



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
23.05.2012 Bulletin 2012/21

(51) Int Cl.:
E06B 9/52 (2006.01) **E06B 3/92 (2006.01)**
E06B 3/48 (2006.01) **E05F 1/02 (2006.01)**

(21) Application number: **11009146.9**

(22) Date of filing: **18.11.2011**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

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(30) Priority: **18.11.2010 NL 2005712**
13.12.2010 EP 10252100

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(54) **Closure for a door opening or window opening**

(57) A closure for a door opening or window opening (1) comprises a horizontally extending upper guide track (2), a horizontally extending lower guide track (3), a stationary frame (4) part extending vertically between corresponding first ends of the guide tracks (2,3), a movable frame part (5) which extends vertically between said guide tracks (2,3) and which is movable between a first position adjacent the stationary frame part (4) and a second position near the second ends of the guide tracks (2,3), a foldable screen (6) attached to and extending between the stationary frame part (4) and movable frame part (5), and guiding means (20) for guiding movement of the screen (6) and/or movable frame part (5) during

closing and opening of the closure (1). A gravity-operated mass (9) is movable within the stationary frame part (4) and by pull means (10) is connected to the movable frame part (5) in such a manner that the mass (9) preloads said movable frame part (5) for moving it in a direction towards its second position. In an embodiment the guiding means (20) may comprise an upper chain (7) and a lower chain (8), which in the first position of the movable frame part (5) each are housed partly in said movable frame part (5) and partly in the stationary frame part (4), and the closure (1) further comprises an auxiliary gravity-operated mass (18) connected to the end of the lower chain part (8) housed in the stationary frame part (4).

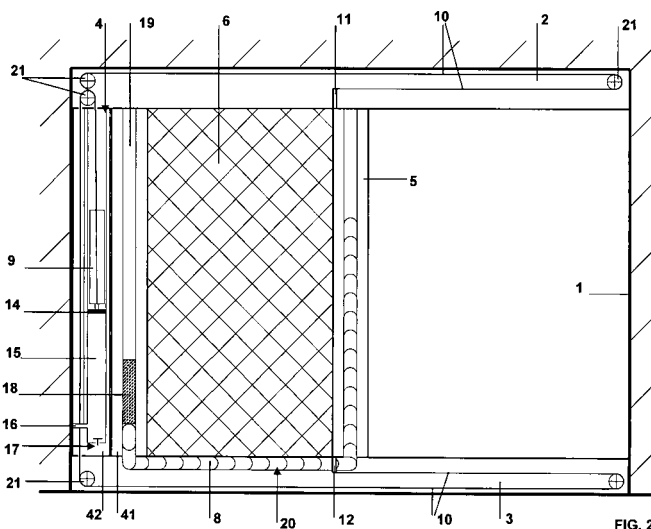


FIG. 2

Description

[0001] The invention relates to a closure for a door opening or window opening of the type comprising a horizontally extending upper guide track, a horizontally extending lower guide track, a stationary frame part extending vertically between corresponding first ends of the guide tracks, a movable frame part which extends vertically between said guide tracks and which is movable between a first position adjacent the stationary frame part and a second position near the second ends of the guide tracks, a foldable screen attached to and extending between the stationary frame part and movable frame part.

[0002] When the movable frame part is in its first position the foldable screen is positioned between the movable frame part and stationary frame part in a folded state (generally folded in a zigzag manner). In this position the door opening or window opening is opened. When the movable frame part moves away from the stationary frame part (towards its second position) the screen gradually unfolds while progressively closing the door or window opening. When the second position is reached the door or window opening is fully closed (for example for preventing the entry of insects).

[0003] The structure of this closure is such that its movable frame part remains in any chosen position. This means, for example, that after opening the door or window opening (moving the movable frame part partly or fully towards the stationary frame part) it remains in its position and that for again closing the door or window opening a user has to move the movable frame part back again towards its second position.

[0004] It is an object of the present invention to provide an improved closure of the type referred to above.

[0005] Thus, in accordance with the present invention a closure of the above-mentioned type is provided which is characterized by a gravity-operated mass that is movable within the stationary frame part and which by pull means is connected to the movable frame part in such a manner that the mass preloads said movable frame part for moving it in a direction towards its second position.

[0006] As a result the closure always will return to its closed position (movable frame part in the second position).

[0007] In one embodiment of the closure according to the present invention damping means are connected to the gravity-operated mass for damping its movement when the movable frame part moves towards its second position. As a result it is prevented that the closure movement of the movable frame part occurs too abrupt (e.g. hitting hard stops provided at the second ends of the guide tracks).

[0008] Preferably the damping means comprise a piston connected to the mass which is movable in a cylinder while displacing a fluid through an opening out of said cylinder. Said opening defines a flow restriction or resistance for the fluid preventing the piston from moving too fast.

[0009] When the size of said opening is settable the damping characteristics (speed with which the movable frame part moves) can be regulated (for example for compensating wear after an extended period of use).

[0010] In another embodiment of the closure a one-way valve is provided allowing an unrestricted inflow of the fluid into the cylinder when the movable frame part moves towards the stationary frame part. As a result the damping means do not restrict the speed with which the closure can be opened (unrestricted movement of the movable frame part towards its first position).

[0011] Constructively it is advantageous when the pull means are connected near an upper end and a lower end of the movable frame part. As a result, the movable frame part will be more evenly loaded and will more readily maintain its vertical orientation during movement towards and away from the stationary frame part.

[0012] Constructively it is advantageous when the pull means comprise flexible cable means guided around appropriate rollers positioned in the closure. Such cable means and rollers need only little space and do not substantially enlarge the parts of the closure in which they are mounted.

[0013] When the flexible cable means comprise a single cable of which the opposite ends are connected to the upper and lower ends, respectively, of the movable frame part and of which a central part extends in a downwardly extending loop which is movably engaged by the gravity-operated mass, an even distribution of (operating) forces on the structure is obtained.

[0014] Further an embodiment is mentioned in which the gravity-operated mass is housed in an auxiliary frame part which is connectable to said stationary frame part at a side thereof facing away from the movable frame part. As a result a conventional closure (without gravity-operated mass) may be retrofitted with such a mass without extremely complicated measures to be taken.

[0015] In yet another embodiment of the closure according to the present invention guiding means may be provided for guiding movement of the foldable screen and/or the movable frame part during closing and opening of the closure. The guiding means may extend at least partly in the movable frame part and/or in the stationary frame part.

[0016] According to one embodiment, the guiding means may comprise an upper chain and a lower chain, extending in the upper guide track and lower guide track, respectively, for cooperation with corresponding upper and lower edges of the screen. In the first position of the movable frame part, each chain is housed partly in said movable frame part and partly in the stationary frame part, wherein further an auxiliary gravity-operated mass is provided connected to the end of the lower chain part housed in the stationary frame part.

[0017] When the movable frame part moves from its first position towards its second position, firstly the chain parts housed in the stationary frame part move out of said frame part. This means that the lower and upper

chains then slide with respect to the lower and upper guide tracks, respectively. Especially at the lower guide track this causes a considerable friction which has to be overcome. This is accomplished by the combined effort of the (primary) gravity-operated mass and the auxiliary gravity-operated mass which former (through the pull means) loads the movable frame part towards its second position and which latter downwardly loads the respective part of the lower chain. When the auxiliary mass has moved downwardly and the respective chain part has moved out of the stationary frame part, a further movement of the movable frame part towards its second position causes the opposite chain parts to move out of the movable frame part. During this stage of the movement of the movable frame part the lower and upper chains do not move relative to the respective guide tracks, and especially at the lower guide track this leads to less friction which easily may be overcome by only the (primary) gravity-operated mass which acts on the movable frame part.

[0018] When the closure is closed and has to be opened, the movable frame part is moved from its second position towards the first position. First the respective parts of the chains are accommodated in the movable frame part which is moved contrary to the load of the (primary) mass. As a result it is possible to open the closure sufficiently to create a passage for a person (e.g. when the closure is applied to a door opening) without having to lift the auxiliary mass, thus minimising the required force. Only when one desires to fully open the closure, during a second stage of this operation at which the respective parts of the chains are moved into the stationary frame part, also the auxiliary mass is lifted by the lower chain and a larger effort is required (both for lifting the primary and auxiliary mass). In practise, however, the majority of occasions in which the closure will be opened will only lead to a limited movement of the movable frame part as described before.

[0019] In an embodiment which combines ease of construction with an effective operation the stationary frame part comprises a vertically extending chain guide for the respective part of the lower chain, wherein the auxiliary mass is guided in said guide too and rests upon said end of the respective lower chain part.

[0020] According to another embodiment, the guiding means may comprise a tape, extending along the lower guide track between a lower end of the stationary frame part and a lower end of the movable frame part, extending along the movable frame part between the lower end and the upper end of the movable frame part and extending along the upper guide track from said upper end of the movable frame part in a direction away from the stationary frame part, such that movement of the movable frame part towards or away from the stationary frame part results in movement of the tape along the movable frame part.

[0021] According to a preferred embodiment the tape is made of a metal. However, other materials or material combinations are possible. The tape may for instance

comprise two or more layers, wherein a first layer is made of a first material, e.g. a first plastic or a first metal, and wherein a further layer is made of a second material, e.g. a second plastic or a second metal.

[0022] Hereinafter the invention will be elucidated while referring to the drawings, in which:

Fig.1 schematically illustrates an embodiment of the closure according to the present invention, fully opened;

Fig.2 schematically illustrates said embodiment of the closure according to the present invention, partially closed,

Fig.3 schematically illustrates said embodiment of the closure according to the present invention, fully closed, and

Fig. 4 schematically illustrates a further embodiment of the closure according to the present invention, in a partially closed position, comparable to Fig. 2.

[0023] Referring to figures 1 to 3 an embodiment of a closure for a door or window opening 1 according to the present invention is illustrated. The closure is of the type comprising a horizontally extending upper guide track 2 (to be attached to the inner side of the opening 1 in any appropriate manner), a horizontally extending lower guide track 3 (likewise to be attached to the inner side of the opening 1 in any appropriate manner), a stationary frame part 4 (which comprises sections 41 and 42) extending vertically between corresponding first ends of the guide tracks 2 and 3 and a movable frame part 5 which extends vertically between said guide tracks 2 and 3 and which is movable between a first open position (figure 1) adjacent the stationary frame part 4 and a second closed position near the second ends of the guide tracks 2 and 3 (figure 3). Further a foldable screen 6 (not visible in figure 1) is attached to and extends between the stationary frame part section 41 and movable frame part 5. Finally the closure comprises guiding means 20, which in the illustrated embodiment comprise an upper chain 7 (only illustrated in figure 3) and lower chain 8 extending in the upper guide track 2 and lower guide track 3, respectively, for cooperation with corresponding upper and lower edges of the foldable screen 6, as is known per se. In the fully opened position of the closure according to figure 1 the screen is folded (e.g. in a zigzag manner) and housed in respective facing recesses of the stationary frame part section 41 and the movable frame part 5 (not represented).

[0024] For automatically closing the closure firstly a gravity-operated mass 9 is provided that is movable within stationary frame part section 42 and which by pull means 10 is connected to the movable frame part 5 in such a manner that the mass 9 preloads said movable frame part 5 for moving it in a direction towards its second position.

[0025] In the illustrated embodiment of the closure the pull means comprise a single flexible cable 10 of which

the opposite ends are connected to the upper and lower ends 11 and 12, respectively, of the movable frame part 5 and of which a central part extends in a downwardly extending loop 13 which is movably engaged by the gravity-operated mass 9. As an alternative two separate cables may be provided, each connected to the mass 9 and to the movable frame part 5. The flexible cable 10 is guided around appropriate rollers 21 positioned in the closure.

[0026] Damping means are connected to the gravity-operated mass 9 for damping its downward movement when the movable frame part 5 moves towards its second position. Said damping means may comprise a piston 14 connected to the mass 9 which is movable in a cylinder 15 while displacing a fluid out of said cylinder through an opening 16. The size of said opening 16 may be settable for setting the speed with which the mass 9 moves downward, and thus the speed with which the movable frame part 5 moves to its second (closed) position.

[0027] Further a one-way valve 17 is provided allowing an unrestricted inflow of the fluid into the cylinder 15 when the mass 9 moves upward (when the movable frame part 5 moves towards the stationary frame part 4).

[0028] The gravity-operated mass 9 is housed in the stationary frame part section 42 which is connectable to the other stationary frame part section 41 at a side thereof facing away from the movable frame part 5, for example by snap means (not illustrated).

[0029] As illustrated clearly in figure 1 for the lower chain 8, the chains 7 and 8 in the first position of the movable frame part 5 each are housed partly in said movable frame part 5 and partly in the stationary frame part section 41. In the second position (figure 3) both chains 7 and 8 have moved out of the frame part section 41 and movable frame part 5 substantially completely. In an intermediate position (figure 2) of the closure the chains 7 and 8 did move out of the stationary frame part section 41 but with their respective ends parts still are housed in the movable frame part 5.

[0030] For closing the closure it further comprises an auxiliary gravity-operated mass 18 connected to the end of the part of the lower chain 8 housed in the stationary frame part section 41. Specifically, in the embodiment shown, said stationary frame part section 41 comprises a vertically extending chain guide 19 for the respective part of the lower chain 8, wherein the auxiliary mass 18 is guided in said chain guide 19 too and rests upon said end of the respective lower chain part 8. Other manners for connecting the mass 18 to the lower chain 8 are conceivable too, however.

[0031] The operation of the closure is as follows. When the closure is closed (figure 3) and has to be opened, the movable frame part 5 is moved (to the left) from its second position towards the first position. This movement causes the mass 9 to be lifted. The one-way valve 17 opens and fluid (e.g. atmospheric air) enters the cylinder 15 below the piston 14 allowing an unrestricted movement of the mass 9. During a first stage of this opening movement

(until reaching the situation according to figure 2) the respective parts of the chains 7 and 8 are moved into the movable frame part 5 which is moved contrary to the load of the (primary) mass 9. As a result it is possible to open the closure sufficiently to create a passage for a person (e.g. when the closure is applied to a door opening) without having to lift the auxiliary mass 18, thus minimising the required force.

[0032] Only during a continued opening movement of the movable frame part 5 towards the stationary frame part 4 (when one desires to fully open the closure), the respective parts of the chains 7 and 8 also are moved into the stationary frame part section 41 and as a result the auxiliary mass 18 is lifted by the lower chain 8 and a larger effort is required (both for lifting the primary and auxiliary mass 9 and 18). In practise, however, the majority of occasions in which the closure will be opened will only lead to a limited movement of the movable frame part 5 (to the situation illustrated in figure 2) as described before.

[0033] The automatic closing movement of the closure starting from the situation illustrated in figure 1 occurs in the opposite sense. Until the situation is achieved according to figure 2, both the primary mass 9 and the auxiliary mass 18 move the movable frame part 5 in the direction for closing the closure. During this first part of the movement the chains 7 and 8 move out of the stationary frame part section 41 and experience sliding friction with respect to the upper and lower guide tracks 2 and 3.

[0034] During the second stage (figure 2 to figure 3) this sliding friction does not occur anymore because the chains 7 and 8 remain stationary with respect to said guide tracks 2 and 3 and move out of the movable frame part 5. During this stage only the primary mass 9 is operative, because the auxiliary mass 18 already reached its lowermost position in the intermediate position of the closure illustrated in figure 2.

[0035] Referring to figure 4, a further embodiment of a closure according to the present invention is illustrated, wherein parts corresponding to the previous embodiment are denoted with corresponding reference numerals. Just like the previous embodiment, the closure is provided with a mass 9, which preloads the movable frame part 5 towards its second (closed) position, as described above. The closure differs over the previous embodiment in that the guiding means 20 comprise a tape 22, as described in the non pre-published European patent application EP10252100 of applicant, the contents of which are considered to be incorporated herein by reference.

[0036] The tape 22 extends along the lower guide track 3, from a lower end of the stationary frame part 4 to a lower end 12 of the movable frame part 5. From there, it extends along the movable frame part 5, preferably through an elongated passage 23 provided inside the movable frame part 5, to the upper end 11 of the movable frame part 5. From there, it extends along the upper guide track 2, in a direction away from the stationary frame part 4, to an end of the upper guide track 2.

[0037] A first end 22a of the tape 22 may be secured to the upper guide track 2 near an end thereof (i.e. in the top right corner as illustrated in figure 4). The other end 22b of the tape 22 may be secured to the lower guide track 3, near the stationary frame part 4. Alternatively, the tape 22 may extend partly inside the stationary frame part 4, as illustrated, in which case the second end 22b may be secured inside the stationary frame part 4.

[0038] According to a preferred embodiment, at least one of the tape ends 22a, 22b is secured to the guide tracks 2,3 or stationary frame part 4 in an adjustable way, e.g. by means of an adjustment mechanism as described in the aforementioned patent application EP10252100 of applicant. As a result, the orientation of the movable frame part 5 can be adjusted, for instance to have said movable frame part extend parallel to the stationary frame part 4.

[0039] As can be seen in figure 4, the tape 22 forms an S or Z shape, extending along the lower guide track 3, up the movable frame part 5 and along the upper guide track 2. As the movable frame part 5 is moved from its first (open) position to its second (closed) position, a portion of the tape 22 that initially extends along the upper guide track 3 is fed progressively down and along the movable frame part 5 and a portion of the tape 22 that initially extends along the movable frame part 5 is fed progressively down and along the lower guide track 3.

[0040] According to a preferred embodiment, the tape 22 is made of a metal. In such case, magnets or magnetic strips (not shown) may be used to maintain the tape 22 in position. Such magnets or magnetic strips may be included in the upper and/or lower guide track 2, 3 and/or in the movable frame part 5. Alternatively, the guide tracks and/or movable frame part themselves may form the magnetic strip.

[0041] According to a further embodiment, one or more cords 24 may extend between the stationary frame part 4 and the movable frame part 5, to support the screen 6 against lateral loads such as wind. To that end, the screen 6 may be provided with holes or rings for passing through the cords 24. Each cord 24 may have a first end 24a connected to the stationary frame part 4, e.g. directly or via a suitable connector such as a resilient member (not shown). A second end 24b of the cords 24 can be connected to the tape 22, inside the movable frame part 5. The second end 24b may be directly connected to the tape 22, or via a flexible intermediate member 26 (as illustrated). Each end 24b may be separately connected to the tape 22 or they may be joined together, and connected to the tape 22 via a single intermediate member 26.

[0042] To take up length of cord within the movable frame part 5, the cords 24 or intermediate member(s) 26 may, from their point of attachment to the tape 22, extend in elongate direction along the movable frame part 5 to a turning point 25 and from there back in the opposite elongate direction.

[0043] During movement of the movable frame part 5,

the tape 22 will be fed along the movable frame part 5 as described above, thereby taking along the cords 24. When the movable frame part 5 is moved away from the stationary frame part 4, the movement of the tape 22 will cause additional lengths of cord 24 to be fed from within the movable frame part 5 to extend between the stationary frame part 4 and the movable frame part 5. When the movable frame part 5 is moved towards the stationary frame part 4, the movement of the tape 22 will cause lengths of cord 24 to be drawn into the movable frame part 5, so as to reduce the length of the cords 24 extending between the stationary frame part 4 and the movable frame part 5.

[0044] The invention is not limited to the embodiments described before which may be varied widely within the scope of the invention. Moreover, all combinations (of parts) of the embodiments shown and described are explicitly understood to be incorporated within this description and are explicitly understood to fall within the scope of the invention as defined by the appending claims.

Claims

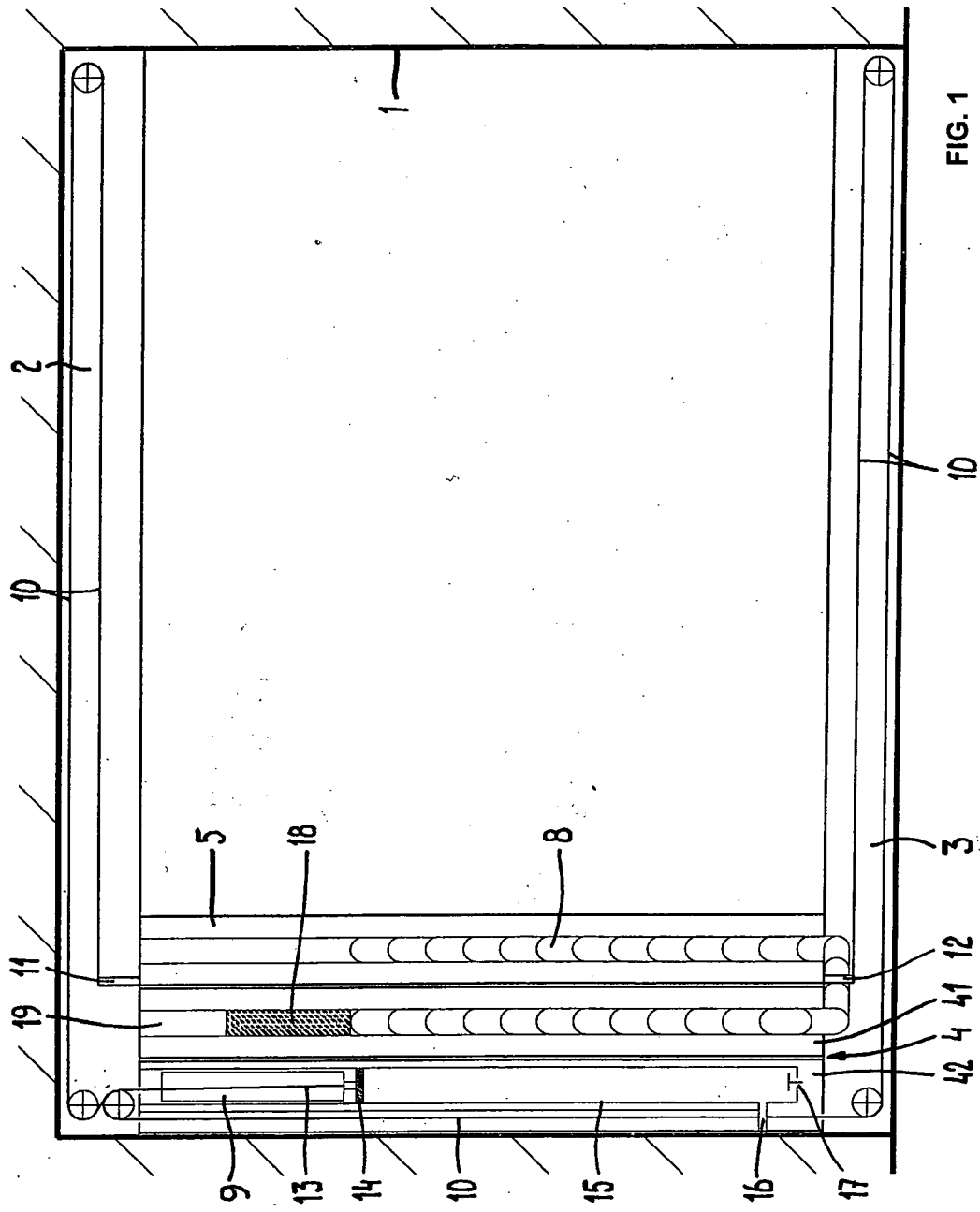
1. Closure for a door opening or window opening of the type comprising a horizontally extending upper guide track, a horizontally extending lower guide track, a stationary frame part extending vertically between corresponding first ends of the guide tracks, a movable frame part which extends vertically between said guide tracks and which is movable between a first position adjacent the stationary frame part and a second position near the second ends of the guide tracks, a foldable screen attached to and extending between the stationary frame part and movable frame part, **characterized by** a gravity-operated mass that is movable within the stationary frame part and which by pull means is connected to the movable frame part in such a manner that the mass preloads said movable frame part for moving it in a direction towards its second position.
2. Closure according to claim 1, wherein damping means are connected to the gravity-operated mass for damping its movement when the movable frame part moves towards its second position.
3. Closure according to claim 2, wherein the damping means comprise a piston connected to the mass which is movable in a cylinder while displacing a fluid through an opening out of said cylinder.
4. Closure according to claim 3, wherein the size of said opening is settable.
5. Closure according to claim 3 or 4, wherein a one-way valve is provided allowing an unrestricted inflow of the fluid into the cylinder when the movable frame

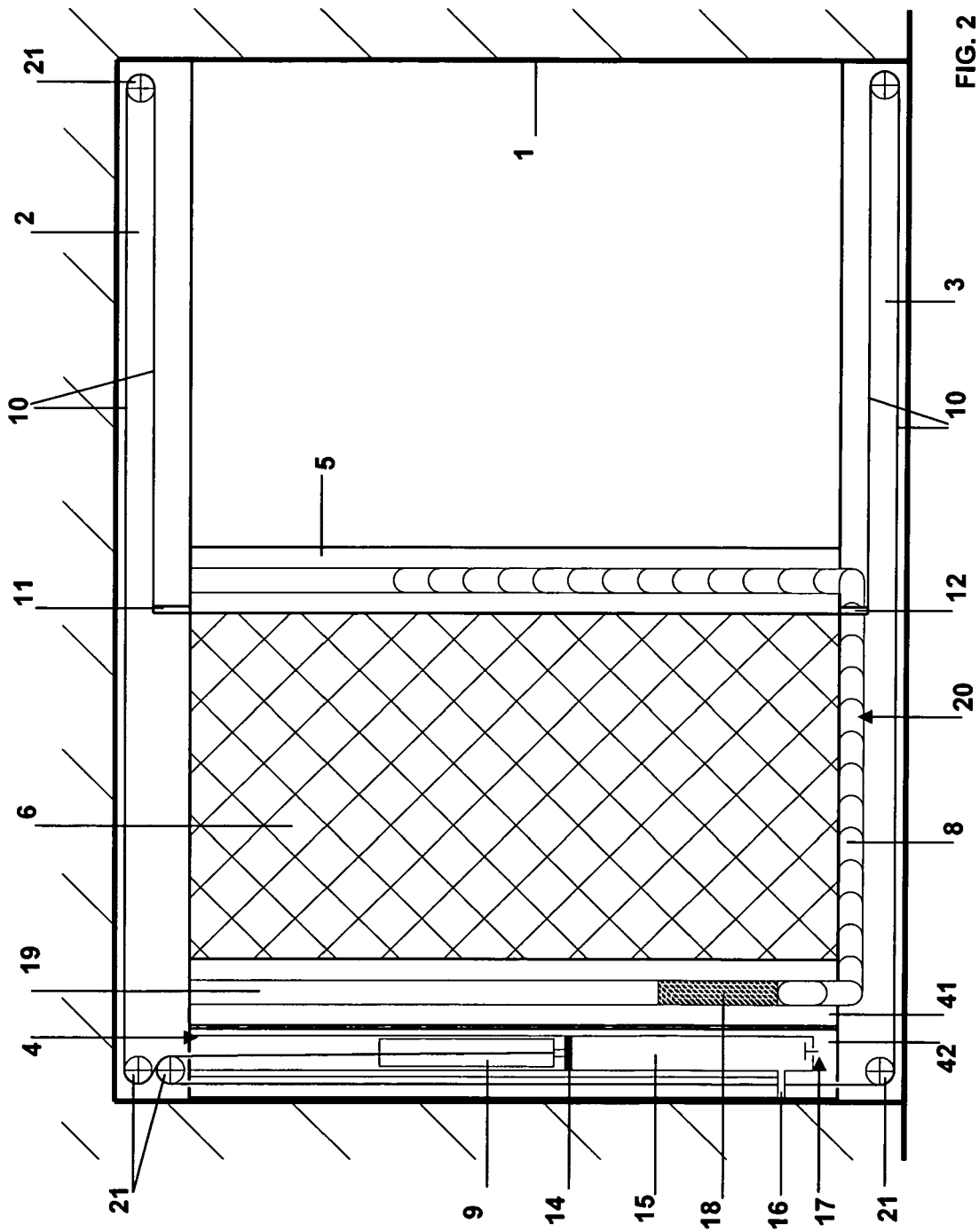
part moves towards the stationary frame part.

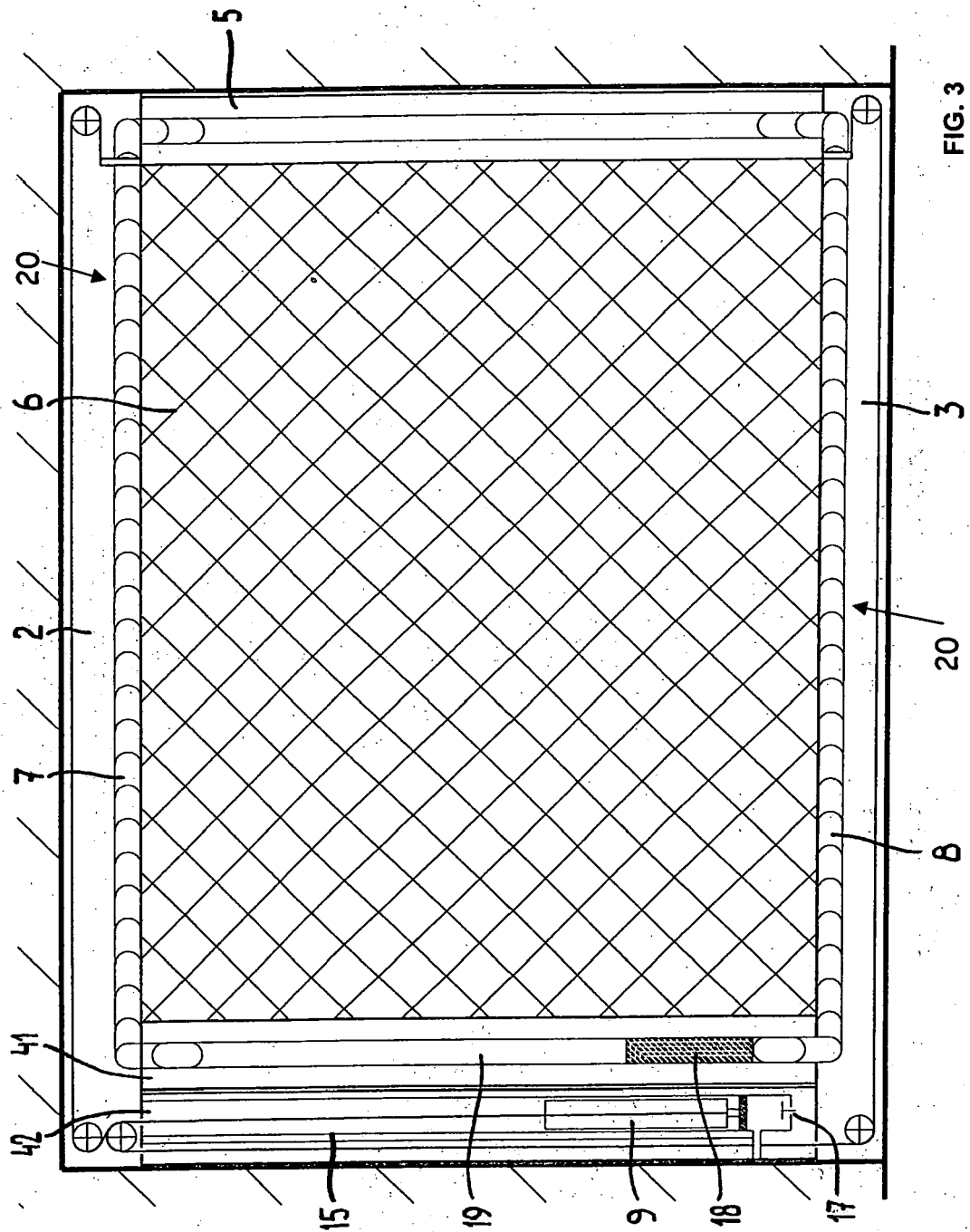
6. Closure according to any of the previous claims, wherein the pull means are connected near an upper end and a lower end of the movable frame part. 5
7. Closure according to any of the previous claims, wherein the pull means comprise flexible cable means guided around appropriate rollers positioned in the closure. 10
8. Closure according to claim 7, wherein the flexible cable means comprise a single cable of which the opposite ends are connected to the upper and lower ends, respectively, of the movable frame part and of which a central part extends in a downwardly extending loop which is movably engaged by the gravity-operated mass. 15
9. Closure according to any of the previous claims, wherein the gravity-operated mass is housed in an auxiliary frame part which is connectable to said stationary frame part at a side thereof facing away from the movable frame part. 20
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10. Closure according to any of the previous claims, wherein an upper chain and a lower chain extend in the upper guide track and lower guide track, respectively, for cooperation with corresponding upper and lower edges of the foldable screen. 30
11. Closure according to claim 10, wherein the chains in the first position of the movable frame part each are housed partly in said movable frame part and partly in the stationary frame part, further comprising an auxiliary gravity-operated mass connected to the end of the lower chain part housed in the stationary frame part. 35
12. Closure according to claim 11, wherein the stationary frame part comprises a vertically extending chain guide for the respective part of the lower chain and wherein the auxiliary mass is guided in said guide too and rests upon said end of the respective lower chain part. 40
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13. Closure according to any of the previous claims, wherein a tape is provided, extending along the lower guide track between a lower end of the stationary frame part and a lower end of the movable frame part, extending along the movable frame part from the lower end to the upper end of the movable frame part and extending along the upper guide track from said upper end of the movable frame part in a direction away from the stationary frame part, such that movement of the movable frame part towards or away from the stationary frame part results in movement of the tape along the movable frame part. 50
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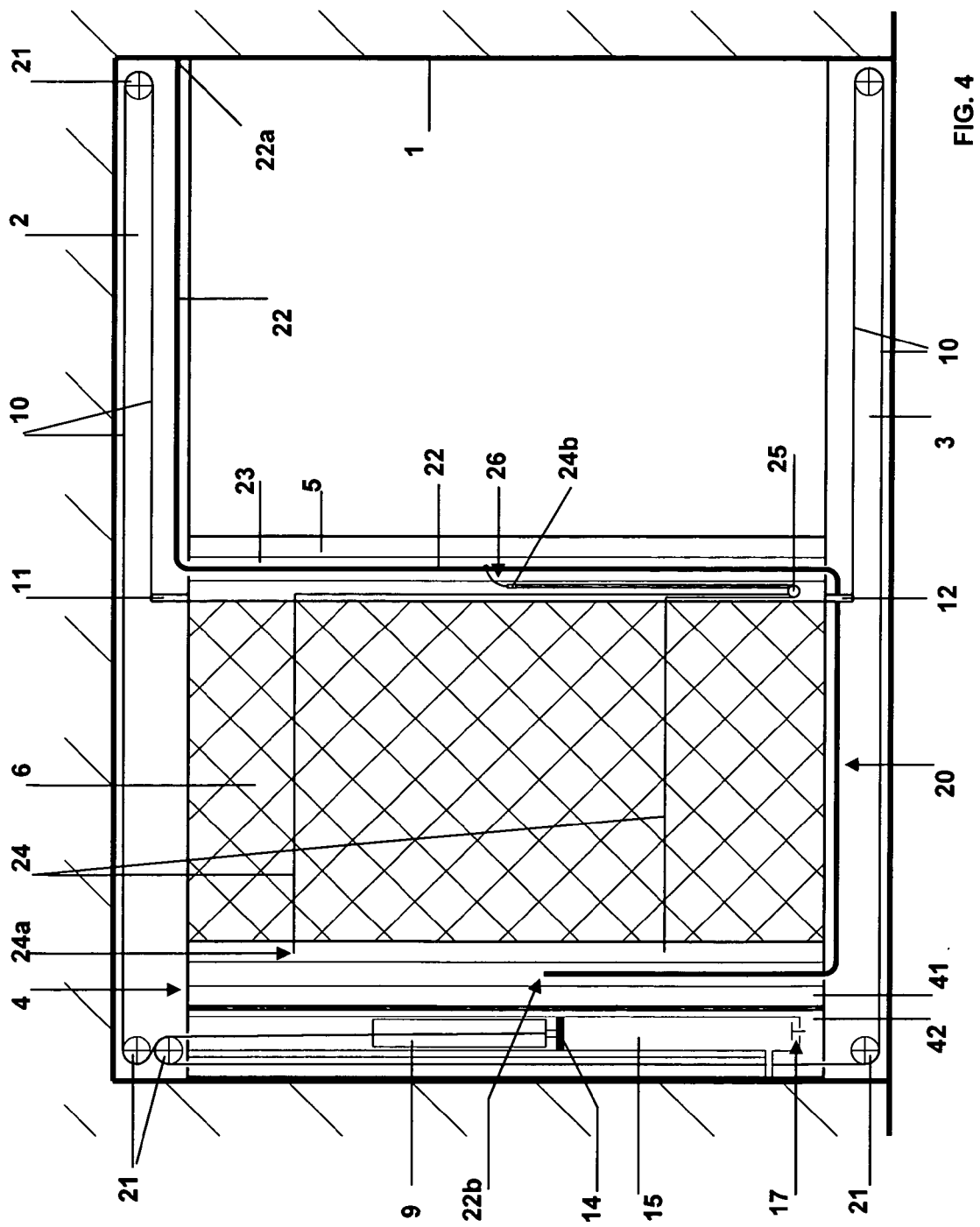
14. Closure according to claim 13, wherein the tape is a metal tape.

15. Closure according to claim 13 or 14, wherein at least one cord is provided, extending between the stationary frame part and the movable frame part to support the foldable screen in lateral direction, wherein the at least one cord has one end associated to the tape so as to be movable along the movable frame part with movement of said tape, such that movement of the movable frame part towards or away from the stationary frame part results in movement of said at least one cord end along the movable frame part, which in turn results in decrease or increase, respectively, of the length of the at least one cord extending between the stationary frame part and the movable frame part.











EUROPEAN SEARCH REPORT

 Application Number
 EP 11 00 9146

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X	US 6 615 894 B1 (MCKEON JAMES [US]) 9 September 2003 (2003-09-09)	1,6,7,9	INV. E06B9/52
Y	* column 4, line 27 - line 51 *	2-5	E06B3/92
A	* column 5, line 23 - line 26 *	8,10-15	E06B3/48
	* column 5, line 46 - line 58; figures 1-5 *		E05F1/02
Y	----- WO 97/23701 A1 (ATC PRODUCTS LIMITED [GB]; DRURY MALCOLM [GB]) 3 July 1997 (1997-07-03) * abstract * * page 5, line 13 - line 34; figures 1-3 * -----	2-5	
			TECHNICAL FIELDS SEARCHED (IPC)
			E06B E05F E05D E05B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 9 February 2012	Examiner Koulo, G
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 11 00 9146

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09-02-2012

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