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(54) ROLLER BLIND WITH ADJUSTABLE SPACING SLATS

(57) Roller shutter for blackout effect of windows comprising a plurality of parallel laths (2, 71-83) constrained with respect to each other so that they can be wound up around a roller (3), to which the first one of said laths is constrained, characterized in that a portion of said laths is spaceable with respect to each other and a portion of said laths is not spaceable with respect to each other, said not spaceable laths (71-77) being the first ones starting from said roller (3), and in that said spaceable laths (78-83, 221-224) are constrained with respect to each other by means of "U" hooks (5,54,90) sliding inside slots (2203,2204) provided in the profile of said laths.

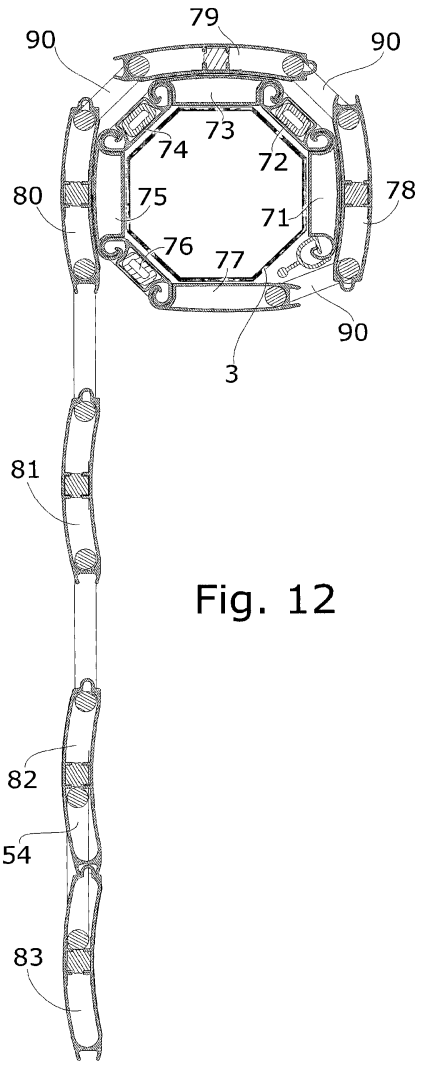

Fig. 12

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Description

[0001] The present invention relates to a roller shutter to be used for total or partial blackout of windows in buildings.

TECHNICAL FIELD

[0002] At the state of the art there are known various embodiments of roller shutters able to block out any light, mounted outside windows in glass or configured to be wound up around an axis or "roller" arranged inside a box positioned in the upper portion of the window.

[0003] According to the traditional embodiments, roller shutters are made up of a plurality of laths or slats parallel between each other, constrained with respect to each other so that they can respectively rotate; hence, the laths can be wound up around a roller in the box. It is to be précised that in the present document the words "lath" or "slat" are used as synonyms.

[0004] However, only a total blackout effect is obtained in this way from the roller shutter, since the distance between the two parallel laths is constant, and in particular it is such that light does not pass therebetween. For this reason, a series of technical solutions have been developed which allow to space out the laths when the roller shutter is lowered, so that both the blackout screen function and the function of solar screen and wind screen are obtained by means of the roller shutter.

[0005] A first solution known at the state of the art is described in the Italian application BA2013A000002, where it is shown a roller shutter in which the laths are constrained with respect to each other by ovoid flanges comprising a slotted hole and constrained to clamping screws rigidly constrained to the profile of the lath. Another example is described in the Spanish application ES2335372, in which it is shown a substantially similar system. A different mechanism is shown in the Italian Patent 1394469 in which it is described a roller shutter whose laths are constrained by a mechanism of articulated rods which allows to vary the respective distance among the laths. Many other embodiments are known at the state of the art, but all of them have some technical drawbacks which limit their efficacy.

[0006] In fact, all the systems using articulated rods, chains or other similar mechanisms cannot be used with boxes and guide rails of existing windows, due to clear dimensions reasons. This limits their commercial diffusion very much. Secondly, systems using slotted connecting flanges are complex to be realized and so they are not cheap.

[0007] All the systems known at the state of the art have further a problem of excessive dimensions when the laths are wound up around the axis or "roller" of the roller shutter. In fact, when the roller shutter is lifted, the laths are wound up around the roller as spaced out with respect to each other due to the weight of the lower laths which are inside the guide rails yet. This makes the arrangement of the laths around the roller not such to optimize the radial dimensions of the wound up roller shutter.

[0008] Therefore, aim of the present invention is to provide a roller shutter whose laths are constrained so that they can be spaced out with respect to each other, which overcomes the limits linked to the embodiments known at the state of the art.

[0009] In particular, the roller shutter according to the invention is cheap in its realization, is provided with a constraining system which reduces strongly the problems of wear compared to the systems known at the state of the art and it is configured so that it has limited dimensions when wound up around its own roller. Moreover, the constraining system of the slats (laths) according to the invention is such that it has limited dimensions thus allowing that it is used inside the guide rails of the existing windows.

[0010] The invention reaches the prefixed aims since it is a roller shutter with blackout effect comprising a plurality of laths parallel with respect to each other, constrained so that they can be wound up around a roller to which the first one of said laths is constrained, characterized in that a portion of said laths is spaceable with respect to each other and a portion of said laths is not-spaceable with respect to each other, said not-spaceable laths being the first ones starting from said roller and in that said spaceable laths are constrained with respect to each other by means of "U" hooks sliding inside slots provided in the profile of said laths.

[0011] The invention will be now described with reference to the appended figures 1 to 15. In fig. 1 it is shown an exploded view of the components of a preferred embodiment of a roller shutter according to the present invention; in figure 2 it is shown the same view as assembled; in figures 3 and 4 there are shown two views, a side and an isometric view respectively, of the roller shutter wound up around its own roller; in figures 5 to 8 there are shown the components of the roller shutter according to the present invention; in figures 9 and 10 there are shown two views, a frontal and a side view respectively, of a roller shutter according to the present invention; in figure 11 it is shown an embodiment of roller shutters with spaceable laths known at the state of the art; in figure 12 it is shown a second embodiment of the roller shutter according to the present invention; in figures 13, 14 and 15 there are shown section views of the profiles usable with the roller shutter according to the present invention.

[0012] As it is shown in figure 1, the roller shutter (1) according to a first embodiment of the present invention comprises a plurality of laths constrained with respect to each other. As it is described in detail in the following the laths (2) have profiles of two different types (21, 22), shown in section in figure 5 and 6, respectively. The reference number (2) refers to the assembly of laths comprised in the roller shutter, the reference numbers (211, 212, 213, 214, 221, 222, 223) refer to the single laths, numbered starting from the lath constrained to the roller,

where needed for explanation of the functioning of the invention. The laths (2) can be wound up around a roller (3), which can have a manual or motorized control. For graphical clarity, in figure there are not shown the components which allow the constraint of the roller to the box and its manual or automatic movement; such components are to be intended as known by the experts of the art. Similarly, there are not shown the side rails inside which the roller shutter slides, to be intended as known at the state of the art as well. The first lath (211) is constrained to the roller (3) by means of a flexible band or spring (4), of known type at the state of the art as well, and visible in figures 3 and 10. The word "spring" is used only to mean that the element is flexible elastically, and not to mean that the same undergoes remarkable stretching due to the weight of the roller shutter.

[0013] It is to be considered that rollers (3) with polygonally shaped, and preferably octagonally shaped, section are commonly used, and not the ones with circularly shaped section. This embodiment of roller, shown also in figures, is to be intended a preferred and not limiting embodiment of the present invention.

[0014] The constraint between the laths constituting the roller shutter occurs preferably according to two distinct ways. The first laths coupled to the roller (3), preferably three or four laths (211, 212, 213, 214) have a profile of the type shown in figure 6, when viewed in section, whose technical features are described in the following. These laths are directly constrained with respect to each other.

[0015] As it is shown in figure 6, the profile of the first type (21) comprises constraining means which allow to constrain a lath to the next one and which allow rotation of two constrained laths with respect to each other at the same time. Preferably, such constraining means comprise a crooked hook (2101) and a respective "C" hook (2102), configured so that once the two hooks (2101, 2102) are constrained with respect to each other by introducing and side sliding a lath with respect to the next one, the two laths can rotate respectively, as it is shown in figure 3. The shapes of the profile and hooks are such that it is impossible to disassemble the two laths unless by side sliding with respect to each other. It is to be observed that the side sliding is not possible when the roller shutter is installed, since the guide rails are provided (not shown in figures) which limit this type of movement. Moreover, the profile of the first type (21) is preferably hollow internally, so that the whole weight of roller shutter is reduced and the constraint of the laths with different profile is allowed, as explained in the following. Inside the profile in fact at least a slot is provided. In the embodiment shown in figure 6 the slot is divided in two sections (2103, 2104) by partitions.

[0016] As said, the laths next to the first ones, preferably starting from the fifth one, have a different profile (22), whose section view is shown in figure 6. Also the profile of the second type (22) is hollow internally. The inner recess, shaped as a slot, is divided at least partially by partitions (2205) in a first (2203) and a second portion (2204). In the outer portion the profile has an appendix (2201) at an end and a corresponding recess (2202) at the opposite end. The functioning of all these elements will be clear in short.

[0017] As it is shown in figure 1, the laths of the second type (221, 222, 223) are constrained with respect to each other by means of hooks (5) of the type shown in figure 7. The hooks are of "U" type and comprise two parallel sections (51, 52) connected with respect to each other by a section perpendicular thereto (53). The dimension of these hooks, in section, is such that it allows that they slide with slack inside the inner recess of the profile (22) of the second type. Moreover, the section of hooks is such that the partitions (2105, 2205) cannot be crossed, which are provided in the inner slot of the profile.

[0018] The last component of the roller shutter according to a first embodiment of the present invention is the plug (6), configured to be constrained laterally to the profile (22) of the lath. The plug (6) is preferably provided with a projection (61) configured to be introduced inside partitions (2205) provided inside the recess of the profile (22) of the second type, and to be fixed therein by means of a screw (7) which can be screwed in a suitable hole (62) provided on the outer surface of the plug (6). The shape of the plug is such that it has an outer surface (63) which prevents the hooks (5) from being removed from the laths of the roller shutter, and at the same time it is such that it allows respective rotation and sliding of hooks (5) with respect to the laths. To such aim, there are provided variations of thickness (64) which allow the hooks (5) to be housed according to what shown in figure 9.

[0019] From the point of view of the materials which can be used, without this being limiting for the present invention, it can be said that the laths of the roller shutter can be realized in plastic material and preferably in PVC, the hooks (5) are preferably in metal material, and more preferably in steel, the plugs (6) can be realized in plastic material as well.

[0020] After describing all the components of the roller shutter, it is now possible to describe its assembly and functioning. At least a band spring (4) is constrained to the roller (3). Preferably there are provided a plurality of band springs, whose number varies according to the width of the roller shutter, integrally constrained to the first lath (211) whose profile is of the just described first type (21).

[0021] The length of the band springs (4) is such that when the roller (3) winds up the roller shutter by rotating in the direction indicated by the arrow in figure 10, the first lath (211) rests at one of the sides of the octagon making up the section of the roller (3). Instead, the length of the spring has a not significant role if a roller with circular section is used.

[0022] As it is particularly clear from figures 10, 3 and 4, the dimensions of the roller (3) and laths of the first type (211, 212, 213, 214) are such that when said laths are wound up around the roller (3) the first (211) and the

third lath (213) are parallel with respect to each other, and the same occurs for the second (212) and the fourth lath (214). In this way, it is obtained that, by using a roller (3) with octagonal section, the four laths rest on four of the eight sides of the octagon and their outer surfaces define a substantially square shape, around which the laths of the next type wind up. The parallelism of the laths can be obviously realized with rollers (3) of any section, also circular, by suitably configuring the dimensions of the laths with respect to the diameter of the roller.

[0023] It is to be noted now that due to the force of weight the next laths (221, 222, 223, 224) are wound up in spaced position with respect to each other, as it is shown in figure 4, and this increases inevitably the radial dimensions of a roller shutter with spaceable laths with respect to the dimensions of a roller shutter with not spaceable laths, thus avoiding in some cases the replacement of the same inside the existing boxes. The just described measure concerning the use of not spaceable laths in the upper portion of the roller shutter and the respective correct dimensioning of roller shutter and laths, reduces markedly the dimensions of the roller shutter when this is wound up inside the box and allows the laths next to the first four ones to be wound up around a surface (defined by the extrados of the first four laths) of equivalent radius markedly greater than the roller. However, this measure has not significant effect on the possibility to space out the laths with respect to each other, since the laths arranged in the upper portion of the roller shutter are the first ones that happen to be inside the box when the roller shutter is lifted, and for this reason it is not important that they are spaced out or not.

[0024] With reference to the constraint of the spaceable laths, it is to be noted in figure 9 that the same are constrained with respect to each other by means of hooks (5) and respective plugs (6). This solution has a series of advantages compared to the known solutions. In primis the provision of plugs avoids that metal parts slide with respect to the rails of the roller shutter, with clear advantages in terms of wear and noise. The unique part of the roller shutter in contact to the rails is in fact made up of the plugs (6), which are preferably in plastic material. Hence, the hooks (5) in steel are in contact only to the inner profile of the laths and the plugs (6). A further and significant advantage is linked to the fact that the hooks (5) slide freely inside the inner slots (2203, 2204) provided in the profiles of the laths. Instead in the said solutions known at the state of the art (as for example the one shown in figure 11) the slots are provided on the connection elements (6-A in figure 11). As it is clear from the figure of prior art shown, this type of approach needs many pieces in its practical implementation; the two plates (6-a), spacers of various type (8 and 5), wear rings (10). The reason why all of this is needed is that the forces between a lath and the next one are exchanged on a very small surface, corresponding to the inner surface of the slotted hooks (6-A). On the contrary, in the roller shutter according to the present invention, the whole surface of the parallel sections (51, 52) of hooks (5) can be used to exchange the forces needed to lift the laths arranged at the bottom. By supposing, for simplicity, that the whole weight of the roller shutter remains the same, the increase in surface on which the forces are exchanged reduces contact pressure, and so the wear of the components. The result is that it is possible to have a direct contact between the hooks (5) and the laths (214, 221, 222, 223) without needing to interpose wear surfaces (ref. 10 in figure 11). It is to be observed yet that the length of the parallel sections (51, 52) in contact to the profile of the laths can be increased as needed and, if useful, it can be different for the laths positioned at the top in the roller shutter and the laths positioned at the bottom, since the upper laths have to lift a greater weight when the roller shutter is lifted.

[0025] Suitably both the types (21, 22) of profile of the laths are internally jointed to allow a better rest of the hooks and to avoid contacts of point type.

[0026] In the following, with reference to figures starting from the 12th one, it is described a second embodiment of the roller shutter according to the present invention able to obtain a further reduction of radial dimensions of the roller shutter wound up around the roller.

[0027] Also this second embodiment provides the use of spaceable laths with inner profile substantially identical to the one shown in figure 6, constrained with respect to each other by just described "U" type hooks, introduced inside slots provided in the section of said laths.

[0028] Moreover, also in this second embodiment the first laths are not spaceable with respect to each other, but they are constrained with hook type constraints, which allow only their respective rotation.

[0029] The difference to the just described embodiment consists in the number and type of the not spaceable laths and in the way of constraint of the first spaceable laths.

[0030] In this case in fact the dimensions of the roller and first laths constrained to the roller are such that when said laths are wound up around the roller with octagonal section, the first 7 laths (71, 72, 73, 74, 75, 76, 77) are such that each lath is substantially parallel to one of the sides of the octagon. A similar condition can be obtained with a circular roller provided that the dimension of the roller and laths is such that the parallelism is guaranteed anyway by opposite sides of the roller of the first (71) and fifth lath (75), the second (72) and sixth lath (76), the third (73) and seventh lath (77).

[0031] To obtain this condition, the first seven laths are suitably of various dimensions, alternatively, the second, fourth and sixth lath (72, 74, 76) being of smaller dimensions so that, when the roller shutter is wound up, each of these laths rests on the side of the intermediate octagon between the two perpendicular sides on which the laths with greater dimensions (71, 73, 75, 77) rest.

[0032] In this way, it is obtained that, by using a roller with octagonal section, the four laths of first type rest on four of the eight sides of the octagon, and their outer

surfaces do not define a substantially square shape but an octagonal one, together with the laths of smaller dimensions (72, 74, 76). This allows to follow accurately the profile of the roller, so that the radial dimensions are optimized.

[0033] Also in this embodiment, the parallelism of the laths can be obviously realized with rollers (3) of any section, also circular, configuring suitably the dimensions of the laths with respect to the diameter of the roller.

[0034] Anyway the use of octagonal rollers is advantageous, as it is clear for example from figure 12, since it allows the first laths, the ones in contact to the roller, to have a great rest surface on the roller.

[0035] From the analysis of figure 12, it is clear another measure which is taken for optimizing the radial dimensions, in this embodiment.

[0036] The last not spaceable lath (77) is constrained to the first spaceable lath (78) by means of a "U" type hook (90) whose length is such that, when the roller shutter is wound up on the roller, the first spaceable lath (78) winds up in parallel to the first lath (71) constrained to the roller. The same occurs for the second spaceable lath (79) and the third one (80). The first row of spaceable laths is practically similar to the arrangement of the first laths, thus optimizing the radial dimensions. Suitably instead, starting from the fourth spaceable lath (81), the constraint to the previous lath (80) occurs by means of a longer "U" type hook, so that the distance of separation of the laths can be maximized.

[0037] The dimension of the "U" hook can be observed with reference to the laths (82, 83) side by side in figure 12, between which the hook (54) is designed. The dimension of the hook is such that it touches substantially the inner partitions of the profile of the laths. Clearly if the hook (54) is shorter, the maximum distance between the two spaced laths will be reduced, if the hook (54) is longer instead, it will not be possible to get the two next laths come closer.

[0038] The first "U" hooks (90) are instead of smaller dimensions, thus scarifying slightly the distance obtainable between the respective laths to optimize the radial dimension of the wound up roller shutter.

Claims

1. Roller shutter for blackout effect of windows comprising a plurality of parallel laths (2) constrained with respect to each other so that they can be wound up around a roller (3) to which the first one of said laths is constrained,
   characterized in that
   a portion of said laths is spaceable with respect to each other and a portion of said laths is not spaceable with respect to each other, said not spaceable laths being the first ones starting from said roller,
   and **in that**
   said spaceable laths (221, 222, 223, 224) are constrained with respect to each other by means of "U" shaped hooks (5), said "U"-shaped hooks sliding inside slots provided in the profile of said laths.

2. Roller shutter according to claim 1, **characterized in that** said not spaceable laths are four and are directly constrained with respect to each other by means of constraints of hook type, which allow the respective rotation of said laths.

3. Roller shutter according to claim 2, **characterized in that** the respective dimensions of said four laths (211, 212, 213, 214) and of said roller (3) are such that when said laths are wound up around a roller (3) the first (211) and the third lath (213) are parallel with respect to each other.

4. Roller shutter according to claim 3, **characterized in that** said roller (3) has octagonal section and **in that** said roller shutter is constrained so that when the roller shutter is wound up, said four laths (211, 212, 213, 214) rest on four of the eight sides of the octagon.

5. Roller shutter for blackout effect of windows according to claim 2, **characterized in that** said first not spaceable laths of said roller shutter starting from said roller (3) are seven (71, 72, 73, 74, 75, 76, 77) and **in that** the respective dimensions of said first seven laths and of said roller (3) are such that when said laths are wound up around the roller they are parallel with respect to each other: the first (71) and the fifth lath (75), the second (72) and the sixth (76), the third (73) and the seventh lath (77).

6. Roller shutter for blackout effect of windows according to claim 5, **characterized in that** said first seven laths (71, 72, 73, 74, 75, 76, 77) are of different dimensions, alternatively.

7. Roller shutter for blackout effect of windows according to claim 5, **characterized in that** to said first seven not spaceable laths (71, 72, 73, 74, 75, 76, 77) a plurality of spaceable laths with respect to each other and constrained by "U" type hooks follow, the dimensions of said laths and first three "U" hooks being such that when the roller shutter is wound up around the roller, the first spaceable lath (78) is parallel to the first lath (71) constrained to the roller, and the third spaceable lath (80) is parallel to the first spaceable one (78), but from the opposite part of the roller.

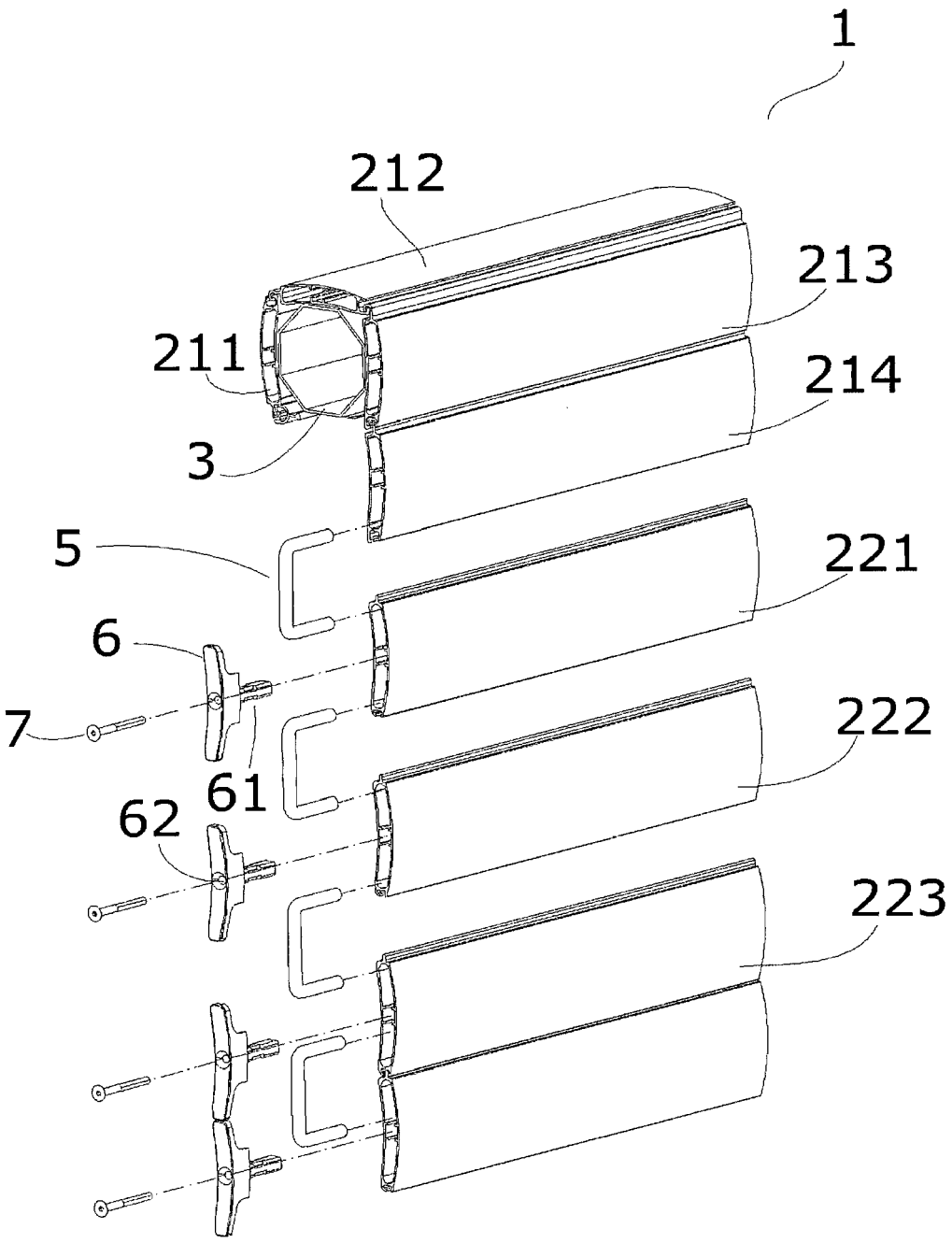

Fig. 1

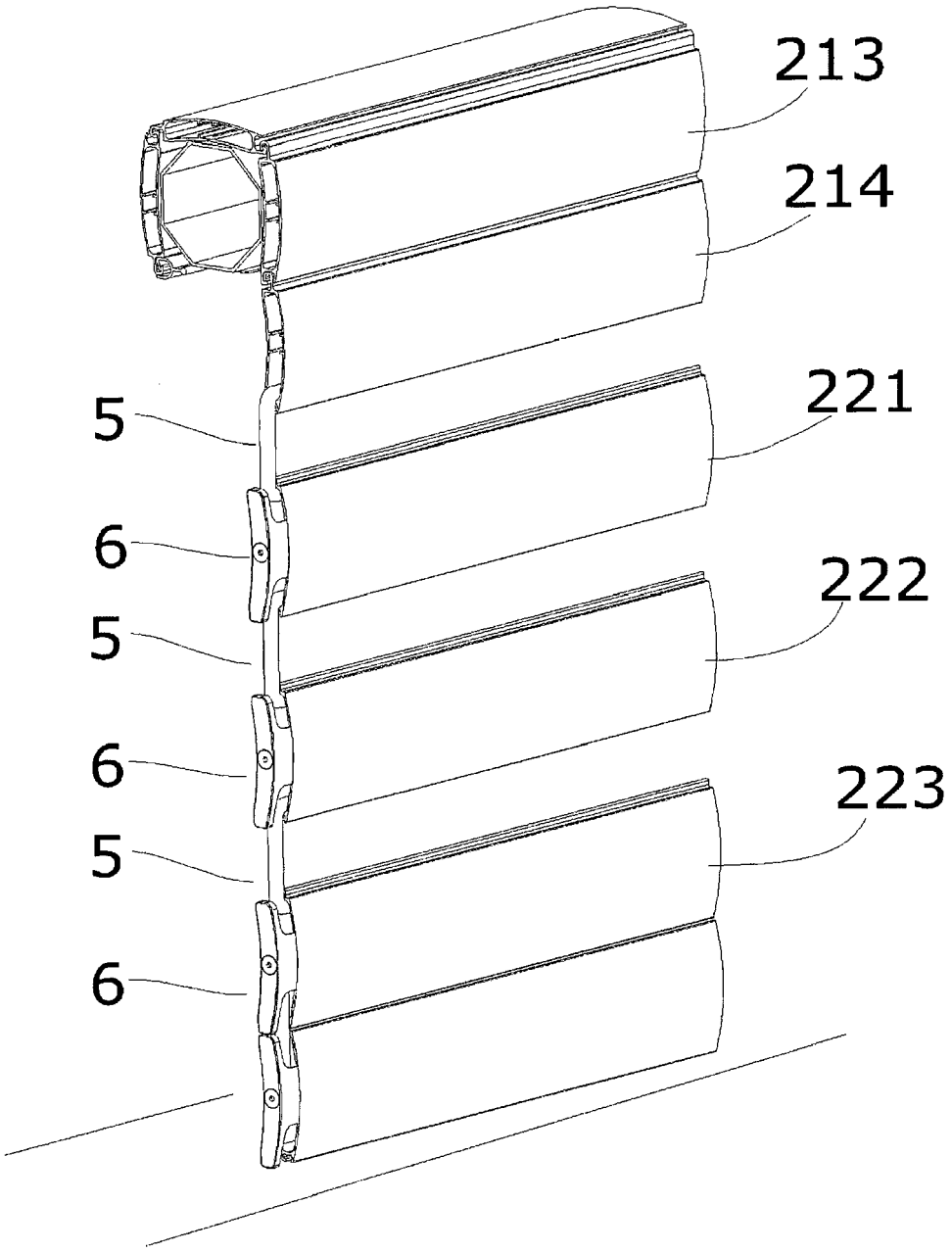

Fig. 2

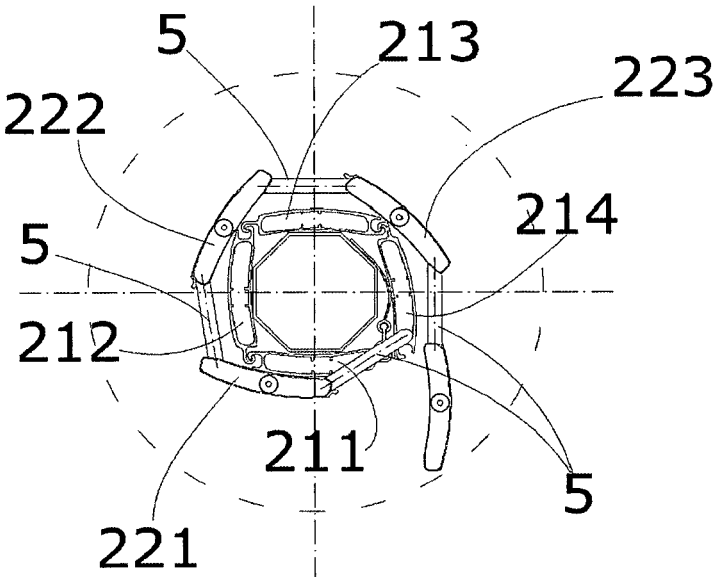

Fig. 3

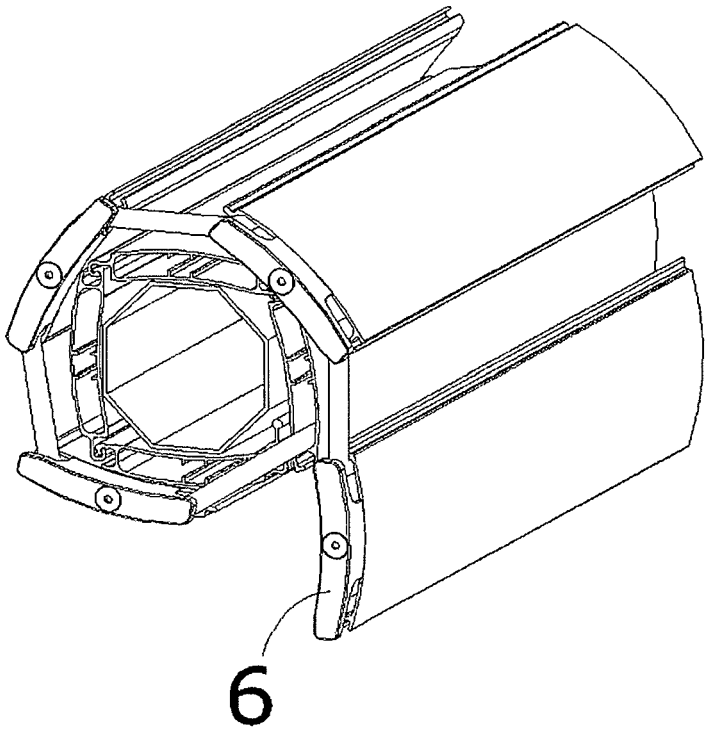

Fig. 4

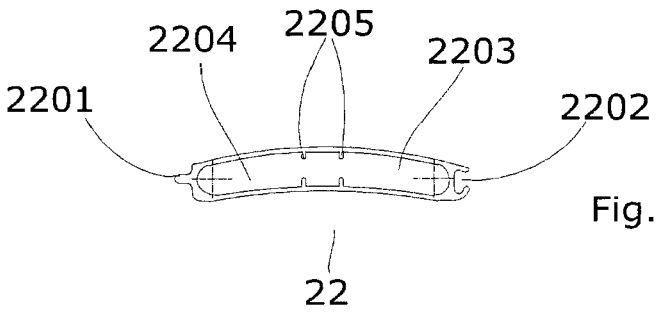

Fig. 5

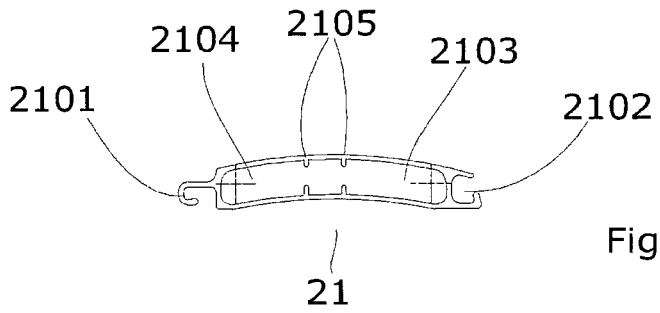

Fig. 6

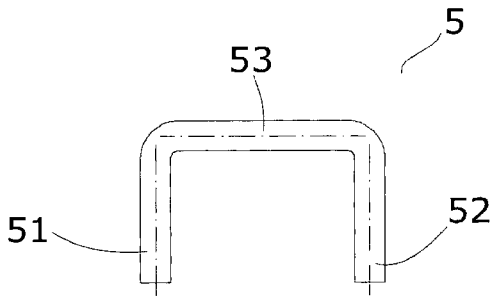

Fig. 7

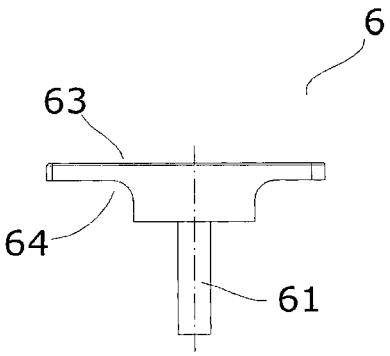

Fig. 8

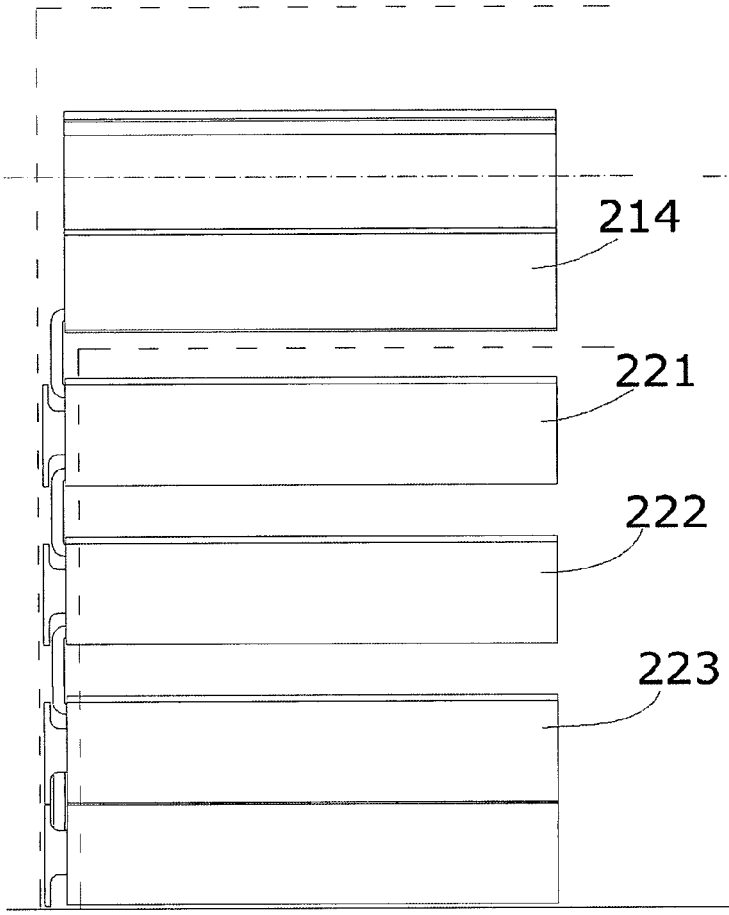

Fig. 9

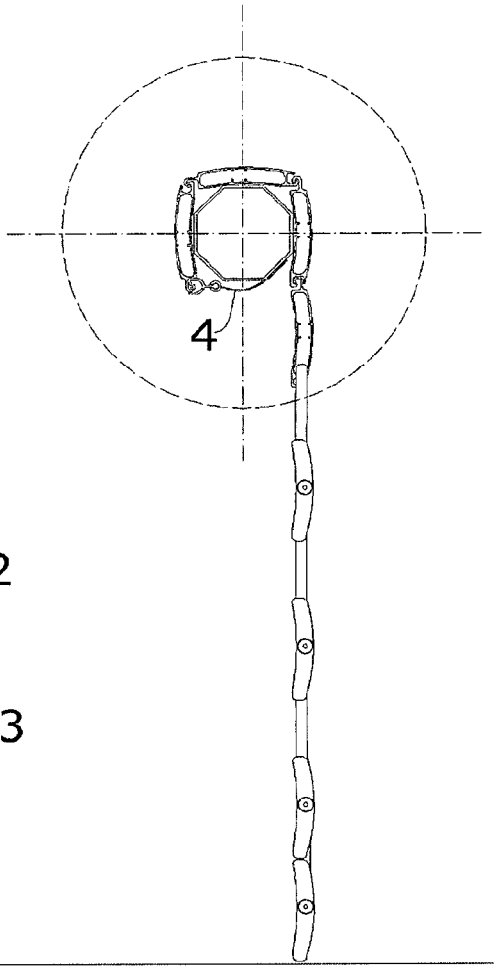

Fig. 10

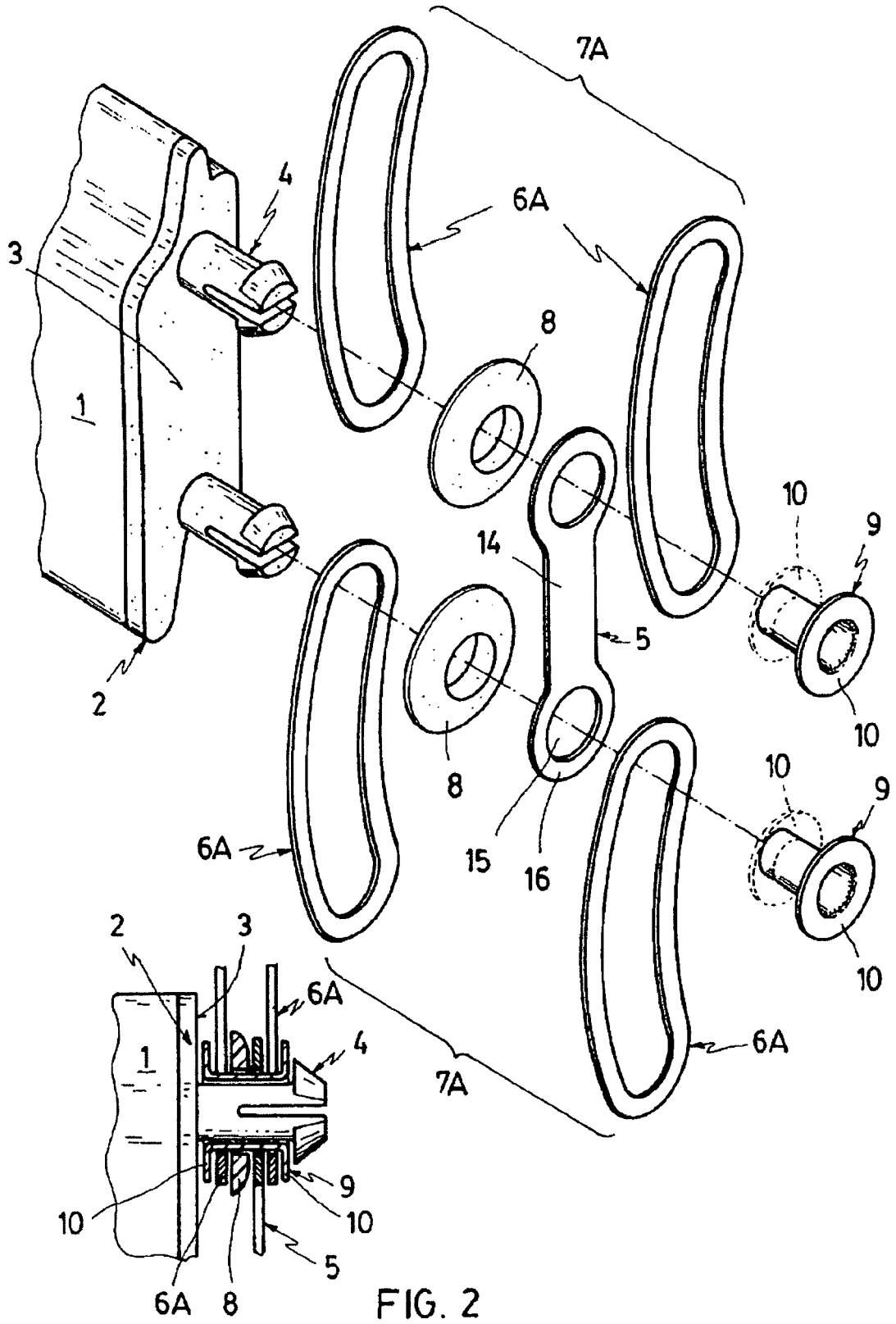

FIG. 2

Fig. 11 – PRIOR ART

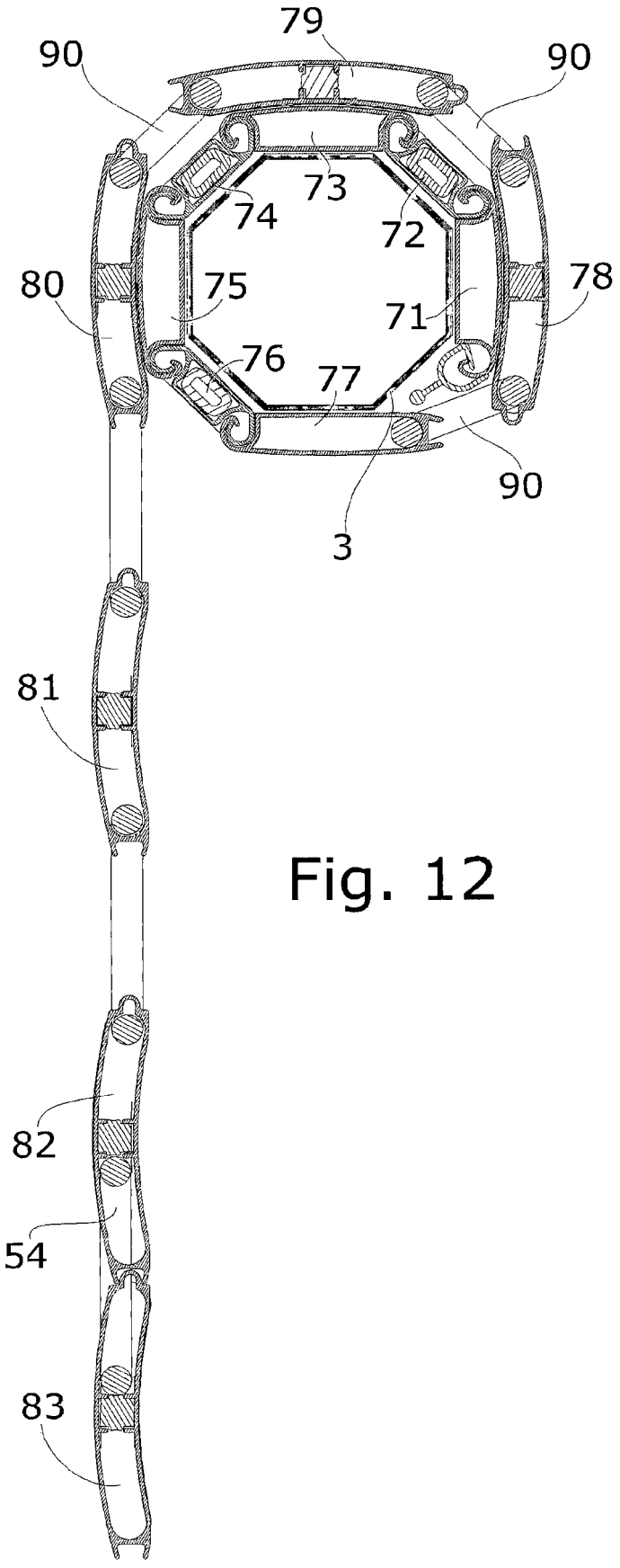

Fig. 12

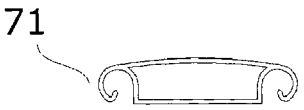

Fig. 13

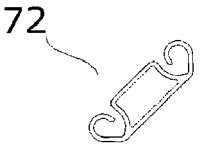

Fig. 14

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EUROPEAN SEARCH REPORT

Application Number
EP 15 42 5113

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	WO 2014/111967 A2 (GIAMPIETRO GIANROCCO [IT]) 24 July 2014 (2014-07-24) * figures 1-10 *	1-7	INV. E06B9/11 E06B9/15
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TECHNICAL FIELDS SEARCHED (IPC)

E06B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	30 May 2016	Merz, Wolfgang

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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