upswing top wall by means of a door hinge so as to be suspended therefrom and swingable to open and close the front opening of the cabinet main body, said metal arm unit for opening and closing the cabinet including a fitting section rigidly secured to the inner surface of rear part of a lateral wall of the cabinet main body and a rotary arm linked at an end thereof to said fitting section by means of a shaft and at the free end thereof to said upswing door by means of a pin so as to pivot on the opposite ends thereof, a vertical motion of opening said upswing door from the closed position causing said upswing top wall and said upswing door to be folded to face each other and held upright at a rear part of the top opening to fully open the cabinet.

[0050] According to claim 6, there is provided a cabinet comprising a cabinet main body, an upswing door and a door damper unit for opening and closing the cabinet secured to said cabinet main body and said upswing door, said cabinet main body having a bottom wall, a pair of lateral walls, a rear wall and a top wall, said top wall being divided into a fixed rear top wall and a movable front top wall linked to said fixed rear top wall by means of a top wall hinge so as to be vertically swingable, said upswing door being linked to the front edge of said movable front top wall by means of a door hinge so as to be suspended therefrom to close the opening of said cabinet main body, said door damper unit for open-

ing and closing the cabinet including a fitting case rigidly secured to the inner surface of a lateral wall of the cabinet main body, a spring holder/slider contained slidably in said fitting case and urged by compression springs, a link arm rotatably linked at and end thereof to said spring holder/slider by means of a pin and a rotary arm including a rotary base rotatably linked to said fitting case by means of an arm shaft and holding the other end of said link arm at a position close to said arm shaft by means of a pin so as to allow said arm shaft to pivot thereon and an arm section extending from said rotary base and linked at the front end thereof to said upswing door by means of a pin so as to pivot thereon, the position of the pin for allowing said link arm to pivot on said base section of said rotary arm being so selected as to accelerate a vertical motion of opening said upswing door from the closed position to the open position and causing said movable front top wall and said upswing door to be sequentially folded and placed at rest on the fixed rear top wall by the resilient force of said compression springs.

[0051] According to claim 7, there is provided a cabinet as defined in claim 6, wherein said arm shaft is linked to the rotary shaft of a damper mechanism arranged in the fitting case and adapted to exert a braking force to said upswing door being closed or opened by means of the viscous fluid contained therein.

[0052] According to claim 8, there is provided a cabinet as defined in claim 6, wherein the difference therefrom exists firstly in that said spring holder/slider of said door damper unit is contained slidably in said fitting case so as to be moved to a predetermined limit although it is urged by compression springs and secondly in that the position of the pin for allowing said link arm to pivot on said base section of said rotary arm being so selected as to accelerate a vertical motion of opening said upswing door from the closed position to the open position for said movable front top wall and said upswing door to be sequentially folded and placed at rest on the fixed rear top wall by the resilient force of said compression springa in the initial stage but to eliminate the accelerating effect of the resilient force of said compression springs by said fitting case at said predetermined limit and cause said pin to idly move in the groove of said spring holder/slider from the pivot position by a required length and allow the opening motion of the upswing door to continue in the final stage.

[0053] According to claim 9, there is provided a cabinet as defined in claim 8, wherein said arm shaft is linked to the rotary shaft of the damper mechanism arranged in the fitting case and adapted to exert a braking force to the upswing door being opened or closed by means of the viscous fluid contained therein.

[0054] According to claim 10, there is provided a cabinet comprising a cabinet main body, an upswing door and a door damper unit for opening and closing the cabinet secured to said cabinet main body and said upswing door, said cabinet main body having a bottom wall, a pair of lateral walls, a rear wall and a top wall, said upswing door including an upper door linked to the front edge of said front wall by means of a door hinge so as to be suspended therefrom to close the opening of said cabinet main body and a lower door linked to said upper door by means of a door link hinge so as to be suspended therefrom and swingable to also open and close the opening of said cabinet main body, said door damper unit for opening and closing the cabinet including a fitting case rigidly secured to the inner surface of a lateral wall of the cabinet main body, a spring holder/slider contained slidably in said fitting case and urged by compression springs, a link arm rotatably linked at and end thereof to said spring holder/slider by means of a pin and a rotary arm including a rotary base rotatably linked to said fitting case by means of an arm shaft and holding the other end of said link arm at a position close to said arm shaft by means of a pin so as to allow said arm shaft to pivot thereon and an arm section extending from said rotary base and linked at the front end thereof to said upswing door by means of a pin so as to pivot thereon, the position of the pin for allowing said link arm to pivot on said base section of said rotary arm being so selected as to accelerate a vertical motion of opening said upswing door from the closed position and causing said upper door and said lower door of said upswing door to be sequentially folded respectively by way of said door hinge and said door link hinge and placed at rest as layers on said top wall to fully open the cabinet by the resilient force of said compression springs.

[0055] According to claim 11, there is provided a cabinet as defined in claim 10, wherein said arm shaft is linked to the rotary shaft of a damper mechanism arranged in the fitting case and adapted to exert a braking force to said upswing door being closed or opened by means of the viscous fluid contained therein.

[0056] According to claim 12, there is provided a cabinet as defined in claim 10, wherein the difference therefrom exists firstly in that said spring holder/slider of said door damper unit is contained slidably in said fitting case so as to be moved to a predetermined limit although it is urged by compression springs and secondly in that the position of the pin for allowing said link arm to pivot on said base section of said rotary arm being so selected as to accelerate a vertical motion of opening said upswing door from the closed position to the open position for said movable front top wall and said upswing door to be sequentially folded and placed at rest on the fixed rear top wall by the resilient force of said compression springs in the initial stage but to eliminate the accelerating effect of the resilient force of said compression springs by said fitting case at said predetermined limit and cause said pin to idly move downward in the groove of said spring holder/slider from the pivot position by a required length and allow the opening motion of the upswing door to continue in the final stage. It will be seen that the relationship between claim 12 and claim 10 is identical with the relationship between claim 8 and claim

6.

[0057] According to claim 13, there is provided a cabinet as defined in claim 12, wherein said arm shaft is linked to the rotary shaft of the damper mechanism arranged in the fitting case and adapted to exert a braking force to the upswing door being opened or closed by means of the viscous fluid contained therein.

[0058] According to claim 14, there is provided a cabinet comprising a cabinet main body, an upswing door and a door damper unit for opening and closing the cabinet secured to said cabinet main body and said upswing door, said cabinet main body having a bottom wall, a pair of lateral walls, a rear wall and a top wall shorter than the bottom wall to make part of the opening of the cabinet main body inclined, said upswing door being divided into an inclined upper door for closing the inclined part of the opening linked to the front edge of said short top wall by means of a door hinge and a lower door for closing the vertical part of the opening linked to said inclined upper door by means of a door link hinge so as to be suspended therefrom and swingable to open and close the opening, said door damper unit for opening and closing the cabinet including a fitting case rigidly secured to the inner surface of a lateral wall of the cabinet main body, a spring holder/slider contained slidably in said fitting case and urged by compression springs, a link arm rotatably linked at and end thereof to said spring holder/slider by means of a pin and a rotary arm including a rotary base rotatably linked to said fitting case by means of an arm shaft and holding the other end of said link arm at a position close to said arm shaft by means of a pin so as to allow said arm shaft to pivot thereon and an arm section extending from said rotary base and linked at the front end thereof to said upswing door by means of a pin so as to pivot thereon, the position of the pin for allowing said link arm to pivot on said base section of said rotary arm being so selected as to accelerate a vertical motion of opening said upswing door from the closed position to the open position and causing said inclined upper door and said lower door of said upswing door to be sequentially folded and placed at rest on the fixed rear top wall by the resilient force of said compression springs.

[0059] According to claim 15, there is provided a cabinet as defined in claim 14, wherein said arm shaft is linked to the rotary shaft of a damper mechanism arranged in the fitting case and adapted to exert a braking force to said upswing door being closed or opened by means of the viscous fluid contained therein as in the case of claims 7 and 10.

[0060] According to claim 16, there is provided a cabinet as defined in claim 14, wherein the difference therefrom exists firstly in that said spring holder/slider of said door damper unit is contained slidably in said fitting case so as to be moved to a predetermined limit although it is urged by compression springs and secondly in that the position of the pin for allowing said link arm to pivot on said base section of said rotary arm being so selected as to accelerate a vertical motion of opening said upswing door from the closed position to the open position for said movable front top wall and said upswing door to be sequentially folded and placed at rest on the fixed rear top wall by the resilient force of said compression springs in the initial stage but to eliminate the accelerating effect of the resilient force of said compression springs by said fitting case at said predetermined limit and cause said pin to idly move downward in the groove of said spring holder/slider from the pivot position by a required length and allow the opening motion of the upswing door to continue in the final stage. It will be seen that the relationship between claim 16 and claim 14 is identical with the relationship between claim 8 and claim 6 and between claim 12 and claim 10.

[0061] According to claim 17, there is provided a cabinet as defined in claim 14, wherein said arm shaft is linked to the rotary shaft of the damper mechanism arranged in the fitting case and adapted to exert a braking force to the upswing door being opened or closed by means of the viscous fluid contained therein as described above by referring to claims 9 and 13.

[0062] According to claim 18, there is provided a cabinet comprising a cabinet main body, an upswing door and a door damper unit for opening and closing the cabinet secured to said cabinet main body and said upswing door, said cabinet main body having a bottom wall, a pair of lateral walls, a rear wall and a top wall linked to said rear wall or said lateral walls by means of one or two top wall hinge so as to be swingable to open and close the top opening of the cabinet main body, said upswing door being linked to the front edge of said upswing top wall by means of a door hinge so as to be suspended therefrom and swingable to open and close the front opening of the cabinet main body, said door damper unit for opening and closing the cabinet including a fitting case rigidly secured to the inner surface of rear part of a lateral wall of the cabinet main body, a spring holder/slider contained slidably in said fitting case and urged by compression springs, a link arm rotatably linked at and end thereof to said spring holder/slider by means of a pin and a rotary arm including a rotary base rotatably linked to said fitting case by means of an arm shaft and holding the other end of said link arm at a position close to said arm shaft by means of a pin so as to allow said arm shaft to pivot thereon and an arm section extending from said rotary base and linked at the front end thereof to said upswing door by means of a pin so as to pivot thereon, the position of the pin for allowing said link arm to pivot on said base section of said rotary arm being so selected as to accelerate a vertical motion of opening said upswing door from the closed position to the open position and causing said upswing top wall and said upswing door to be folded to face each other and held upright at a rear part of the top opening by the resilient force of said compression springs.

[0063] According to claim 19, there is provided a cabinet as defined in claim 18, wherein said arm shaft is

linked to the rotary shaft of a damper mechanism arranged in the fitting case and adapted to exert a braking force to said upswing door being closed or opened by means of the viscous fluid contained therein as in the case of claims 7,10 and 15.

[0064] According to claim 20, there is provided a cabinet as defined in claim 18, wherein the difference therefrom exists firstly in that said spring holder/slider of said door damper unit is contained slidably in said fitting case so as to be moved to a predetermined limit although it is urged by compression springs and secondly in that the position of the pin for allowing said link arm to pivot on said base section of said rotary arm being so selected as to accelerate a vertical motion of opening said upswing door from the closed position to the open position for said movable front top wall and said upswing door to be sequentially folded and placed at rest on the fixed rear top wall by the resilient force of said compression springs in the initial stage but to eliminate the accelerating effect of the resilient force of said compression springs by said fitting case at said predetermined limit and cause said pin to idly move downward in the groove of said spring holder/slider from the pivot position by a required length and allow the opening motion of the upswing door to continue in the final stage. It will be seen that the relationship between claim 16 and claim 14 is identical with the relationship between claim 8 and claim 6, between claim 12 and claim 10 and between claim 16 and 14.

[0065] According to claim 21, there is provided a cabinet as defined in claim 18, wherein said arm shaft is linked to the rotary shaft of the damper mechanism arranged in the fitting case and adapted to exert a braking force to the upswing door being opened or closed by means of the viscous fluid contained therein as described above by referring to claims 9, 13 and 17.

BRIEF DESCRIPTION OF THE DRAWINGS

[0066] FIGS. 1A and 1B are schematic longitudinal cross sectional views of an embodiment of cabinet according to claims 1 and 2 of the present invention, illustrating respectively a state where the door is closed and a state where the door is fully opened.

[0067] FIG. 2 is a schematic longitudinal cross sectional view of the embodiment of FIGS. 1A and 1 B, illustrating an initial stage of an operation of opening the door.

[0068] FIG. 3 is a schematic longitudinal cross sectional view of the embodiment of FIGS. 1A and 1 B, illustrating a final stage of an operation of opening the door.

[0069] FIGS. 4A and 4B are schematic longitudinal cross sectional views of an embodiment of cabinet according to claims 1 and 3 of the present invention, illustrating respectively a state where the door is closed and a state where the door is fully opened.

[0070] FIGS. 5A and 5B are schematic longitudinal cross sectional views of an embodiment of cabinet according to claims 1 and 4 of the present invention, illustrating respectively a state where the door is closed and a state where the door is fully opened.

[0071] FIGS. 6A and 6B are schematic longitudinal cross sectional views of an embodiment of cabinet according to claims 1 and 5 of the present invention, illustrating respectively a state where the door is closed and a state where the door is fully opened.

[0072] FIGS. 7A and 7B are schematic longitudinal cross sectional views of the embodiment of FIGS. 6A and 6B, illustrating respectively an initial stage and a final stage of an operation of opening the door.

[0073] FIGS. 8A and 8B are schematic longitudinal cross sectional views of an embodiment of cabinet according to any of claims 1 through 4 of the present invention, illustrating respectively a state where the door is closed and a state where the door is fully opened.

[0074] FIG. 9 is a schematic longitudinal cross sectional view of the embodiment of FIGS. 8A and 8B, illustrating an initial stage of an operation of opening the door.

[0075] FIG. 10 is a schematic longitudinal cross sectional view of the embodiment of FIGS. 8A and 8B, illustrating a final stage of an operation of opening the door.

[0076] FIGS. 11A and 1B are schematic longitudinal cross sectional views of an embodiment of cabinet according to any of claims 5 through 8 of the present invention, illustrating respectively a state where the door is closed and a state where the door is fully opened.

[0077] FIGS. 12A and 12B are schematic longitudinal cross sectional views of an embodiment of cabinet according to any of claims 9 through 12 of the present invention, illustrating respectively a state where the door is closed and a state where the door is fully opened.

[0078] FIGS. 13A and 13B are schematic longitudinal cross sectional views of an embodiment of cabinet according to any of claims 13 through 16 of the present invention, illustrating respectively a state where the door is closed and a state where the door is fully opened.

[0079] FIGS. 14A and 14B are schematic longitudinal cross sectional views of an embodiment of cabinet according to claims 1 and 2 of the present invention, illustrating respectively an initial stage and a final stage of an operation of opening the door.

[0080] FIG. 15 is a schematic partially cut out longitudinal cross sectional view of a known cabinet with an upswing door, illustrating a state where the door is closed.

[0081] FIG. 16 is a schematic partially cut out longitudinal cross sectional view of the known cabinet of FIG. 15, illustrating a final stage of an operation of opening the door.

[0082] FIG. 17 is a schematic partially cut out longitudinal cross sectional view of the known cabinet of FIG. 15, illustrating a state where the door is fully opened.

[0083] FIG. 18 is an exploded schematic perspective

view of the door damper unit used in the known cabinet of FIG. 15 and also applicable to the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0084] Now, the present invention will be described by referring to the accompanying drawings that illustrates preferred embodiments of the invention.

[0085] Referring firstly to FIGS. 1A and 1B schematically illustrating an embodiment of cabinet according to claim 1, it comprises a cabinet main body 10 provided with a upswing door 10a and a metal arm unit B for opening and closing the cabinet that is rigidly secured to the cabinet main body and the upswing door. The stationary part 10A of the cabinet main body 10 is formed by a bottom wall 10b, a pair of lateral walls 10c, a rear wall 10d and a rear part 10f of the top wall 10e, which is also referred to as fixed rear top wall.

[0086] The closure of the cabinet for closing the opening 10i of said stationary part 10A of the cabinet main body 10A is formed by sequentially linking a plurality of wall plates including said vertically rotatable upswing door 10a to the stationary part 10A of the cabinet main body 10 by means of a plurality of hinges so as to make the closure to completely close the opening 10i of the cabinet main body 10 with the upswing door 10a suspended from above.

[0087] Said metal arm unit B for opening and closing the cabinet main body 10 includes a fitting section B1 rigidly secured to the inner surface 10m of a lateral wall of the cabinet main body 10 and a rotary arm B3 linked at an end thereof to said fitting section by means of a shaft B2 and at the free end thereof to said upswing door 10a by means of a pin B5 so as to pivot on the opposite ends thereof.

[0088] Additionally, according to claim 2, it is so arranged that a vertical motion of opening said upswing door 10a from the closed position causes said linked wall plates including a front part 10k of the top wall 10h which is also referred to as movable rear top wall 10k and the upswing door 10a to be folded by way of said plurality of hinges including a top wall hinge 10g and a door hinge 10k placed at rest as layers on said stationary part 10A of the cabinet main body 10. The expression of "to be placed at rest" refers to a state where the movable front top wall 1 Oh and the upswing door 1 Oa are folded along the top wall hinge 10g and the door hinge 10k and sequentially placed on the fixed rear top wall 10f by the operation of opening the upswing door 10a as shown in FIGS. 1A through 3 illustrating the embodiment according to claim 2.

[0089] While FIGS. 1A through 3 illustrates an embodiment of cabinet with a upswing door according to claim 2, they can be used to describe claims 3 through 5.

[0090] In a cabinet according to claim 3, the stationary part 10a of the cabinet is identical with the cabinet main body 10 and formed by a bottom wall 10b, a pair of lateral walls 10c, a rear wall 10d and a top wall 10e. However, unlike a cabinet according to claim 2, the plurality of hinges include a door hinge 10k and a door link hinge 10r and the plurality of wall plates includes an upper door 10p and a lower door 10q belonging to the upswing door 10a.

[0091] The upper door 10p is linked to and suspended from the front edge 10n of the top wall 10e of the cabinet main body 10 by means of the door hinge 10k and the lower door 10q is linked to and suspended from the lower edge of the upper door p by means of the door link hinge 10r so that the opening 10i of the cabinet main body 10 can be opened and closed by operating the upswing door 10a.

[0092] As described above by referring to claim 1, the metal arm unit B for opening and closing the cabinet main body 10 includes a fitting section B1 rigidly secured to the inner surface 10m of a lateral wall of the cabinet main body 10 and a rotary arm B3 linked at an end thereof to said fitting section by means of a shaft B2 and at the free end thereof to said upswing door 10a by means of a pin B5 so as to pivot on the opposite ends thereof. Thus, a vertical motion of opening said upswing door 10a from the closed position causes said linked wall plates including said upper door 10p and said lower door 10q of the top wall 10h which is also referred to as movable rear top wall 10k and the upswing door 10a to be folded by way of said plurality of hinges including said door hinge 10k and said door link hinge 10r placed at rest as layers on the top wall 10e of said stationary part 10A.

[0093] Now, a cabinet according to claim 4 will be described by referring to FIGS. 5A and 5B. The stationary part of the cabinet main body 10 of this cabinet is formed by a bottom wall 10b, a pair of lateral walls 10c, a rear wall 10d and a top wall 10s shorter than the bottom wall 10b and linked to the rear wall 10c to define an inclined part of the opening whereas the upswing door is formed by an upper door 10t for closing the inclined part of the opening and a lower door 10q for closing the vertical part of the opening. Thus, again, said plurality of hinges includes a door hinge 10k and a door link hinge 10r.

[0094] More specifically, the upper door 10t is linked to and obliquely suspended from the front edge of the short top wall 10s by means of the door hinge 10k so that, when closed, it lies on the inclined edges 10u of the lateral walls while the lower door 10q is linked to and suspended from the lower edge of the upper door 10 by means of the door link hinge 10r.

[0095] In the above described cabinet, again, the metal arm unit B is arranged to link the cabinet main body 10 and the upswing door 10a so that a vertical motion of opening the lower door 10q of the upswing door 10a from the closed position causes the upper door 10t and the lower door 10q of the to be sequentially folded respectively by way of the door hinge 10k and the door link hinge 10r and placed at rest as layers on the short top wall 10s to fully open the cabinet.

[0096] Now, a cabinet according to claim 5 will be described by referring to FIGS. 6A, 6B, 7A and 7B. As shown, the cabinet comprises an upswing door 10a, a cabinet main body 10 and a metal arm unit B and the stationary part 10A of the cabinet main body 10 is formed by a bottom wall 10b, a pair of lateral walls 10c and a rear wall 10d and the plurality of hinges include one or two top wall hinges 10w and a door hinge 10k, whereas the plurality of wall plates include a rotatable top wall 10v and a upswing door 10a.

[0097] The rotatable top wall 10v is swingably linked to the rear wall 10d or the lateral walls 10c by means of the top wall hinge(s) 10w as part of the closure for closing the top opening 10x of the cabinet main body 10 while the upswing door 10a is linked to and suspended from the front edge 10y of the rotatable top wall 10v by means of the door hinge 10k as the remaining part of the closure for closing the front opening 10i of the cabinet main body 10.

[0098] While the metal arm unit B of this cabinet has a configuration substantially similar to the above described ones, it includes a fitting section B1 rigidly secured to the inner surface 10m of rear part of a lateral wall 10d of the cabinet main body. Thus, a vertical motion of opening the upswing door 10a from the closed position causes the rotatable top wall 10v and the upswing door 10a to be folded to face each other and held upright at a rear part of the top opening 10x located close to the rear wall 10d to fully open the cabinet. Therefore, when the closure including the rotatable top wall 10v and the upswing door 10a are fully opened as shown in FIG. 7B, the user can access the inside of the cabinet through not only the front opening 10i but also the top opening 10x of the cabinet main body 10 and fully utilize the internal space of the stationary part 10A.

[0099] While a cabinet with an upswing door according to any of claims 6 through 21 as described hereinafter comprises a cabinet main body 10 having a configuration as defined in the corresponding one of claims 2 through 5, they use not a metal arm unit B as described above but a door damper unit as described earlier by referring to a known cabinet. Thus, the same reference symbols will be used to respectively denotes the same components thereof and the door damper unit will not be described any further.

[0100] Firstly, a cabinet with an upswing door according to claim 6 will be described by referring to FIGS. 8A, 8B, 9 and 10. It comprises a cabinet main body 10, an upswing door 10a and a door damper unit A fitted to them. The cabinet main body 10 is formed by a bottom wall 10b, a pair of lateral walls 10c, a real wall 20d and a top wall 10e.

[0101] As described above by referring to claim 2, the top wall is divided into a fixed rear top wall 10f rigidly secured tot he lateral walls 10c and the rear wall 10d and a movable front top wall 10h linked to the fixed rear top wall 10f by means of a top wall hinge 10g so as to be operated to close and open the front top opening of the cabinet main body 10.

[0102] Then, the upswing door 10a is linked to and suspended from the front edge 10j of the movable front top wall 10h located at the top of the opening 10i of the cabinet main body 10 by means of the door hinge 10k.

[0103] More specifically, referring to FIG. 8A, the axis of rotation of the top wall hinge 10g is located along the upper front edge of the fixed rear top wall whereas that of the door hinge 10k is located along the lower front edge of the movable front top wall.

[0104] The door damper unit A for opening and closing the cabinet includes a fitting case 2 rigidly secured to the inner surface 10m of a lateral wall 10c of the cabinet main body 10, a spring holder/slider 4 contained slidably in the fitting case 2 and urged by compression springs 3, a link arm 5 rotatably linked at an end thereof, or the upper end in FIG. 8A, to said spring holder/slider by means of a pin 5a and a rotary arm 6 rotatably linked to the fitting case 2 at a lower part in FIG. 8A by means of an arm shaft 6a. The rotary arm 6 includes a rotary base 6b rotatably linked to the fitting case 2 by means of the an arm shaft 6a and holding the other end of the link arm 5 at a position close to the arm shaft 6a by means of a pin 6d so as to allow the arm shaft 6a to pivot thereon and an arm section 6c extending from the rotary base 6b and linked at the front end thereof to the upswing door 10a by means of an arm holder 7 and a pin 6d so as to pivot thereon.

[0105] When the door is closed as shown in FIG. 8A, the pivot P of the link arm 5 where it is linked to the base section 6b of the rotary arm 6 by means of the pin 5b is located closer to the upswing door 10a relative to the vertical line L connecting the pin 5a and the arm shaft 6a. As a result, the compression springs 3 are in a compressed state to exert their resilient force in the sense of arrow R2 to hold the upswing door 10a to the closed state.

[0106] While the force holding the door 10a to the closed state may not be necessary depending on the circumstances. However, according to the invention, the position of the pivot P is so selected that, when the movable front top plate 10h and the upswing door 10a are folded along the top wall hinge 10g and the door hinge 10k and sequentially placed at rest on the fixed rear top wall 10f to completely open the cabinet, the motion of closing the closure is accelerated by the resilient force of the compression springs 3 so that the user can easily and comfortably open the closure.

[0107] More specifically, when the closed door is partly opened by hand to the state as illustrated in FIG. 9, the movable front top wall 10h and the upswing door 10a intersect each other with an obtuse angle. When the door is opened further to the state as shown in FIG. 10, the movable front top wall 10h and the upswing door 10a come to intersect each other with an acute angle and thereafter the motion of opening the door is completed as shown in FIG. 8B.

[0108] Therefore, according to the invention, the up-

swing door 10a can be operated to become open and closed without arranging a slide rail assembly on the rear surface of the upswing door unlike the above described conventional cabinets and, additionally, the upswing door 10a can be laid flat above the opening 10i to allow an easy and convenient access to the user.

[0109] A cabinet according to claim 7 has a cabinet main body 10 having a configuration same as the above described cabinet according to claim 6 but differs from the latter in that the door damper unit A is provided with a damper mechanism 8 for urging the upswing door in a manner as described earlier by referring to FIG. 18.

[0110] Therefore, as described above by referring to a known cabinet provided with a door damper, it may be so arranged by using a one-way clutch or some other means that the damping effect of the damper mechanism 8 becomes effective only when the door is closed. Then, the closing motion of the door will proceeds more slowly and smoothly than that its counterpart according to claim 6. As a matter of course, it may alternatively be so arranged that the damping effect of the damper mechanism 8 is effective both when the door is closed and when it is opened. Then, while the resilient force of the compression springs 3 may exert an effect of braking the door opening motion, the effect of the damping mechanism for encouraging the door opening motion can be maximized by appropriately adjusting it.

[0111] A cabinet according to claim 8 has a cabinet main body having a configuration same as that of the above described cabinet according to claim 6. However, its door damper unit A is so arranged that, as the spring holder/slider 4 is pushed and moved downward by the compression springs 3, it does not slide laterally but hits the stoppers 2t of the lateral guide grooves 2s shown in FIG. 18 immediately before the door gets to the completely open state from the closed state, when the resilient force of the compression springs 3 no longer affects the rotary arm 6.

[0112] As a result, the upswing door 10a is completely released from the damper mechanism so that the user can easily operate the door 10a by hand. Then, the pin 5a idly moves downward in the grooves 4g as seen from FIG. 18 until the movable front top wall and the upswing door 10a are sequentially laid on the fixed rear top wall 10f to complete the door closing operation as shown in FIG. 8B.

[0113] When closing the door, it can be operated with a minimal force at first and then moved slowly and downwardly by utilizing the urging force of the compression springs 3.

[0114] A cabinet according to claim 9 differs from the above described cabinet according to claim 8 in that the door damper unit additionally includes a damper mechanism 8 adapted to exert a braking force to the upswing door being opened or closed by means of the viscous fluid contained therein.

[0115] Now, a cabinet according to claim 10 will be described by referring to FIG. 11. It comprises a cabinet main body 10 having a configuration same as that of the above described cabinet according to claim 3.

[0116] More specifically, the cabinet main body 10 is formed by a bottom wall 10b, a pair of lateral walls 10c, a rear wall 10d and a top wall 10e and the upswing door 10 has an upper door 10p and a lower door 10q. The upper door 10p is linked to and suspended from the front edge 10n of the top wall 10e of the cabinet main body 10 by means of the door hinge 10k and the lower door 10q is linked to and suspended from the lower edge of the upper door p by means of the door link hinge 10r so that the opening 10i of the cabinet main body 10 can be opened and dosed by operating the upswing door 10a.

[0117] The axis of rotation of the door hinge 10k is located along the upper front edge of the top wall 10e whereas that of the door link hinge 104 is located along the lower inner edge of the movable front top wall.

[0118] The door damper unit A is fitted to the cabinet main body 10 in a manner as described above by referring to claim 6 but differs from the above description in that the front end of the rotary arm 6 is linked to the lower door 10q of the upswing door 10a by means of an arm holder 7 and a pin 6d.

[0119] The pivot P of the link arm 5 where it is linked to the base section 6b of the rotary arm 6 by means of the pin 5b is so selected that, when the upper door 10p and the lower door 10q of the upswing door 10a are folded along the top wall hinge 10g and the door hinge 10k and sequentially placed at rest on the top wall 10e to completely open the cabinet as shown in FIG. 11B, the motion of closing the upswing door 10a is accelerated by the resilient force of the compression springs 3 so that the user can easily and comfortably open the closure as described above by referring to claim 1.

[0120] It should be noted that in the case of FIGS. 11A and 11B, the pivot P is located slightly away from the upswing door from the vertical line L of the door damper unit A so that the compression springs 3 exert force to the lower door 10q to urge the latter to become closed. When the door is opened, the pivot P is shifted to accelerate the door opening motion as described above by referring to claim 6 so that it is no longer necessary to use a slider rail assembly and the user can easily access the inside of the cabinet main body.

[0121] Claims 11, 12 and 13 depend on claim 10 as claims 7, 8 and 9 depend on claim 6. More specifically, claim 11 defines a damper mechanism 9 added to the door damper unit of a cabinet according to claim 10 and claim 12 defines vertical guide grooves 2s having respective stoppers 2t and oblong grooves 4g added to the door damper unit of a cabinet according to claim 10. Claim 13 defines a damper mechanism 8 added to the door damper unit of a cabinet according to claim 12.

[0122] The cabinet main body 10 of a cabinet according to claim 14 has a configuration same as a cabinet according to claim 4 and differs from those according to claims 6 and 9. More specifically, the cabinet main body 10 is formed by a bottom wall 10b, a pair of lateral walls

10c, a rear wall 10d and a fixed rear top wall 10s and the upswing door 10a is formed by an inclined upper door 10t and a lower door 10q, of which the inclined upper door 10t is linked to and obliquely suspended from the front edge of the fixed rear top wall 10s by means of a door hinge 10k.

[0123] Then, the lower door 10q is linked to and suspended from the lower edge of the inclined upper door 10t by means of a door link hinge 10r.

[0124] Then, a door damper unit A as described above by referring to claim 10 is fitted to the cabinet main body 10 and the pivot P of the link arm 5 where it is linked to the base section 6b of the rotary arm 6 by means of the pin 5b is so selected that, when the inclined upper door 10t and the lower door 10q of the upswing door 10a are folded along the door hinge 10k and the door link hinge 104 and sequentially placed at rest on the top wall 10e to completely open the cabinet by operating the lower door 10q of the upswing door 10a, the motion of closing the upswing door 10a is accelerated by the resilient force of the compression springs 3 so that the user can easily and comfortably open the closure as described above.

[0125] Claims 15 through 17 depend on claim 14 exactly as claims 11 through 13 depend on claim 10 so that they will not be described here any further.

[0126] While a cabinet according to claim 18 has a door damper unit A same as the above described one and the cabinet main body 10 is formed by a bottom wall 10b, a pair of lateral walls 10c and a rear wall 10d. Then, a rotatable top wall 10v is swingably fitted either to the rear wall 10d or the lateral walls 10c by means of one or two top wall hinges 10w to close the top opening 10x, while the upswing door 10a is linked to and suspended from the front edge 10y of the rotatable top wall 10v by means of the door hinge 10k as the remaining part of the closure for closing the front opening 10i of the cabinet main body 10. However, the door damper unit A is located on the inner surface 10m of a lateral wall at a position close to the rear wall 10d unlike the its counterpart of any of the proceeding embodiments.

[0127] The position of the pivot P of the link arm 5 where it is linked to the base section 6b of the rotary arm 6 by means of the pin 5b is so selected that, when the upswing door 10a is opened from the closed position until the rotatable top wall 10v and the upswing door 10a become folded to face each other and held upright at a rear part of the top opening 10x located close to the rear wall 10d to fully open the cabinet, the motion of closing the closure is accelerated by the resilient force of the compression springs 3 so that the user can easily and comfortably open the closure.

[0128] Additionally, when the door is closed as shown in FIG. 13, the arm section 6c of the rotary arm 6 is found to be substantially horizontal and the pivot P is located closer to the rear wall 10d from the vertical line L. The door damper unit is so regulated that the upswing door 10a is opened under this condition and the motion of opening the door is accelerated by the resilient force of the compression springs 3 from the initial stage. When the door opening motion is stopped and held to the state shown in FIG. 14B, the pivot P rotates to approach the vertical line L but still remain closer to the rear wall 10d from the vertical line L so that the upswing door 10a and the rotatable top wall 10v are prevented from falling down.

[0129] Claims 19 through 21 depend on claim 14 exactly as claims 15 through 17 depend on claim 14 so that they will not be described here any further. The effects of a cabinet according to any of claims 18 through 21 is identical with those of a cabinet according to the corresponding one of claims 6 through 9, claims 10 through 14 or claims 14 through 17 and hence they will not be discussed here any further. All of them eliminate the need of using a slide rail assembly and provide an easy access to the inside of the cabinet. Particularly, a cabinet according to any of claims 18 through 21 is advantageous in that not only the front opening 10i but also the top opening 10x can conveniently be used for the user to access the inside of the cabinet.

[0130] As described above in detail, a cabinet according to claim 1 is adapted to use a metal arm unit having a simple configuration and the cabinet main body is formed in a unique way and the closure is formed by linking a plurality of plate by means of a plurality of hinges to eliminate the need of using a slide rail assembly and provide an easy access to the inside of the cabinet.

[0131] A cabinet according to any of claims 2, 3, 4 and 4 is realized by modifying a cabinet according to claim 1 in terms of using a unique stationary part for the cabinet and forming a closure by linking an upper door and a lower door, an inclined upper door and a lower door or a movable top wall and an upswing door, whichever appropriate.

[0132] A cabinet according to claim 6 is realized by dividing the top wall of the cabinet main body into a fixed rear top wall and a movable front top wall and the door damper unit secured to the inner surface of a lateral wall is linked to the upswing door by way of a rotary arm in order to exploit the resilient force of the compression springs contained in the door damper unit. With this arrangement, the need of using a slide rail assembly as in the case of conventional cabinets is totally eliminated to simplify the overall configuration and provide an easy access to the inside of the cabinet.

[0133] A cabinet according to any of claims 7 through 9 is realized by modifying the cabinet according to claim 6. More specifically, a damper mechanism is added to the door damper unit to further dampen the door closing motion and the effect of the compression springs is nullified before the door is completely opened and placed at rest on the tope of the cabinet so that the door closing operation is completed only by hand and the door closing operation is started without exerting force against the urging effort of the compression springs to the convenience of the user.

[0134] A cabinet according to claim 10 has a unique door formed by an upper door and a lower door that are linked by means of a door hinge and folded at rest on the top wall of the cabinet when the door is opened to eliminate the need of arranging a slide rail assembly so that it provides an easy access to the inside of the cabinet. Claims 11 through 13 depend on claim 10 exactly as claims 7 through 9 depend on claim 6.

[0135] A cabinet according to claim 14 has a unique cabinet main body whose top wall is shorter than the bottom wall and connected to the rear wall so that the closure is formed by an inclined upper door and a vertical lower door that are linked together and in which a door damper unit is provided. Therefore, as in the case of a cabinet according to claim 10, the upper and lower doors are folded at rest on the top wall of the cabinet when the door is opened to eliminate the need of arranging a slide rail assembly and provide an improved access to the inside of the cabinet because the opening of the cabinet is enlarged.

[0136] Claims 15 through 17 depend on claim 14 exactly as claims 7 through 9 depend on claim 6.

[0137] A cabinet according to claim 18 also has a unique arrangement where the top wall is used as part of the closure and swingably linked to the rear wall on the one hand and to the upswing door on the other by means of hinges and the door damper unit is fitted to the inner surface of a lateral wall at a position close to the rear wall. With this arrangement, when the closure is opened, the rotatable top wall and the upswing door become folded to face each other and held upright at a rear part of the top opening located close to the rear wall to fully open the cabinet. This arrangement also eliminates the need of using a slide rail assembly and provides a maximally easy access to the inside of the cabinet.

[0138] Claims 19 through 21 depend on claim 18 exactly as claims 7 through 9 depends on claim 6.

Claims

1. A cabinet comprising a cabinet main body, an upswing door and a metal arm unit for opening and closing the cabinet secured to said cabinet main body and said upswing door, the closure of the cabinet being formed by sequentially linking a plurality of wall plates including said vertically rotatable upswing door to the stationary part of the cabinet main body by means of a plurality of hinges so as to make the closure to completely close the opening of the cabinet with the upswing door suspended from above, said metal arm unit for opening and closing the cabinet including a fitting section rigidly secured to the inner surface of a lateral wall of the cabinet main body and a rotary arm linked at an end thereof to said fitting section by means of a shaft and at the free end thereof to said upswing door by means of a pin so as to pivot on the opposite ends thereof, a vertical motion of opening said upswing door from the closed position causing said linked wall plates to be folded by way of said plurality of hinges and placed at rest as layers on said stationary part of the cabinet main body to fully open the cabinet.

2. A cabinet comprising a cabinet main body, an upswing door and a metal arm unit for opening and closing the cabinet secured to said cabinet main body and said upswing door, said cabinet main body having a bottom wall, a pair of lateral walls, a rear wall and a top wall, said top wall being divided into a fixed rear top wall and a movable front top wall linked to said fixed rear top wall by means of a top wall hinge so as to be vertically swingable, said upswing door being linked to the front edge of said movable front top wall by means of a door hinge so as to be suspended therefrom to close the opening of said cabinet main body, said metal arm unit for opening and closing the cabinet including a fitting section rigidly secured to the inner surface of a lateral wall of the cabinet main body and a rotary arm linked at an end thereof to said fitting section by means of a shaft and at the free end thereof to said upswing door by means of a pin so as to pivot on the opposite ends thereof, a vertical motion of opening said upswing door from the closed position causing said movable top wall and said upswing door to be sequentially folded respectively by way of said top wall hinge and said door hinge and placed at rest as layers on said fixed wall to fully open the cabinet.

3. A cabinet comprising a cabinet main body, an upswing door and a metal arm unit for opening and closing the cabinet secured to said cabinet main body and said upswing door, said cabinet main body having a bottom wall, a pair of lateral walls, a rear wall and a top wall, said upswing door including an upper door linked to the front edge of said front wall by means of a door hinge so as to be suspended therefrom to close the opening of said cabinet main body and a lower door linked to said upper door by means of a door link hinge so as to be suspended therefrom and swingable to also open and close the opening of said cabinet main body, said metal arm unit for opening and closing the cabinet including a fitting section rigidly secured to the inner surface of a lateral wall of the cabinet main body and a rotary arm linked at an end thereof to said fitting section by means of a shaft and at the free end thereof to said lower door of said upswing door by means of a pin so as to pivot on the opposite ends thereof, a vertical motion of opening said upswing door from the closed position causing said upper door and said lower door of said upswing door to be sequentially folded respectively by way

of said door hinge and said door link hinge and placed at rest as layers on said top wall to fully open the cabinet.

4. A cabinet comprising a cabinet main body, an upswing door and a metal arm unit for opening and closing the cabinet secured to said cabinet main body and said upswing door, said cabinet main body having a bottom wall, a pair of lateral walls, a rear wall and a top wall shorter than the bottom wall to make part of the opening of the cabinet main body inclined, said upswing door being divided into an inclined upper door for closing the inclined part of the opening linked to the front edge of said short top wall by means of a door hinge and a lower door for closing the vertical part of the opening linked to said inclined upper door by means of a door link hinge so as to be suspended therefrom and swingable to open and close the opening, said metal arm unit for opening and closing the cabinet including a fitting section rigidly secured to the inner surface of a lateral wall of the cabinet main body and a rotary arm linked at an end thereof to said fitting section by means of a shaft and at the free end thereof to said lower door of said upswing door by means of a pin so as to pivot on the opposite ends thereof, a vertical motion of opening said upswing door from the closed position causing said inclined upper door and said lower door of said upswing door to be sequentially folded respectively by way of said door hinge and said door link hinge and placed at rest as layers on said short top wall to fully open the cabinet.

5. A cabinet comprising a cabinet main body, an upswing door and a metal arm unit for opening and closing the cabinet secured to said cabinet main body and said upswing door, said cabinet main body having a bottom wall, a pair of lateral walls, a rear wall and a top wall linked to said rear wall or said lateral walls by means of one or two top wall hinge so as to be swingable to open and close the top opening of the cabinet main body, said upswing door being linked to the front edge of said upswing top wall by means of a door hinge so as to be suspended therefrom and swingable to open and close the front opening of the cabinet main body, said metal arm unit for opening and closing the cabinet including a fitting section rigidly secured to the inner surface of rear part of a lateral wall of the cabinet main body and a rotary arm linked at an end thereof to said fitting section by means of a shaft and at the free end thereof to said upswing door by means of a pin so as to pivot on the opposite ends thereof, a vertical motion of opening said upswing door from the closed position causing said upswing top wall and said upswing door to be folded to face each other and held upright at a rear part of the top opening to fully open the cabinet.

6. A cabinet comprising a cabinet main body, an upswing door and a door damper unit for opening and closing the cabinet secured to said cabinet main body and said upswing door, said cabinet main body having a bottom wall, a pair of lateral walls, a rear wall and a top wall, said top wall being divided into a fixed rear top wall and a movable front top wall linked to said fixed rear top wall by means of a top wall hinge so as to be vertically swingable, said upswing door being linked to the front edge of said movable front top wall by means of a door hinge so as to be suspended therefrom to close the opening of said cabinet main body, said door damper unit for opening and closing the cabinet including a fitting case rigidly secured to the inner surface of a lateral wall of the cabinet main body, a spring holder/slider contained slidably in said fitting case and urged by compression springs, a link arm rotatably linked at and end thereof to said spring holder/slider by means of a pin and a rotary arm including a rotary base rotatably linked to said fitting case by means of an arm shaft and holding the other end of said link arm at a position close to said arm shaft by means of a pin so as to allow said arm shaft to pivot thereon and an arm section extending from said rotary base and linked at the front end thereof to said upswing door by means of a pin so as to pivot thereon, the position of the pin for allowing said link arm to pivot on said base section of said rotary arm being so selected as to accelerate a vertical motion of opening said upswing door from the closed position to the open position and causing said movable front top wall and said upswing door to be sequentially folded and placed at rest on the fixed rear top wall by the resilient force of said compression springs.

7. A cabinet comprising a cabinet main body, an upswing door and a door damper unit for opening and closing the cabinet secured to said cabinet main body and said upswing door, said cabinet main body having a bottom wall, a pair of lateral walls, a rear wall and a top wall, said top wall being divided into a fixed rear top wall and a movable front top wall linked to said fixed rear top wall by means of a top wall hinge so as to be vertically swingable, said upswing door being linked to the front edge of said movable front top wall by means of a door hinge so as to be suspended therefrom to close the opening of said cabinet main body, said door damper unit for opening and closing the cabinet including a fitting case rigidly secured to the inner surface of a lateral wall of the cabinet main body, a spring holder/slider contained slidably in said fitting case and urged by compression springs, a link arm rotatably linked at and end thereof to said spring holder/slider by means of a pin and a rotary arm including a rotary

base rotatably linked to said fitting case by means of an arm shaft and holding the other end of said link arm at a position close to said arm shaft by means of a pin so as to allow said arm shaft to pivot thereon and an arm section extending from said rotary base and linked at the front end thereof to said upswing door by means of a pin so as to pivot thereon, the position of the pin for allowing said link arm to pivot on said base section of said rotary arm being so selected as to accelerate a vertical motion of opening said upswing door from the closed position to the open position and causing said movable front top wall and said upswing door to be sequentially folded and placed at rest on the fixed rear top wall by the resilient force of said compression springs, said arm shaft being linked to the rotary shaft of a damper mechanism arranged in the fitting case and adapted to exert a braking force to said upswing door being closed or opened by means of the viscous fluid contained therein.

8. A cabinet comprising a cabinet main body, an upswing door and a door damper unit for opening and closing the cabinet secured to said cabinet main body and said upswing door, said cabinet main body having a bottom wall, a pair of lateral walls, a rear wall and a top wall, said top wall being divided into a fixed rear top wall and a movable front top wall linked to said fixed rear top wall by means of a top wall hinge so as to be vertically swingable, said upswing door being linked to the front edge of said movable front top wall by means of a door hinge so as to be suspended therefrom to close the opening of said cabinet main body, said door damper unit for opening and closing the cabinet including a fitting case rigidly secured to the inner surface of a lateral wall of the cabinet main body, a spring holder/slider contained slidably in said fitting case so as to be moved to a predetermined limit and urged by compression springs, a link arm rotatably linked at and end thereof to said spring holder/slider by means of a pin and a rotary arm including a rotary base rotatably linked to said fitting case by means of an arm shaft and holding the other end of said link arm at a position close to said arm shaft by means of a pin so as to allow said arm shaft to pivot thereon and an arm section extending from said rotary base and linked at the front end thereof to said upswing door by means of a pin so as to pivot thereon, the position of the pin for allowing said link arm to pivot on said base section of said rotary arm being so selected as to accelerate a vertical motion of opening said upswing door from the closed position to the open position and causing said movable front top wall and said upswing door to be sequentially folded and placed at rest on the fixed rear top wall by the resilient force of said compression springs in the initial stage but to eliminate the accelerating effect of the resilient force of said compression springs by said fitting case at said predetermined limit and cause said pin to idly move in the groove of said spring holder/slider from the pivot position by a required length and allow the opening motion of the upswing door to continue in the final stage.

9. A cabinet comprising a cabinet main body, an upswing door and a door damper unit for opening and closing the cabinet secured to said cabinet main body and said upswing door, said cabinet main body having a bottom wall, a pair of lateral walls, a rear wall and a top wall, said top wall being divided into a fixed rear top wall and a movable front top wall linked to said fixed rear top wall by means of a top wall hinge so as to be vertically swingable, said upswing door being linked to the front edge of said movable front top wall by means of a door hinge so as to be suspended therefrom to close the opening of said cabinet main body, said door damper unit for opening and closing the cabinet including a fitting case rigidly secured to the inner surface of a lateral wall of the cabinet main body, a spring holder/slider contained slidably in said fitting case so as to be moved to a predetermined limit and urged by compression springs, a link arm rotatably linked at and end thereof to said spring holder/slider by means of a pin and a rotary arm including a rotary base rotatably linked to said fitting case by means of an arm shaft and holding the other end of said link arm at a position close to said arm shaft by means of a pin so as to allow said arm shaft to pivot thereon and an arm section extending from said rotary base and linked at the front end thereof to said upswing door by means of a pin so as to pivot thereon, the position of the pin for allowing said link arm to pivot on said base section of said rotary arm being so selected as to accelerate a vertical motion of opening said upswing door from the closed position and causing said movable top wall and said upswing door to be sequentially folded respectively by way of said top wall hinge and said door hinge and placed at rest as layers on said fixed wall to fully open the cabinet by the resilient force of said compression springs in the initial stage but to eliminate the accelerating effect of the resilient force of said compression springs by said fitting case at said predetermined limit and cause said pin to idly move in the groove of said spring holder/slider from the pivot position by a required length and allow the opening motion of the upswing door to continue in the final stage, said arm shaft being linked to the rotary shaft of the damper mechanism arranged in the fitting case and adapted to exert a braking force to the upswing door being opened or closed by means of the viscous fluid contained therein.

10. A cabinet comprising a cabinet main body, an up-

swing door and a door damper unit for opening and closing the cabinet secured to said cabinet main body and said upswing door, said cabinet main body having a bottom wall, a pair of lateral walls, a rear wall and a top wall, said upswing door including an upper door linked to the front edge of said front wall by means of a door hinge so as to be suspended therefrom to close the opening of said cabinet main body and a lower door linked to said upper door by means of a door link hinge so as to be suspended therefrom and swingable to also open and close the opening of said cabinet main body, said door damper unit for opening and closing the cabinet including a fitting case rigidly secured to the inner surface of a lateral wall of the cabinet main body, a spring holder/slider contained slidably in said fitting case and urged by compression springs, a link arm rotatably linked at and end thereof to said spring holder/slider by means of a pin and a rotary arm including a rotary base rotatably linked to said fitting case by means of an arm shaft and holding the other end of said link arm at a position close to said arm shaft by means of a pin so as to allow said arm shaft to pivot thereon and an arm section extending from said rotary base and linked at the front end thereof to said upswing door by means of a pin so as to pivot thereon, the position of the pin for allowing said link arm to pivot on said base section of said rotary arm being so selected as to accelerate a vertical motion of opening said upswing door from the closed position and causing said upper door and said lower door of said upswing door to be sequentially folded respectively by way of said door hinge and said door link hinge and placed at rest as layers on said top wall to fully open the cabinet by the resilient force of said compression springs.

11. A cabinet comprising a cabinet main body, an upswing door and a door damper unit for opening and closing the cabinet secured to said cabinet main body and said upswing door, said cabinet main body having a bottom wall, a pair of lateral walls, a rear wall and a top wall, said upswing door including an upper door linked to the front edge of said front wall by means of a door hinge so as to be suspended therefrom to close the opening of said cabinet main body and a lower door linked to said upper door by means of a door link hinge so as to be suspended therefrom and swingable to also open and close the opening of said cabinet main body, said door damper unit for opening and closing the cabinet including a fitting case rigidly secured to the inner surface of a lateral wall of the cabinet main body, a spring holder/slider contained slidably in said fitting case and urged by compression springs, a link arm rotatably linked at and end thereof to said spring holder/slider by means of a pin and a rotary arm including a rotary base rotatably linked to said fitting case by means of an arm shaft and holding the other end of said link arm at a position close to said arm shaft by means of a pin so as to allow said arm shaft to pivot thereon and an arm section extending from said rotary base and linked at the front end thereof to said upswing door by means of a pin so as to pivot thereon, the position of the pin for allowing said link arm to pivot on said base section of said rotary arm being so selected as to accelerate a vertical motion of opening said upswing door from the closed position and causing said upper door and said lower door of said upswing door to be sequentially folded respectively by way of said door hinge and said door link hinge and placed at rest as layers on said top wall to fully open the cabinet by the resilient force of said compression springs, said arm shaft being linked to the rotary shaft of a damper mechanism arranged in the fitting case and adapted to exert a braking force to said upswing door being closed or opened by means of the viscous fluid contained therein.

12. A cabinet comprising a cabinet main body, an upswing door and a door damper unit for opening and closing the cabinet secured to said cabinet main body and said upswing door, said cabinet main body having a bottom wall, a pair of lateral walls, a rear wall and a top wall, said upswing door including an upper door linked to the front edge of said front wall by means of a door hinge so as to be suspended therefrom to close the opening of said cabinet main body and a lower door linked to said upper door by means of a door link hinge so as to be suspended therefrom and swingable to also open and close the opening of said cabinet main body, said door damper unit for opening and closing the cabinet including a fitting case rigidly secured to the inner surface of a lateral wall of the cabinet main body, a spring holder/slider contained slidably in said fitting case so as to be moved to a predetermined limit and urged by compression springs, a link arm rotatably linked at and end thereof to said spring holder/slider by means of a pin and a rotary arm including a rotary base rotatably linked to said fitting case by means of an arm shaft and holding the other end of said link arm at a position close to said arm shaft by means of a pin so as to allow said arm shaft to pivot thereon and an arm section extending from said rotary base and linked at the front end thereof to said upswing door by means of a pin so as to pivot thereon, the position of the pin for allowing said link arm to pivot on said base section of said rotary arm being so selected as to accelerate a vertical motion of opening said upswing door from the closed position and causing said upper door and said lower door of said upswing door to be sequentially folded respectively by way of said door hinge and said door link hinge and placed at rest as layers on said top wall

to fully open the cabinet by the resilient force of said compression springs in the initial stage but to eliminate the accelerating effect of the resilient force of said compression springs by said fitting case at said predetermined limit and cause said pin to idly move in the groove of said spring holder/slider from the pivot position by a required length and allow the opening motion of the upswing door to continue in the final stage.

13. A cabinet comprising a cabinet main body, an upswing door and a door damper unit for opening and closing the cabinet secured to said cabinet main body and said upswing door, said cabinet main body having a bottom wall, a pair of lateral walls, a rear wall and a top wall, said upswing door including an upper door linked to the front edge of said front wall by means of a door hinge so as to be suspended therefrom to close the opening of said cabinet main body and a lower door linked to said upper door by means of a door link hinge so as to be suspended therefrom and swingable to also open and close the opening of said cabinet main body, said door damper unit for opening and closing the cabinet including a fitting case rigidly secured to the inner surface of a lateral wall of the cabinet main body, a spring holder/slider contained slidably in said fitting case so as to be moved to a predetermined limit and urged by compression springs, a link arm rotatably linked at and end thereof to said spring holder/slider by means of a pin and a rotary arm including a rotary base rotatably linked to said fitting case by means of an arm shaft and holding the other end of said link arm at a position close to said arm shaft by means of a pin so as to allow said arm shaft to pivot thereon and an arm section extending from said rotary base and linked at the front end thereof to said upswing door by means of a pin so as to pivot thereon, the position of the pin for allowing said link arm to pivot on said base section of said rotary arm being so selected as to accelerate a vertical motion of opening said upswing door from the closed position and causing said upper door and said lower door of said upswing door to be sequentially folded respectively by way of said door hinge and said door link hinge and placed at rest as layers on said top wall to fully open the cabinet by the resilient force of said compression springs in the initial stage but to eliminate the accelerating effect of the resilient force of said compression springs by said fitting case at said predetermined limit and cause said pin to idly move in the groove of said spring holder/slider from the pivot position by a required length and allow the opening motion of the upswing door to continue in the final stage, said arm shaft being linked to the rotary shaft of the damper mechanism arranged in the fitting case and adapted to exert a braking force to the upswing door being opened or closed by means of the viscous fluid contained therein.

14. A cabinet comprising a cabinet main body, an upswing door and a door damper unit for opening and closing the cabinet secured to said cabinet main body and said upswing door, said cabinet main body having a bottom wall, a pair of lateral walls, a rear wall and a top wall shorter than the bottom wall to make part of the opening of the cabinet main body inclined, said upswing door being divided into an inclined upper door for closing the inclined part of the opening linked to the front edge of said short top wall by means of a door hinge and a lower door for closing the vertical part of the opening linked to said inclined upper door by means of a door link hinge so as to be suspended therefrom and swingable to open and close the opening, said door damper unit for opening and closing the cabinet including a fitting case rigidly secured to the inner surface of a lateral wall of the cabinet main body, a spring holder/slider contained slidably in said fitting case and urged by compression springs, a link arm rotatably linked at and end thereof to said spring holder/slider by means of a pin and a rotary arm including a rotary base rotatably linked to said fitting case by means of an arm shaft and holding the other end of said link arm at a position close to said arm shaft by means of a pin so as to allow said arm shaft to pivot thereon and an arm section extending from said rotary base and linked at the front end thereof to said upswing door by means of a pin so as to pivot thereon, the position of the pin for allowing said link arm to pivot on said base section of said rotary arm being so selected as to accelerate a vertical motion of opening said upswing door from the closed position to the open position and causing said inclined upper door and said lower door of said upswing door to be sequentially folded and placed at rest on the fixed rear top wall by the resilient force of said compression springs.

15. A cabinet comprising a cabinet main body, an upswing door and a door damper unit for opening and closing the cabinet secured to said cabinet main body and said upswing door, said cabinet main body having a bottom wall, a pair of lateral walls, a rear wall and a top wall shorter than the bottom wall to make part of the opening of the cabinet main body inclined, said upswing door being divided into an inclined upper door for closing the inclined part of the opening linked to the front edge of said short top wall by means of a door hinge and a lower door for closing the vertical part of the opening linked to said inclined upper door by means of a door link hinge so as to be suspended therefrom and swingable to open and close the opening, said door damper unit for opening and dosing the cabinet including a fitting case rigidly secured to the inner surface of a lateral

wall of the cabinet main body, a spring holder/slider contained slidably in said fitting case and urged by compression springs, a link arm rotatably linked at and end thereof to said spring holder/slider by means of a pin and a rotary arm including a rotary base rotatably linked to said fitting case by means of an arm shaft and holding the other end of said link arm at a position close to said arm shaft by means of a pin so as to allow said arm shaft to pivot thereon and an arm section extending from said rotary base and linked at the front end thereof to said upswing door by means of a pin so as to pivot thereon, the position of the pin for allowing said link arm to pivot on said base section of said rotary arm being so selected as to accelerate a vertical motion of opening said upswing door from the closed position to the open position a vertical motion of opening said upswing door from the closed position to the open position and causing said inclined upper door and said lower door of said upswing door to be sequentially folded and placed at rest on the fixed rear top wall by the resilient force of said compression springs, said arm shaft being linked to the rotary shaft of a damper mechanism arranged in the fitting case and adapted to exert a braking force to said upswing door being closed or opened by means of the viscous fluid contained therein.

16. A cabinet comprising a cabinet main body, an upswing door and a door damper unit for opening and closing the cabinet secured to said cabinet main body and said upswing door, said cabinet main body having a bottom wall, a pair of lateral walls, a rear wall and a top wall shorter than the bottom wall to make part of the opening of the cabinet main body inclined, said upswing door being divided into an inclined upper door for closing the inclined part of the opening linked to the front edge of said short top wall by means of a door hinge and a lower door for closing the vertical part of the opening linked to said inclined upper door by means of a door link hinge so as to be suspended therefrom and swingable to open and close the opening, said door damper unit for opening and closing the cabinet including a fitting case rigidly secured to the inner surface of a lateral wall of the cabinet main body, a spring holder/slider contained slidably in said fitting case so as to be moved to a predetermined limit and urged by compression springs, a link arm rotatably linked at and end thereof to said spring holder/slider by means of a pin and a rotary arm including a rotary base rotatably linked to said fitting case by means of an arm shaft and holding the other end of said link arm at a position close to said arm shaft by means of a pin so as to allow said arm shaft to pivot thereon and an arm section extending from said rotary base and linked at the front end thereof to said upswing door by means of a pin so as to pivot thereon, the position of the pin for allowing said link arm to pivot on said base section of said rotary arm being so selected as to accelerate a vertical motion of opening said upswing door from the closed position to the open position and causing said inclined upper door and said lower door of said upswing door to be sequentially folded and placed at rest on the fixed rear top wall by the resilient force of said compression springs in the initial stage but to eliminate the accelerating effect of the resilient force of said compression springs by said fitting case at said predetermined limit and cause said pin to idly move in the groove of said spring holder/slider from the pivot position by a required length and allow the opening motion of the upswing door to continue in the final stage.

17. A cabinet comprising a cabinet main body, an upswing door and a door damper unit for opening and closing the cabinet secured to said cabinet main body and said upswing door, said cabinet main body having a bottom wall, a pair of lateral walls, a rear wall and a top wall shorter than the bottom wall to make part of the opening of the cabinet main body inclined, said upswing door being divided into an inclined upper door for closing the inclined part of the opening linked to the front edge of said short top wall by means of a door hinge and a lower door for closing the vertical part of the opening linked to said inclined upper door by means of a door link hinge so as to be suspended therefrom and swingable to open and close the opening, said door damper unit for opening and closing the cabinet including a fitting case rigidly secured to the inner surface of a lateral wall of the cabinet main body, a spring holder/slider contained slidably in said fitting case so as to be moved to a predetermined limit and urged by compression springs, a link arm rotatably linked at and end thereof to said spring holder/slider by means of a pin and a rotary arm including a rotary base rotatably linked to said fitting case by means of an arm shaft and holding the other end of said link arm at a position close to said arm shaft by means of a pin so as to allow said arm shaft to pivot thereon and an arm section extending from said rotary base and linked at the front end thereof to said upswing door by means of a pin so as to pivot thereon, the position of the pin for allowing said link arm to pivot on said base section of said rotary arm being so selected as to accelerate a vertical motion of opening said upswing door from the closed position to the open position and causing said inclined upper door and said lower door of said upswing door for said movable front top wall and said upswing door to be sequentially folded and placed at rest on the fixed rear top wall by the resilient force of said compression springs in the initial stage but to eliminate the accelerating effect of the resilient force of said

compression springs by said fitting case at said predetermined limit and cause said pin to idly move in the groove of said spring holder/slider from the pivot position by a required length and allow the opening motion of the upswing door to continue in the final stage, said arm shaft being linked to the rotary shaft of the damper mechanism arranged in the fitting case and adapted to exert a braking force to the upswing door being opened or closed by means of the viscous fluid contained therein.

18. A cabinet comprising a cabinet main body, an upswing door and a door damper unit for opening and closing the cabinet secured to said cabinet main body and said upswing door, said cabinet main body having a bottom wall, a pair of lateral walls, a rear wall and a top wall linked to said rear wall or said lateral walls by means of one or two top wall hinge so as to be swingable to open and close the top opening of the cabinet main body, said upswing door being linked to the front edge of said upswing top wall by means of a door hinge so as to be suspended therefrom and swingable to open and close the front opening of the cabinet main body, said door damper unit for opening and closing the cabinet including a fitting case rigidly secured to the inner surface of rear part of a lateral wall of the cabinet main body, a spring holder/slider contained slidably in said fitting case and urged by compression springs, a link arm rotatably linked at and end thereof to said spring holder/slider by means of a pin and a rotary arm including a rotary base rotatably linked to said fitting case by means of an arm shaft and holding the other end of said link arm at a position close to said arm shaft by means of a pin so as to allow said arm shaft to pivot thereon and an arm section extending from said rotary base and linked at the front end thereof to said upswing door by means of a pin so as to pivot thereon, the position of the pin for allowing said link arm to pivot on said base section of said rotary arm being so selected as to accelerate a vertical motion of opening said upswing door from the closed position to the open position and causing said upswing top wall and said upswing door to be folded to face each other and held upright at a rear part of the top opening by the resilient force of said compression springs.

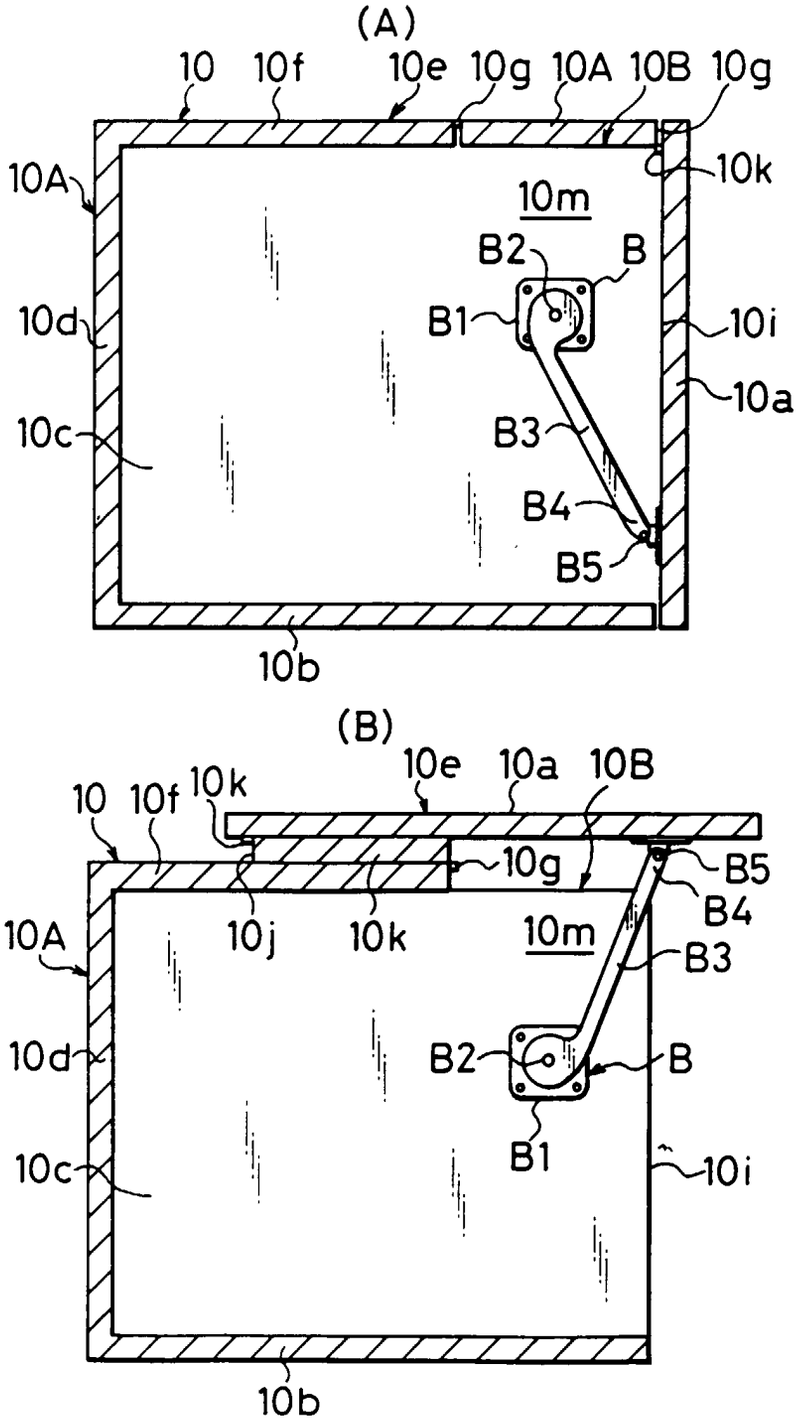
19. A cabinet comprising a cabinet main body, an upswing door and a door damper unit for opening and closing the cabinet secured to said cabinet main body and said upswing door, said cabinet main body having a bottom wall, a pair of lateral walls, a rear wall and a top wall shorter than the bottom wall to make part of the opening of the cabinet main body inclined, said upswing door being divided into an inclined upper door for closing the inclined part of the opening linked to the front edge of said short top wall by means of a door hinge and a lower door for closing the vertical part of the opening linked to said inclined upper door by means of a door link hinge so as to be suspended therefrom and swingable to open and close the opening, said door damper unit for opening and closing the cabinet including a fitting case rigidly secured to the inner surface of a lateral wall of the cabinet main body, a spring holder/slider contained slidably in said fitting case and urged by compression springs, a link arm rotatably linked at and end thereof to said spring holder/slider by means of a pin and a rotary arm including a rotary base rotatably linked to said fitting case by means of an arm shaft and holding the other end of said link arm at a position close to said arm shaft by means of a pin so as to allow said arm shaft to pivot thereon and an arm section extending from said rotary base and linked at the front end thereof to said upswing door by means of a pin so as to pivot thereon, the position of the pin for allowing said link arm to pivot on said base section of said rotary arm being so selected as to accelerate a vertical motion of opening said upswing door from the closed position to the open position and causing said upswing top wall and said upswing door to be folded to face each other and held upright at a rear part of the top opening by the resilient force of said compression springs, said arm shaft being linked to the rotary shaft of a damper mechanism arranged in the fitting case and adapted to exert a braking force to said upswing door being closed or opened by means of the viscous fluid contained therein.

20. A cabinet comprising a cabinet main body, an upswing door and a door damper unit for opening and closing the cabinet secured to said cabinet main body and said upswing door, said cabinet main body having a bottom wall, a pair of lateral walls, a rear wall and a top wall shorter than the bottom wall to make part of the opening of the cabinet main body inclined, said upswing door being divided into an inclined upper door for closing the inclined part of the opening linked to the front edge of said short top wall by means of a door hinge and a lower door for closing the vertical part of the opening linked to said inclined upper door by means of a door link hinge so as to be suspended therefrom and swingable to open and close the opening, said door damper unit for opening and closing the cabinet including a fitting case rigidly secured to the inner surface of a lateral wall of the cabinet main body, a spring holder/slider contained slidably in said fitting case so as to be moved to a predetermined limit and urged by compression springs, a link arm rotatably linked at and end thereof to said spring holder/slider by means of a pin and a rotary arm including a rotary base rotatably linked to said fitting case by means of an arm shaft and holding the other end of said

link arm at a position close to said arm shaft by means of a pin so as to allow said arm shaft to pivot thereon and an arm section extending from said rotary base and linked at the front end thereof to said upswing door by means of a pin so as to pivot thereon, the position of the pin for allowing said link arm to pivot on said base section of said rotary arm being so selected as to accelerate a vertical motion of opening said upswing door from the closed position to the open position and causing said upswing top wall and said upswing door to be folded to face each other and held upright at a rear part of the top opening by the resilient force of said compression springs in the initial stage but to eliminate the accelerating effect of the resilient force of said compression springs by said fitting case at said predetermined limit and cause said pin to idly move in the groove of said spring holder/slider from the pivot position by a required length and allow the opening motion of the upswing door to continue in the final stage.

21. A cabinet comprising a cabinet main body, an upswing door and a door damper unit for opening and closing the cabinet secured to said cabinet main body and said upswing door, said cabinet main body having a bottom wall, a pair of lateral walls, a rear wall and a top wall shorter than the bottom wall to make part of the opening of the cabinet main body inclined, said upswing door being divided into an inclined upper door for closing the inclined part of the opening linked to the front edge of said short top wall by means of a door hinge and a lower door for closing the vertical part of the opening linked to said inclined upper door by means of a door link hinge so as to be suspended therefrom and swingable to open and close the opening, said door damper unit for opening and closing the cabinet including a fitting case rigidly secured to the inner surface of a lateral wall of the cabinet main body, a spring holder/slider contained slidably in said fitting case so as to be moved to a predetermined limit and urged by compression springs, a link arm rotatably linked at and end thereof to said spring holder/slider by means of a pin and a rotary arm including a rotary base rotatably linked to said fitting case by means of an arm shaft and holding the other end of said link arm at a position close to said arm shaft by means of a pin so as to allow said arm shaft to pivot thereon and an arm section extending from said rotary base and linked at the front end thereof to said upswing door by means of a pin so as to pivot thereon, the position of the pin for allowing said link arm to pivot on said base section of said rotary arm being so selected as to accelerate a vertical motion of opening said upswing door from the closed position to the open position and causing said upswing top wall and said upswing door to be folded to face each other and held upright at a rear part of the top opening by the resilient force of said compression springs in the initial stage but to eliminate the accelerating effect of the resilient force of said compression springs by said fitting case at said predetermined limit and cause said pin to idly move in the groove of said spring holder/slider from the pivot position by a required length and allow the opening motion of the upswing door to continue in the final stage, said arm shaft being linked to the rotary shaft of the damper mechanism arranged in the fitting case and adapted to exert a braking force to the upswing door being opened or closed by means of the viscous fluid contained therein.

FIG. 1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10d
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B4
B5
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(B)
10e
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10B
10
10f
10k
10g
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10k
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B3
10d
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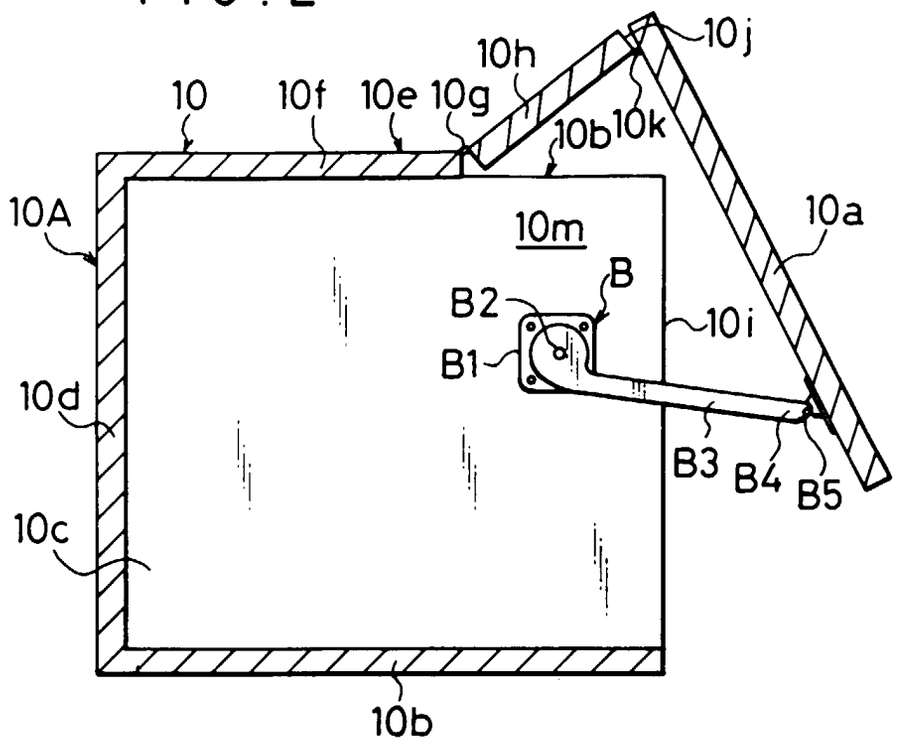
B
B1
10c
10i
10b

FIG. 2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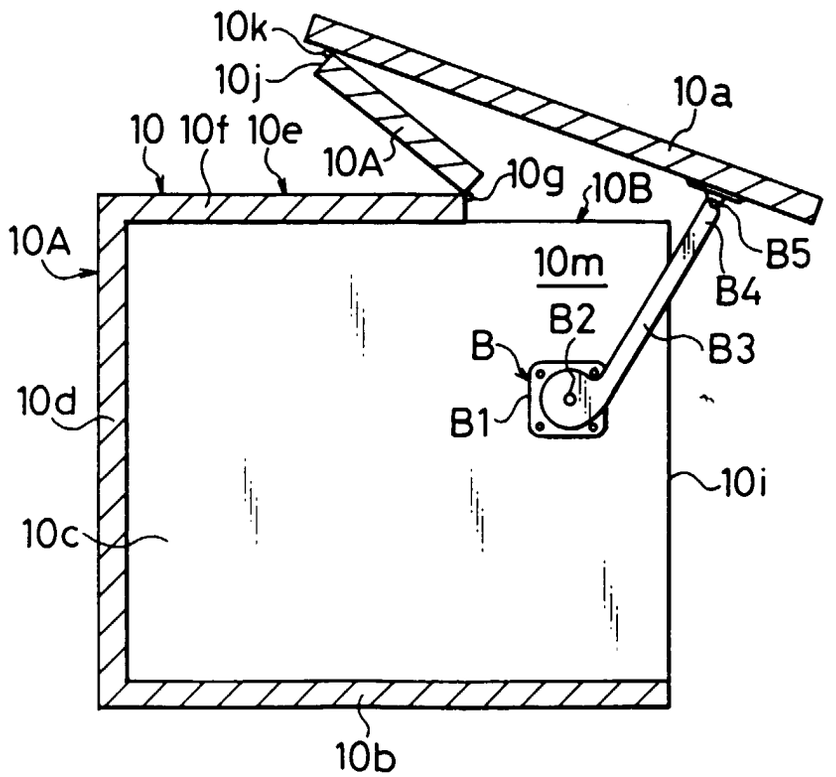
B3
B4
B5
10c
10b

FIG. 3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10m
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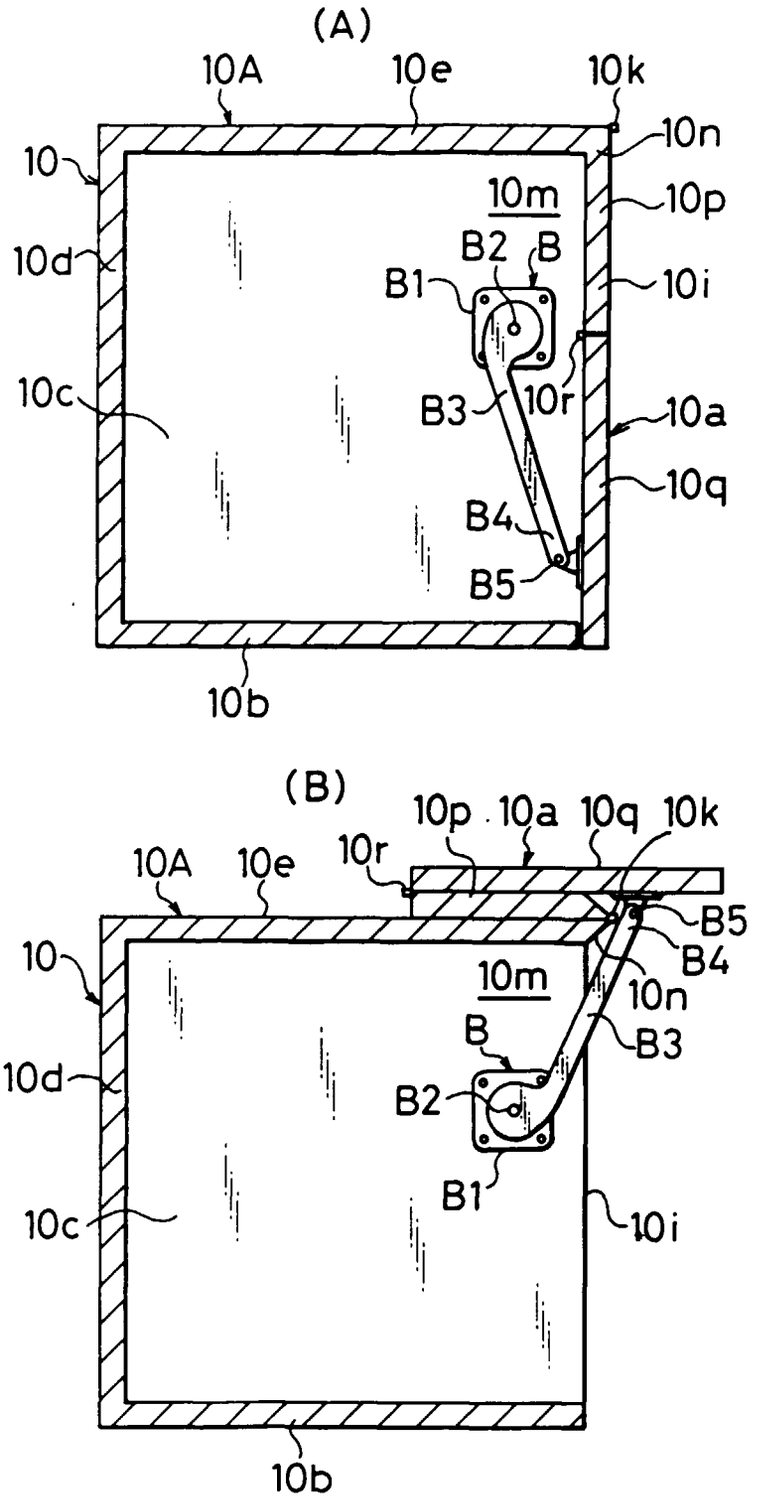
B3
B1
10d
10i
10c
10b

FIG. 4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10p
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B
B1
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B3
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10q
B4
B5
10b
(B)
10p
10a
10q
10k
10r
10A
10e
B5
B4
10
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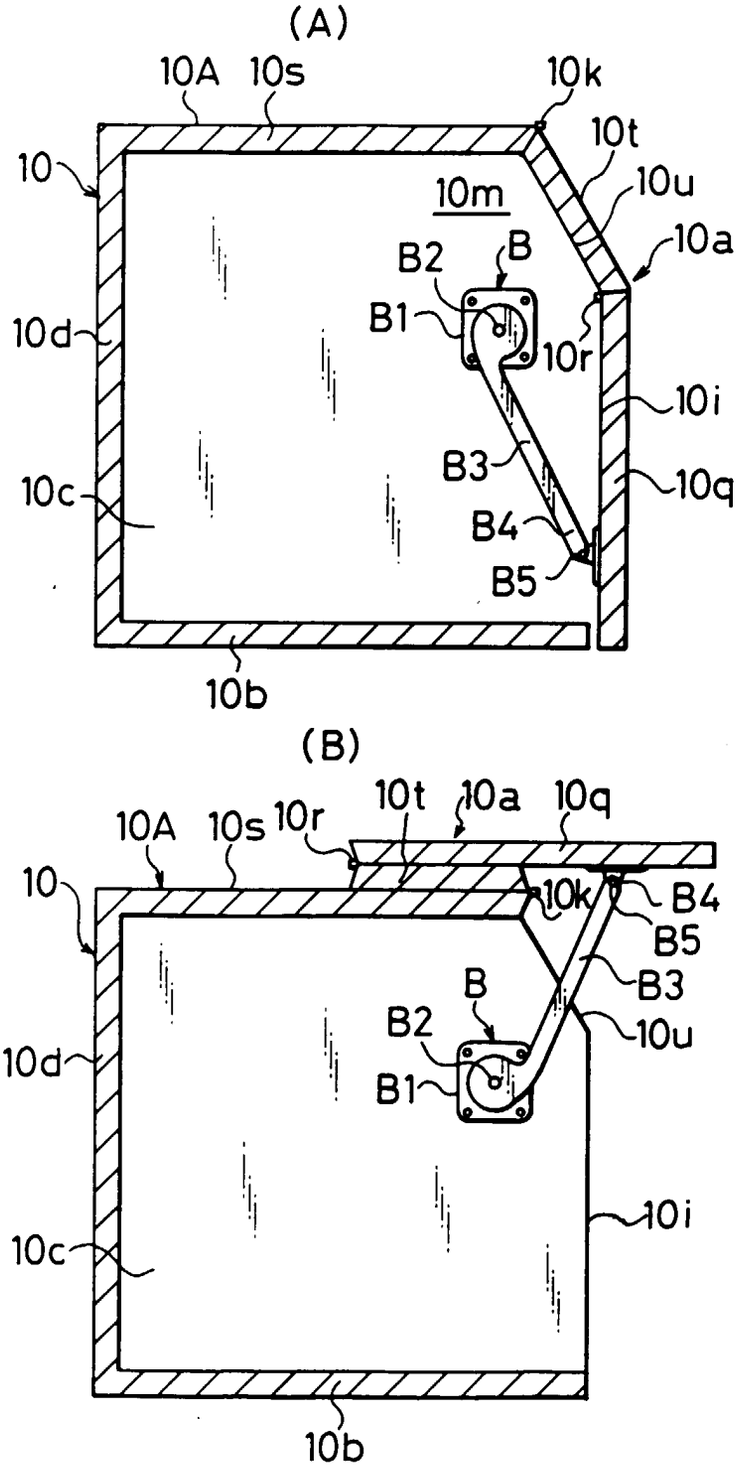
B
B3
10d
B2
B1
10c
10i
10b

FIG. 5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B4
B5
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(B)
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10q
10A
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B4
B5
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B
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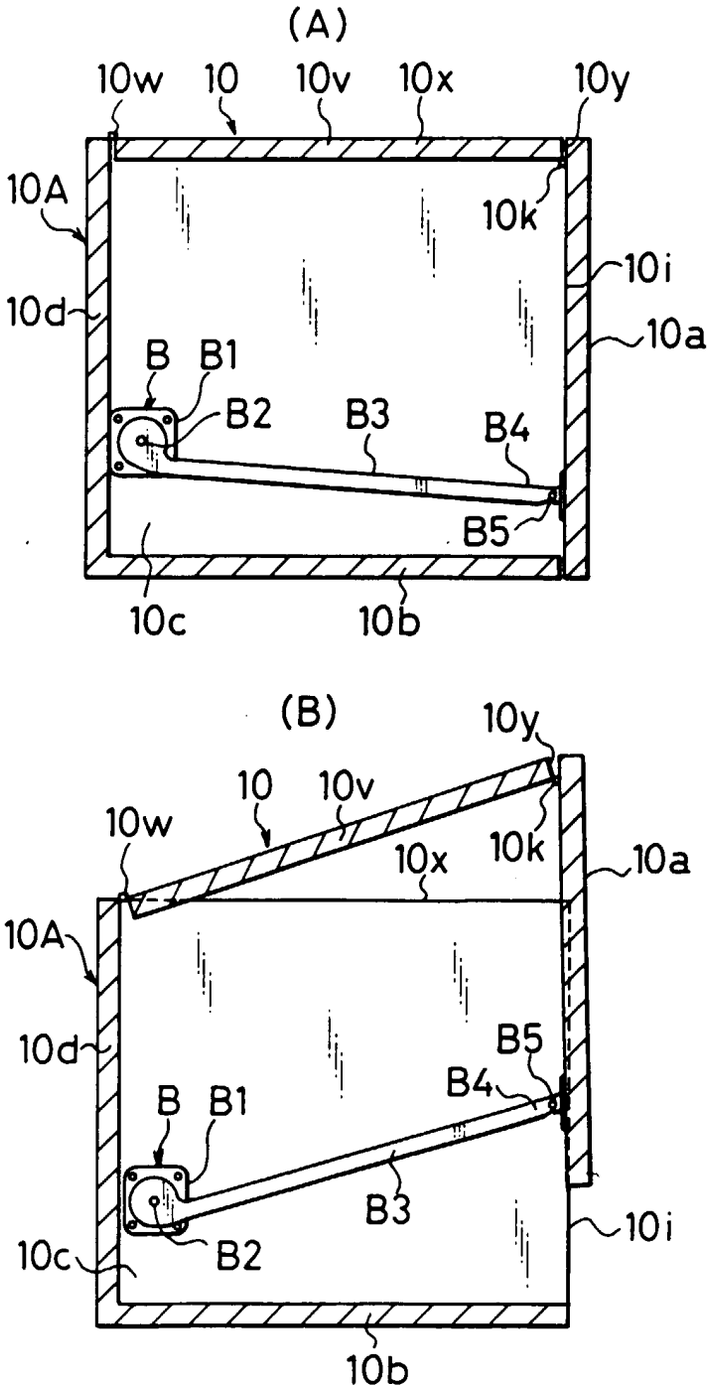
10d
B1
10i
10c
10b

FIG. 6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10A
10k
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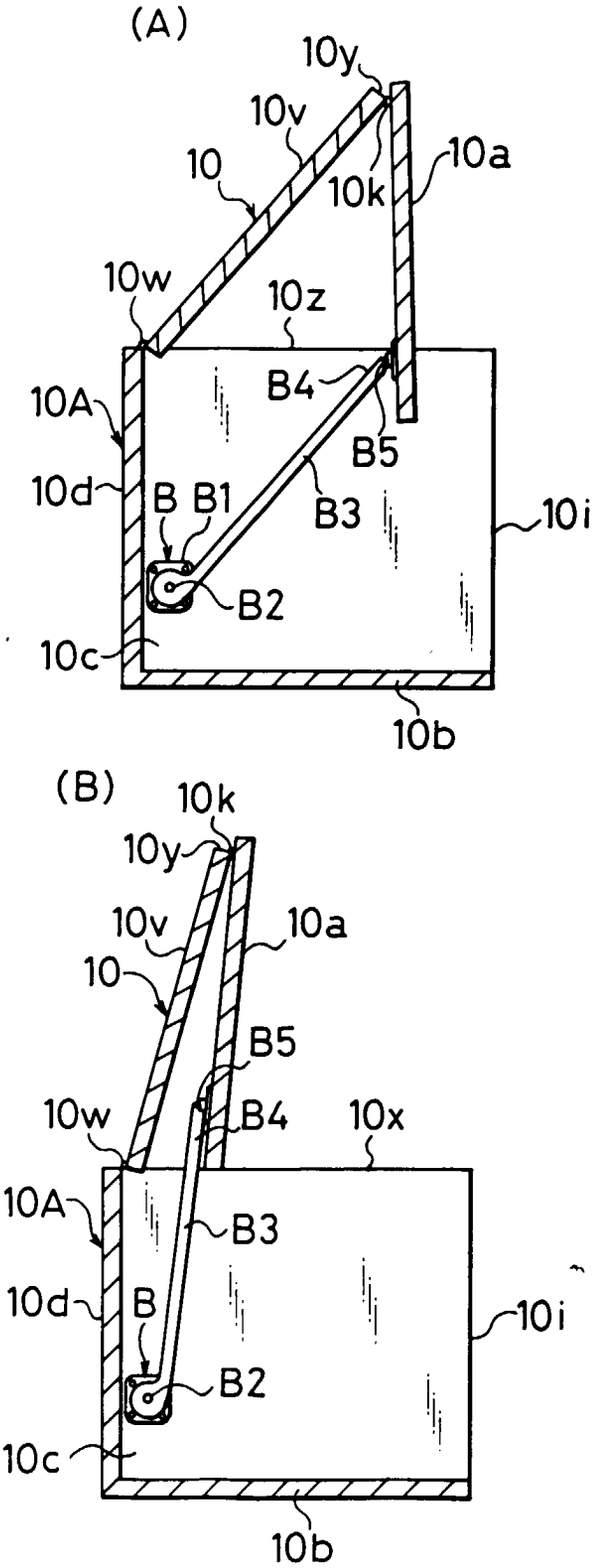
10d
10a
B
B1
B2
B3
B4
B5
10c
10b
(B)
10y
10
10v
10w
10x
10k
10a
10A
10d
B5
B4
B
B1
B3
10i
10c
B2
10b

FIG. 7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B5
10d
B B1
B3
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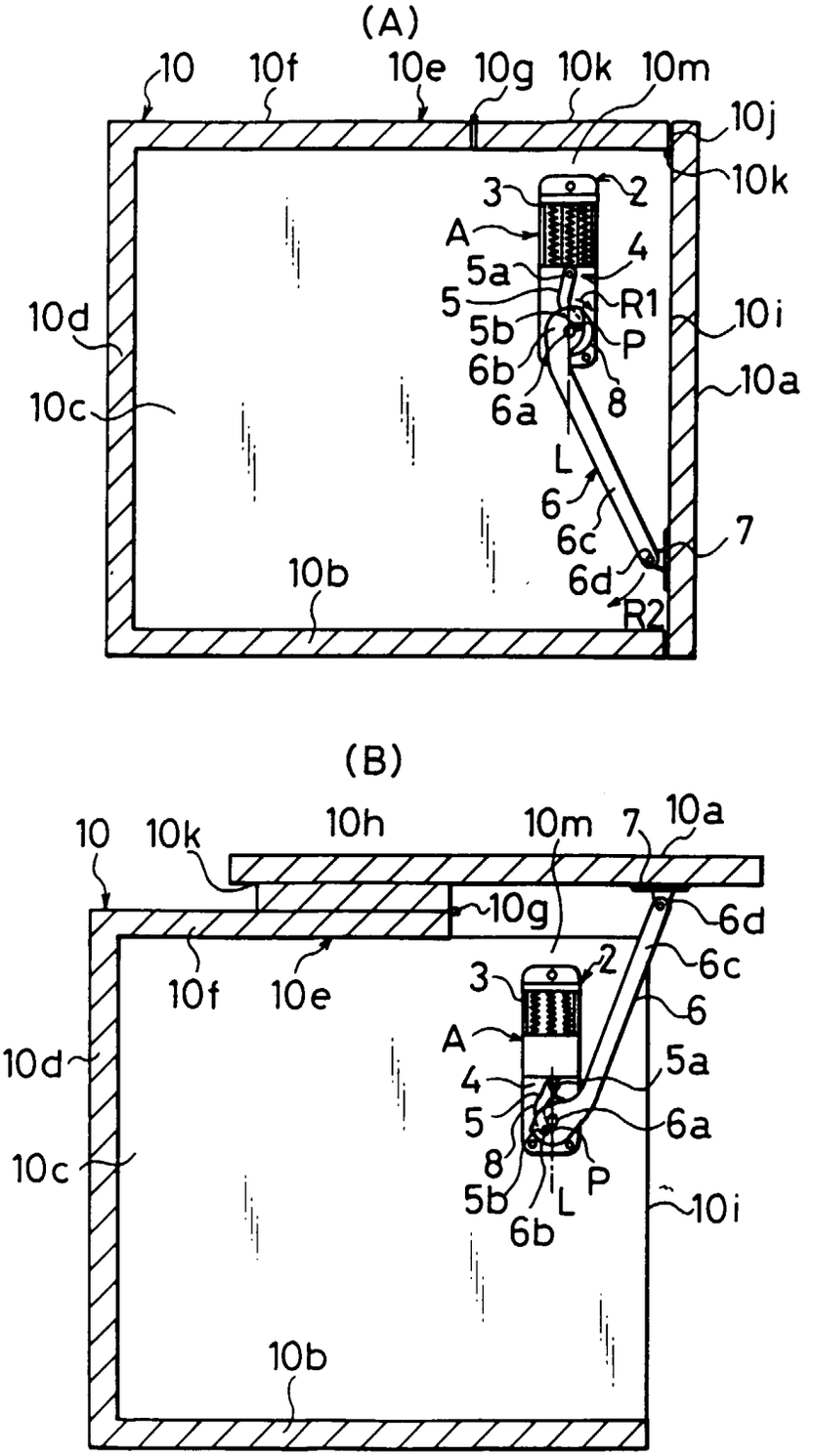
B2
10c
10b
(B)
10k
10y
10v
10a
10
B5
10w
B4
10x
10A
B3
10d
B
10i
B2
10c
10b

FIG. 8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P
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10a
10c
6a
8
L
6
6c
7
10b
6d
R2
(B)
10
10k
10h
10m
7
10a
10g
6d
6c
10f
10e
3
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6a
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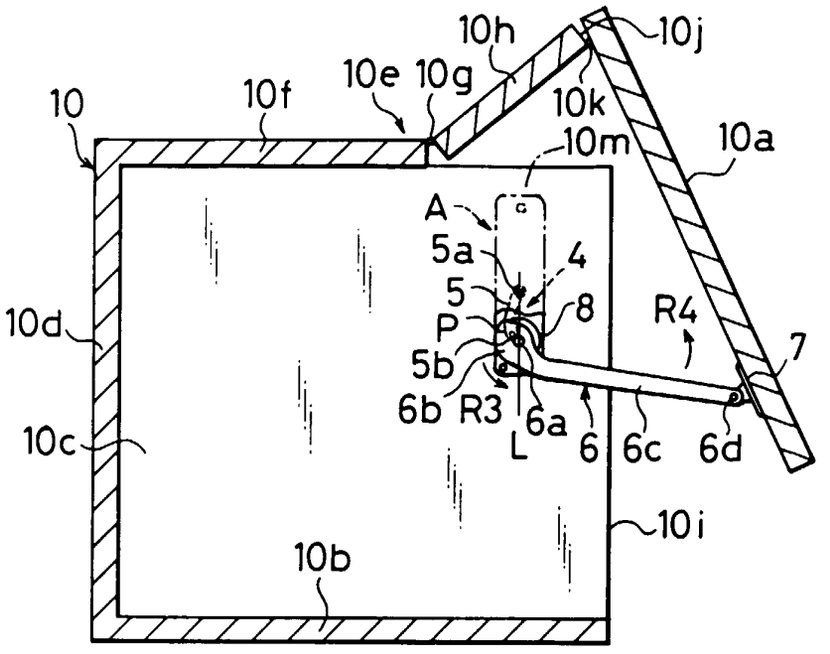
L
P
10i
6b
10b

FIG. 9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P
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6b
R3
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L
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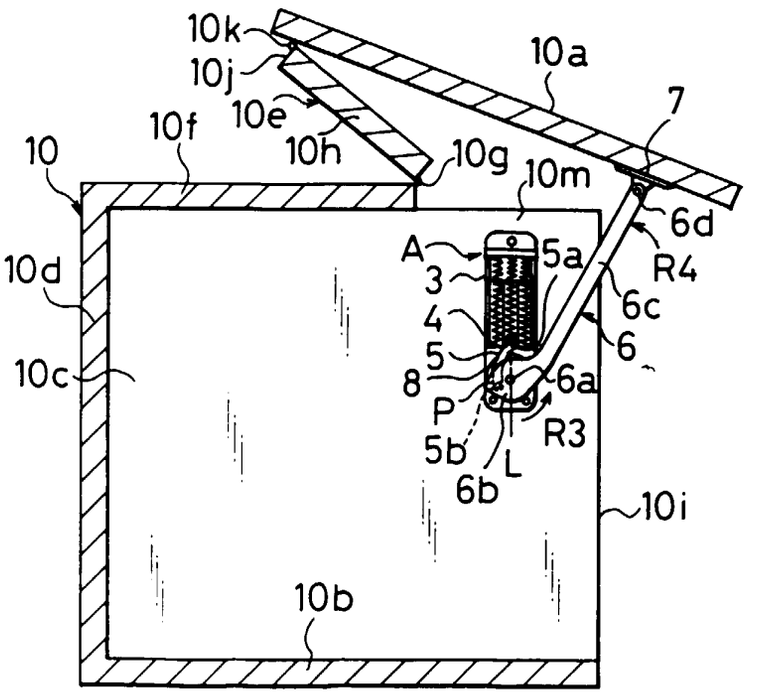
6c
6d
10c
10i
10b

FIG. 10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6
5
8
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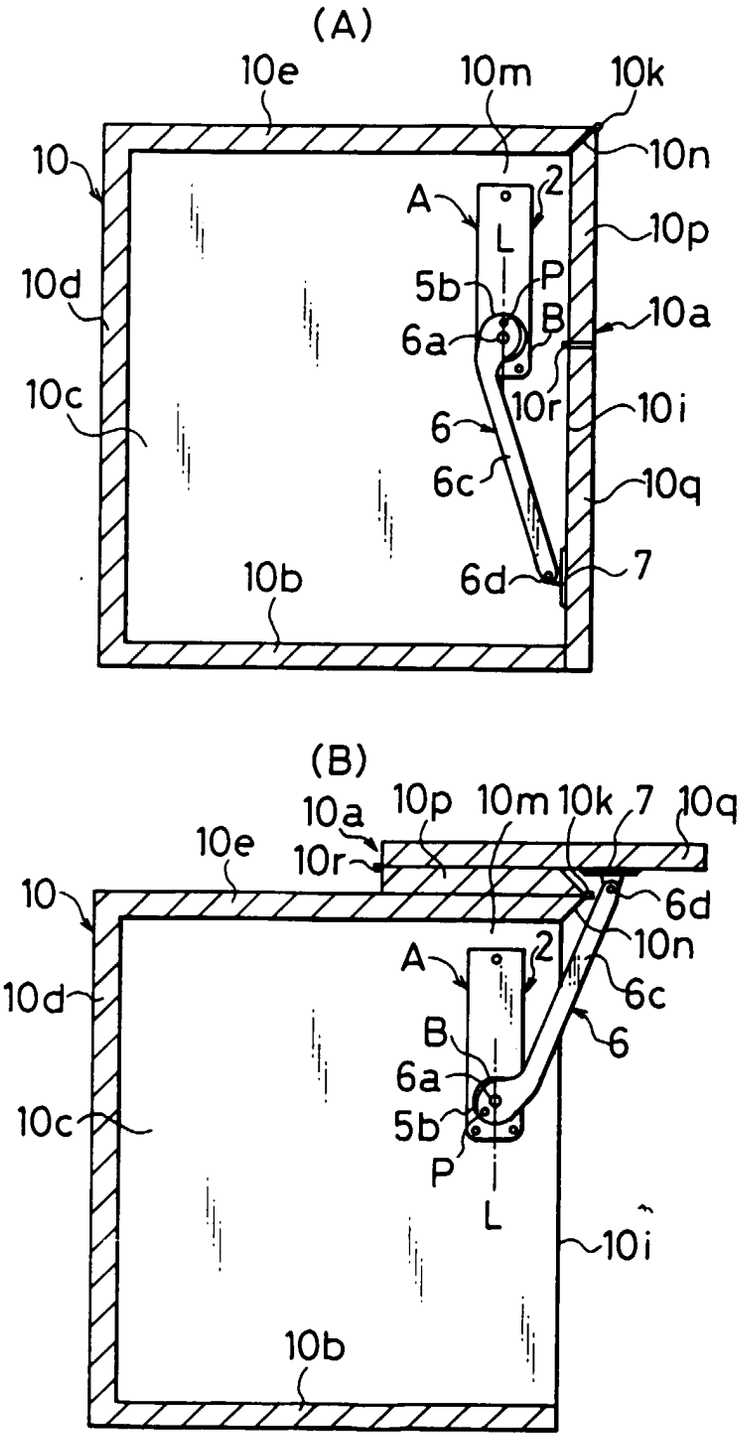
10c
P
R3
5b
L
6b
10i
10b

FIG. 11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10q
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6d
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(B)
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10p
10m
10k
7
10q
10e
10r
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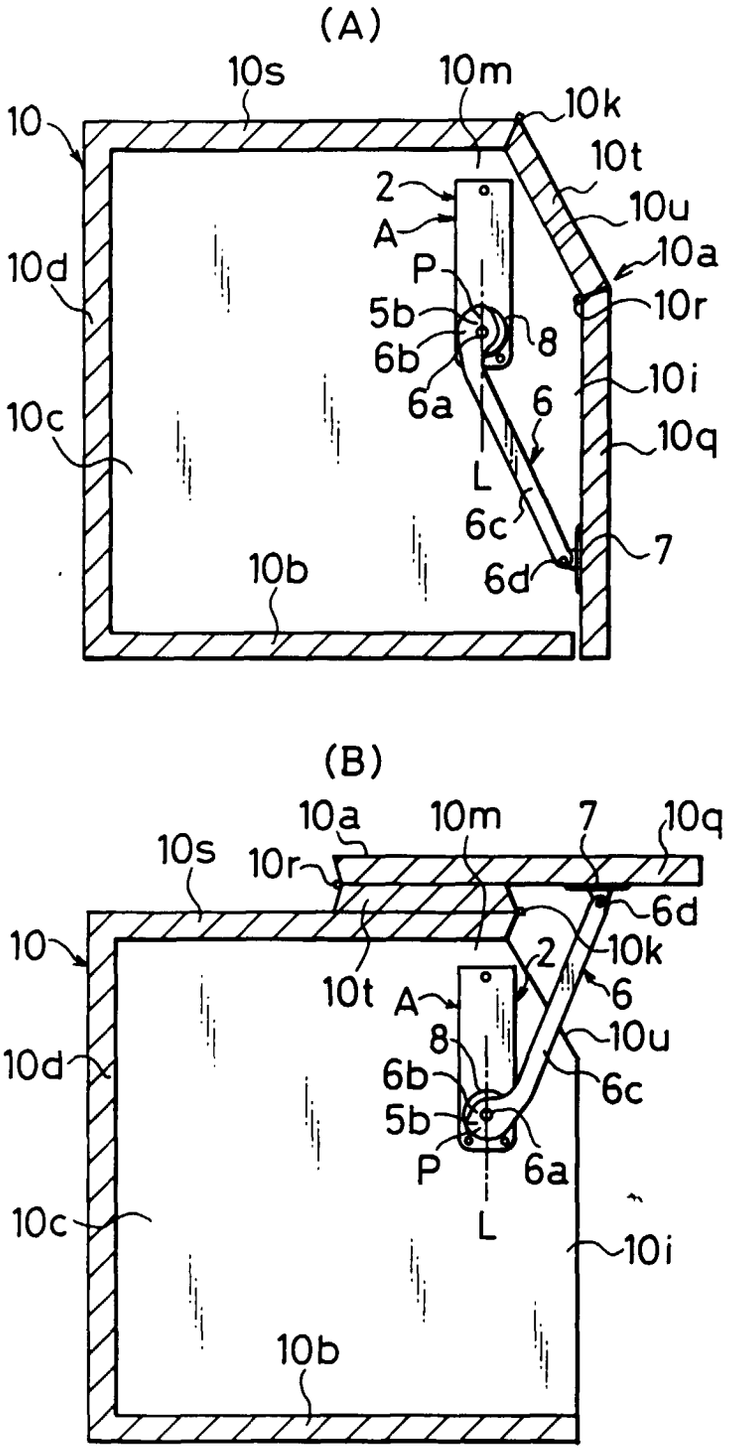
5b
P
L
10i
10b

FIG. 12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P
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5b
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10i
6a
6
10c
10q
L
6c
7
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6d
(B)
10a
10m
7
10q
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10r
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10
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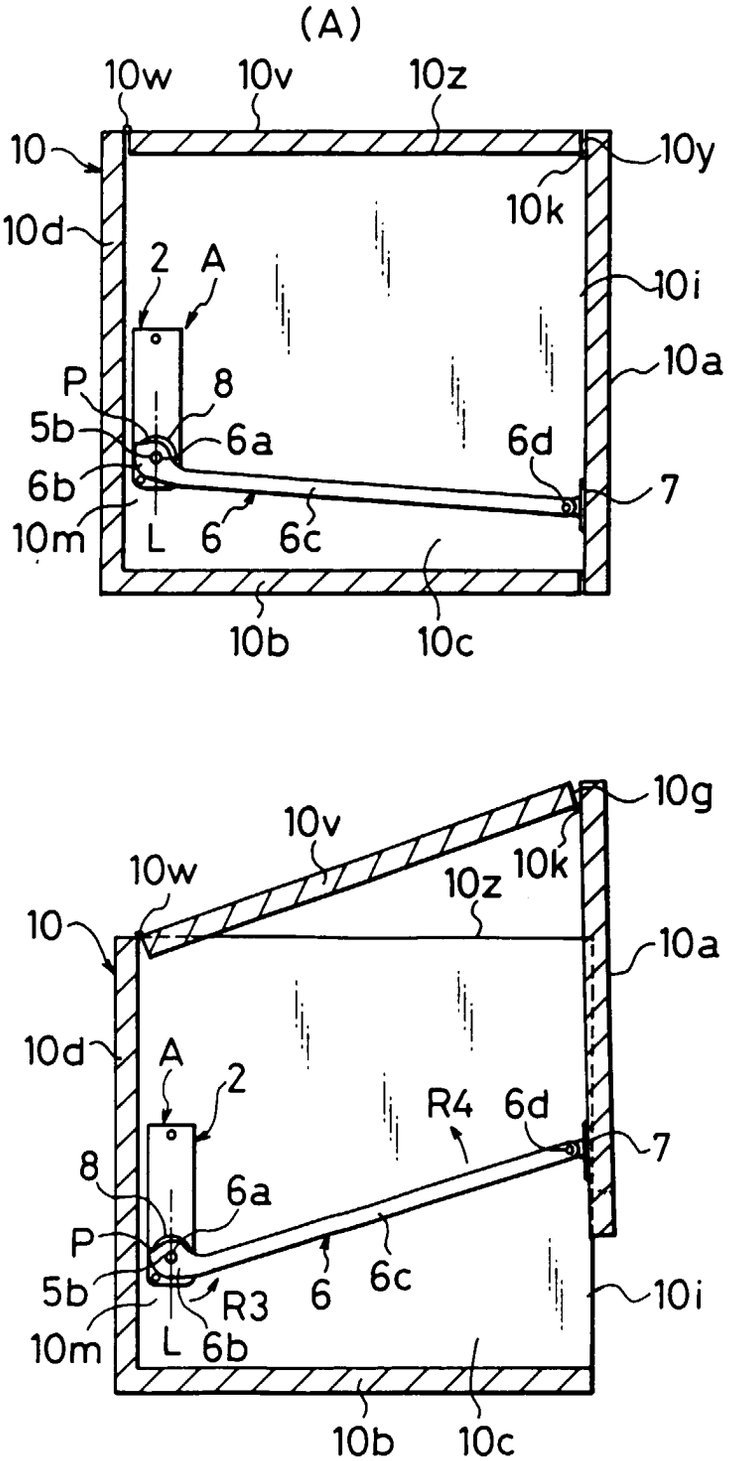
10c
L
10i
10b

FIG. 13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6b
7
10m
L
6
6c
10b
10c
10g
10v
10w
10k
10z
10
10a
10d
A
2
R4
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R3
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10m
L
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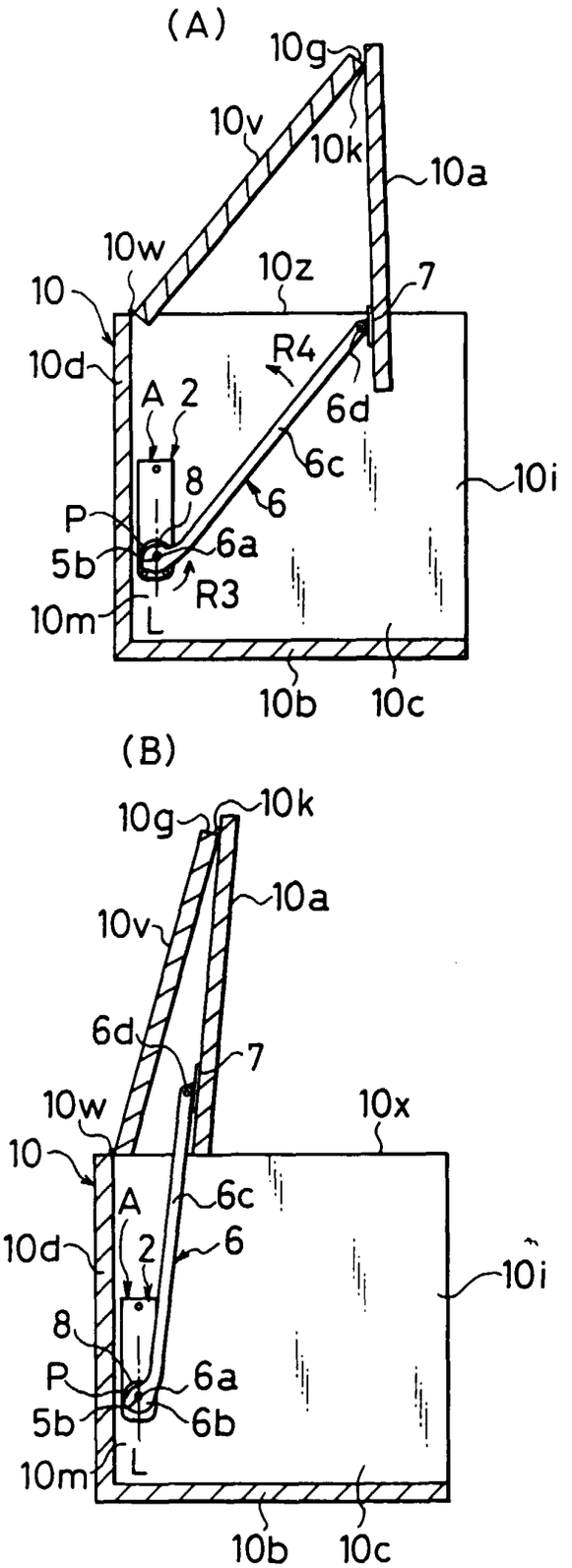
10b
10c

FIG. 14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10i
P
6a
5b
R3
10m
L
10b
10c
(B)
10g
10k
10a
10v
6d
7
10w
10x
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6b
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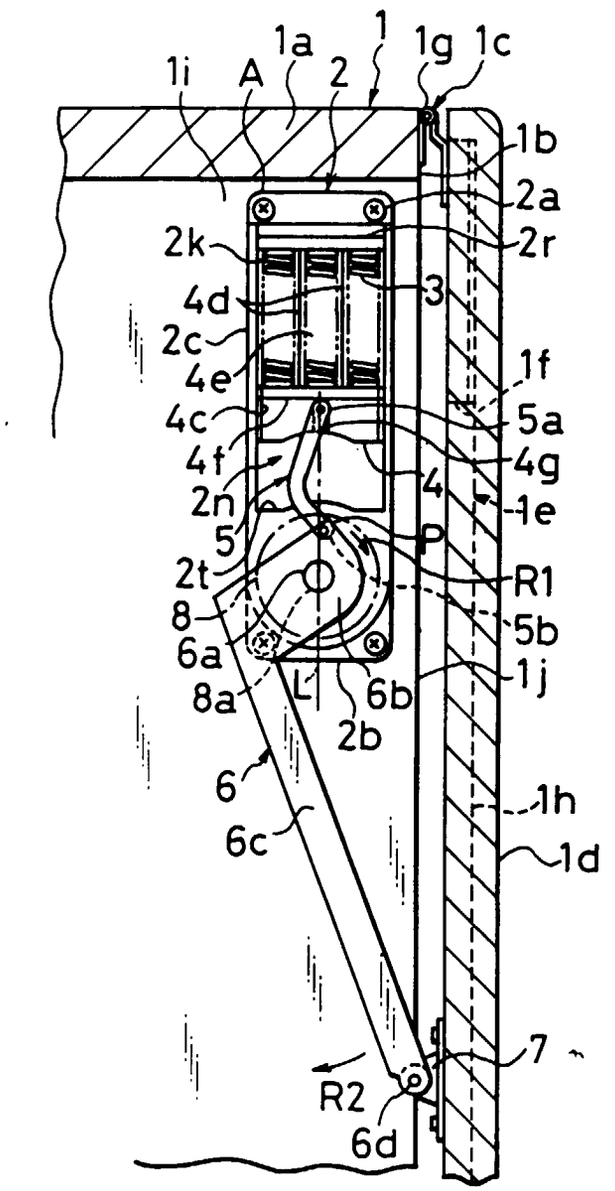
L
10b
10c

FIG. 15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1f
5a
4c
4g
4f
4
2n
1e
5
P
2t
R1
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5b
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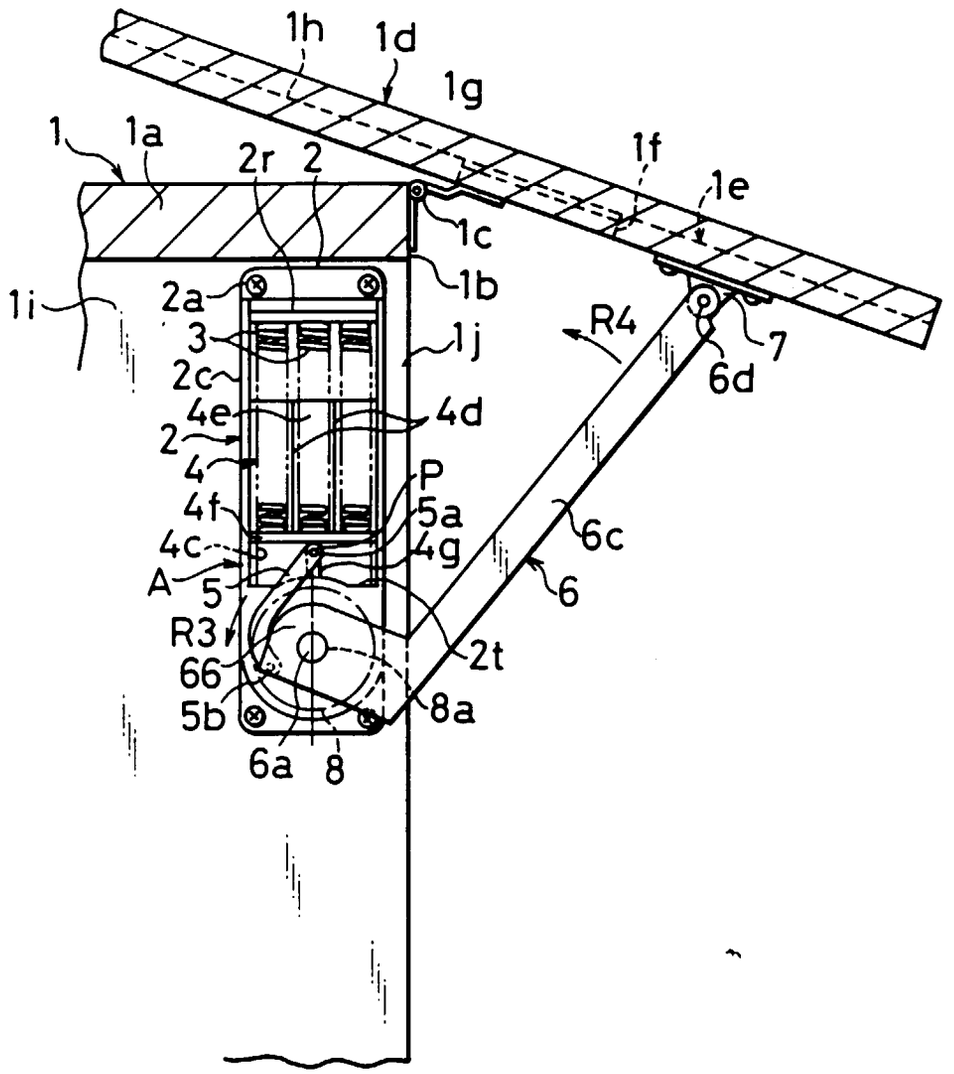
6c
1d
7
R2
6d

FIG. 16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1c
1b
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2a
3
1j
R4
7
6d
2c
4e
4d
2
4
P
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4g
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R3
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66
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6a
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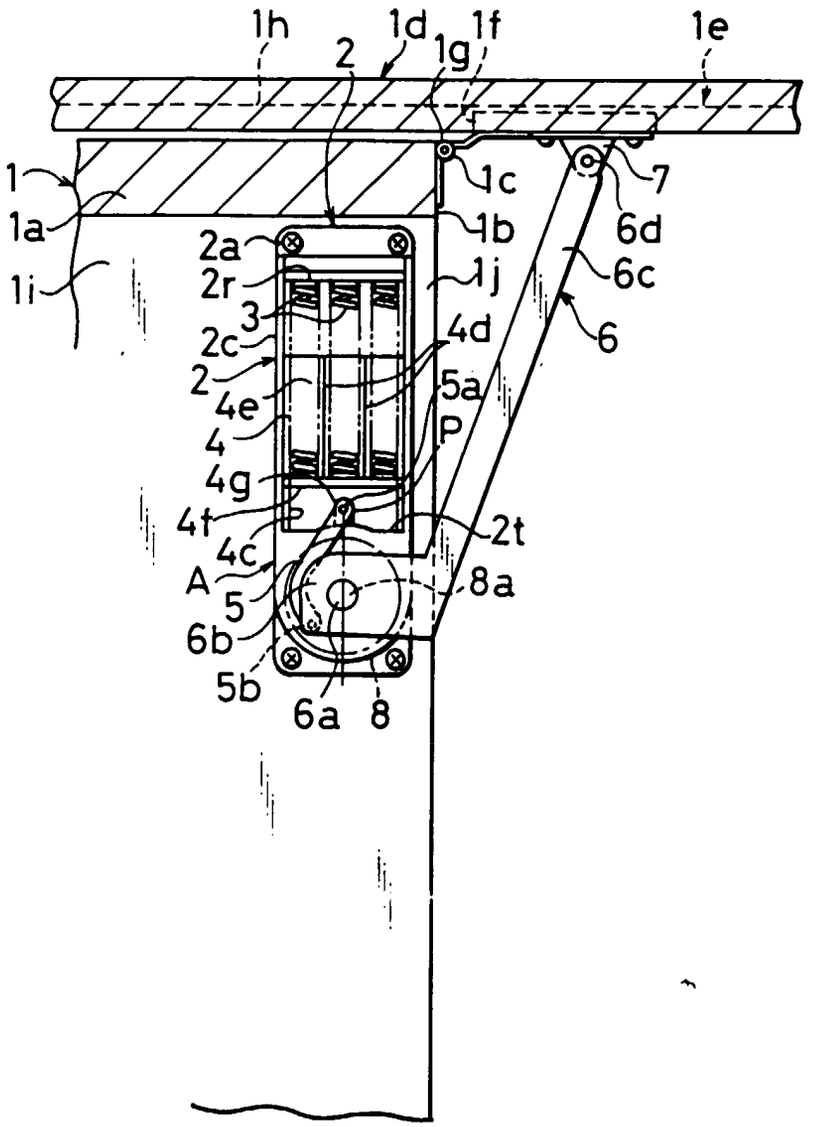
FIG. 17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4e
4
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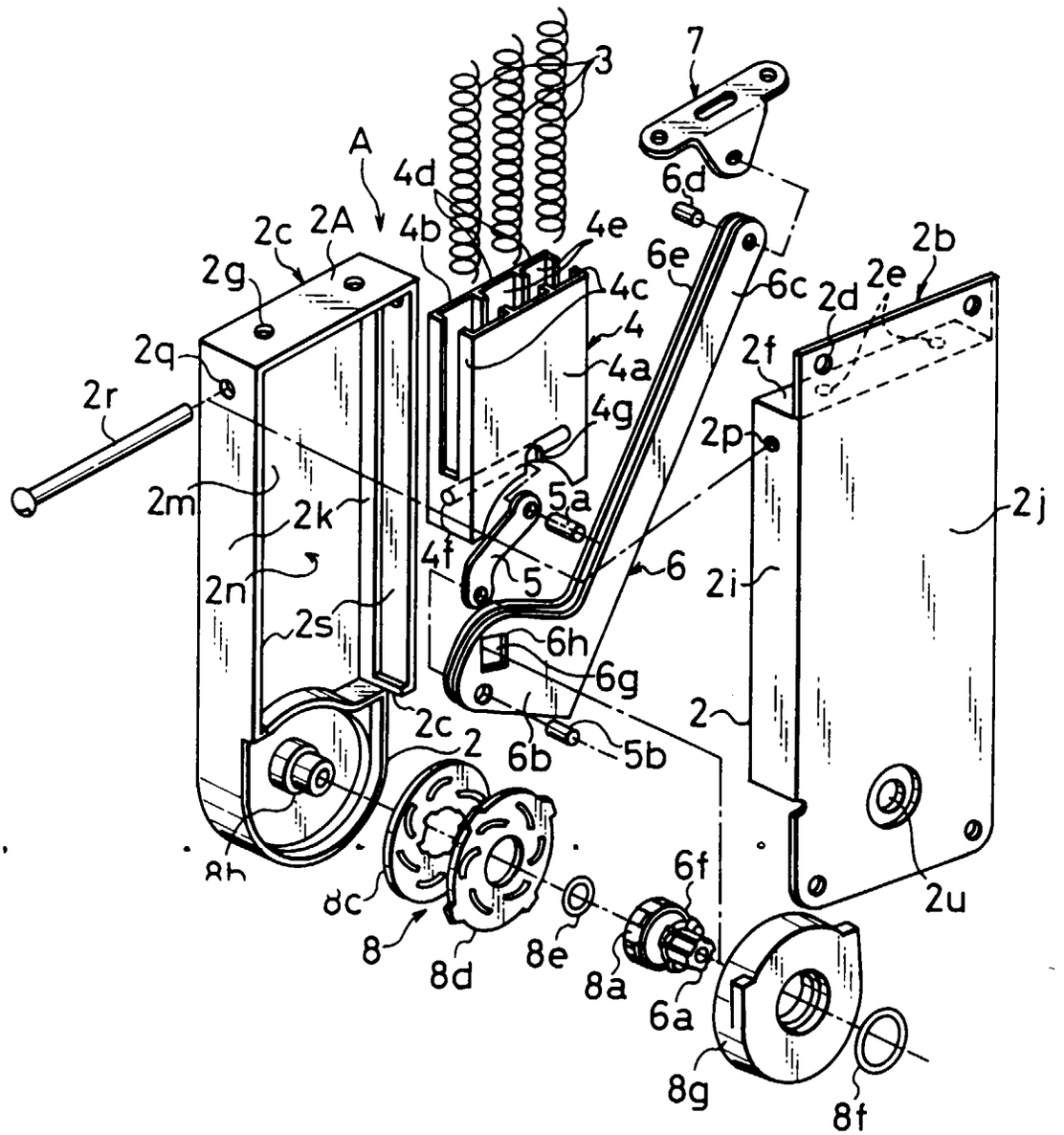
P
2t
8a

FIG. 18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2g
4c
6c
2d
2e
4
2q
2f
4a
2r
4g
2p
2m
5a
2j
2k
4f
5
6
2i
2n
2s
6h
6g
2
2c
2
6b
5b
8h
6f
8c
8
8d
8e
8a
2u
6a
8g
8f