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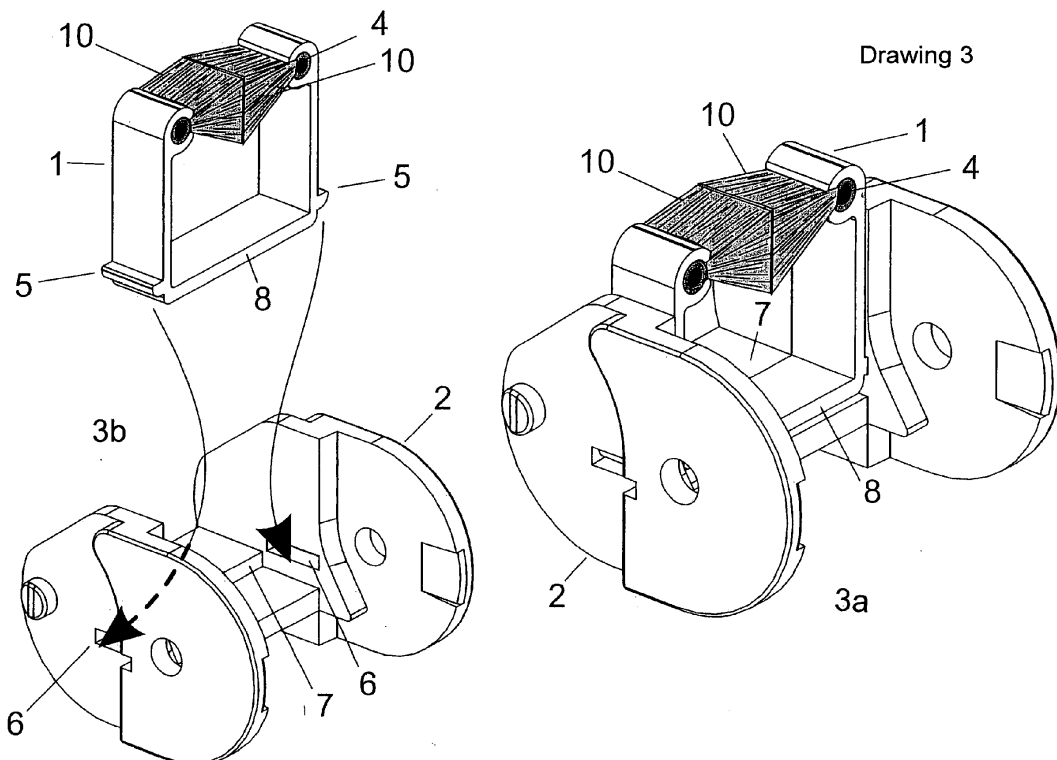
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(54) **Anti-mosquito screen restraint system within articulated guide**

(57) Anti-mosquito screen restraint system within articulated guide with accessories (1) that are mounted and removed from the articulation pieces (2) ("joints") of the articulated guide (3). The accessories (1) have restraint means on their ends, such as brushes (10) or arms (1) extending the accessories' ends, of various sizes and inclinations, of equal length to each other, that adjoin at their ends. Every detachable accessory (1) has support protrusions (5) at its lower part, that are adjusted and

fasten at their respective receptions (6) of each articulation piece (2) of the guide. Each articulation piece (2) of the articulated guide (3) has at its lower part one more reception (7) "tooth" that accepts the lower part (8) of the detachable accessory (1), whereas the height of the holder (7) is equal to the thickness of the lower part (8). If the detachable restraint accessory (1) is worn out, that specific piece is simply replaced and there is no need to replace the whole guide (3).



## Description

**[0001]** This invention belongs to the field of mechanics with regard to anti-mosquito screen systems (net) that are used for horizontal door sliding and is related to a restraint accessory of a straight anti-mosquito screen. The accessory is mounted on and removed on a piece of the articulated guide.

**[0002]** More specifically, in today's state of the art, the mosquito screens with a straight screen (net) for the horizontal door sliding, use two rails steadily screwed: one at the upper and another at the lower door opening, horizontal and parallel to each other. The mosquito net is unrolled horizontally in these rails, when the user pulls the moving vertical sliding box. The net is rolled around a roll-up axis, which is placed inside the restraint box that is screwed steadily on the vertical wall of the frame opening. The two fixed horizontal rails, parallel at the upper and lower part, usually have along their internal part a kind of net stabilization means, usually two facing fixed single rods, with a brush lengthwise. The net is held in its place between the stabilization means when this is unrolled and thus it is not moved by wind. Moreover, these means (the two facing rods with the brush) hinder the entrance of crawling insects from the lower part -mainly- of the screen. Thus, the whole mosquito screen system consists of the vertical restraint box, which contains the net roll-up axis and of the vertical sliding box that is parallel to the restraint box and moves parallel to that. The upper and lower fixed rails are screwed at the upper and lower frame opening and the sliding box moves in these rails pulling and unrolling the mosquito net. The main disadvantage of this type of mosquito screen systems is that the lower rail that is steadily screwed on the ground in order the mosquito net to be unrolled therein, always hinders the free movement of the door users, makes them fall or take a false step, etc.

**[0003]** In order to solve this technical problem, a newer state of the art was created, where the steadily screwed rails at the upper and lower frame opening are abolished and are replaced by two articulated guides that are built-in and consist a part of the whole system, as part of a frame. These guides are articulated and are used as guides in several applications formerly (DE 3806400 guides for electrical cables). Those articulated guides, due to their joints, are mounted on and removed from the upper and lower horizontal frame opening of the restraint box, parallel to the mosquito net that is rolled and unrolled when the user shuts and opens the sliding box in order to roll and unroll the anti-mosquito net. By the same net use movement, the user pulls simultaneously and takes out the articulated guides from the restraint box, or brings back the net in the original rolled position, by pressing at the same time the articulated guides that are placed again in the restraint box.

**[0004]** This group does not include mosquito net stabilization and restraint means in the upper and lower rails due to the articulated structure of the guides. The artic-

ulated guides "retract" their joints, entering and getting out of the restraint guide that is fixed on the vertical frame. This joint movement excludes the possibility of placing thereon the straight steady rod with the brush that is mounted on the straight fixed rails, pursuant to the previous state of the art; for the rods with the brush have neither joints nor the capacity to "retract" and entering -getting out of the vertical frame.

**[0005]** Thus, the replacement of the straight rails that had a rod with a brush by the articulated guides without a brush, solved the problem considering the hindering the user (stumbling, etc), but created another technical problem: when the mosquito screen is unrolled in the articulated guides it has no longer any stabilization means in the guides, and this has as a result that with the slightest gust of wind the mosquito screen gets out of the articulated guides and creates a void allowing insects to pass, mainly through the lower opening. Moreover, the continuous movement of the mosquito screen from its place causes wear, tear of weaving and finally it is damaged, generating continuously the need to replace either the mosquito net or the whole mosquito screen system. This problem arises when the roll-up axis is either in the restraint box or in the sliding box.

**[0006]** This problem is attempted to be solved by Patent No EP1318267 by using a rod with brush, which however did not manage to adapt to the articulated sliding guide, thus remaining at the previous state of the art in connection to first anti-mosquito screens with fixed, straight und rigid sliding rails.

**[0007]** The same problem is attempted to be solved by Patent No EP 2011954, by using a sliding articulated guide and a series of brushes placed vertically at the outer side of the lower sliding articulated guide, outside and parallel to the screen. Albeit this mode solves the problem of entrance of crawling insects (at least from lower side), but when the wind blows towards the mosquito screen, the net may still get out of its place towards the interior side of the guides, as there is no interior device to keep it in place. In particular, when the opening is more than 1 meter wide, then the mosquito screen is displaced, even if no wind blows.

**[0008]** The same problem was attempted to be solved by EP 1905944 at which the lower articulated guide has protrusions at its joints, formed in such a way in order to keep the net stretched in its place. This solution has a weak point, i.e. the protrusions of the guide that keep the net stretched at its position, are made of the same hard material the articulated guide is made of, and therefore, they may damage or tear the lattice weaving of the screen, which in today's state of the art is made of fiber glass.

**[0009]** Last, the same problem is attempted to be solved by Patent No EP 1333148 according to which, the screen net has "buttons" at its ends, whereas, the articulated parts of the rail have their upper part almost closed. Thus, the "buttons" stop the screen getting out of the articulated guide. The disadvantage of this solution is the

production cost for the placement of the "buttons" along the screen finishing.

**[0010]** The present invention solves the above technical problem in connection to the restraint of the unrolled screen in its place, adjusting single brushes at single "joints" of the articulated guide. It applies for the screen with the stretched mosquito screen (not pleated).

**[0011]** In short, the invention consists in the following: on the pieces ("joints") that constitute the articulated guide, either only at the lower rail or at the upper as well, on all of them or on some of them, detachable (removable) accessories are adapted the ends of which have restraining means, such as brushes or arms, of various sizes and inclinations. Each accessory is adjusted separately on each articulation piece of the articulated guide. Thereby, each articulation piece is properly formed. The invention is applied with the adjustment of the detachable accessory in the guide joint; namely, the function of one technical element requires the collaboration with the other element. This invention cannot be applied neither only by the separate function of the removable fitting nor only by the joint of the articulated guide functioning in separation.

**[0012]** The present invention solves the technical problem of keeping the screen in its place in the sliding rails and thus it has the advantage that it hinders the entrance of crawling insects from the lower articulated guide. Moreover, it has the further advantage that if any detachable restraint fitting wears, simply that specific piece is replaced and it is not necessary to replace the whole guide.

**[0013]** The thirteen (13) Figures that accompany the invention illustrate, in brief, the following:

Figure 1 pictures the articulated guide in front view (1a), top view (1b) and lateral view (1c) assembled with the brush accessory.

Figure 2 pictures the mosquito net in the articulated guide (2a), pursuant to the current state of the art, i.e. without a restraint brush, therefore, when the mosquito net is pushed by wind it gets out of the position it must have in the guides (2b).

Figure 3 pictures the detachable accessory with a brush and two protrusions, as well as the mode it is placed in the piece of the articulated guide that bears the respective receptions (3b) of the protrusions, as well as the accessory placed in the piece of the articulated guide (3a).

Figure 4 pictures the alternative detachable accessory with bilateral arms inclined towards the lateral walls of the accessory with two protrusions and the mode that it is placed in the piece of the articulated guide that has the respective receptions (4b), as well as the accessory placed in the piece of the articulated guide (4a).

Figure 5 pictures the removal accessory with a brush, before and after placing it in the piece of the articulated guide, scaled-up from a part of the lower articulated guide, with the brushes in a horizontal position or inclined.

Figure 6 pictures the detachable accessory with bilateral arms at a right angle or alternatively inclined towards the lateral walls, before and after it is placed in the piece of the articulated guide, scaled up from a part of the lower articulated guide, with the arms being 2 or 4 in number.

Figure 7 pictures the detachable accessory with double bilateral arms inclined towards the lateral walls, as well as the mode by which only by one protrusion it is placed in the piece of the articulated guide, which has the respective holder.

Figure 8 pictures the case in which the detachable accessory has double bilateral arms inclined towards the lateral walls and the mode that these arms move and restrain the mosquito net when the net is immobile (8a) and when the net is pushed by wind (8b) getting out of the guides.

Figure 9 pictures the alternative detachable accessory when this comprises a brush and double bilateral arms inclined towards the lateral walls, with protrusions, and the mode that it is placed in the piece of the articulated guide, having the respective receptions (9b) of the protrusions, as well as the accessory placed in the piece of the articulated guide (9a).

Figure 10 pictures the detachable accessory when this comprises a brush and also double bilateral arms inclined towards the lateral walls, placed in the piece of the articulated guide, scaled up from a part of the lower articulated guide.

Figure 11 pictures the piece of the articulated guide alone, before the placement of the detachable accessory therein, in lateral view (11a), front view (11b), top view (11c) and perspective view (11d).

Figure 12 pictures the detachable accessory alone, in lateral view (12a), front view (12b), top view (12c) and perspective view (12d), when this has double bilateral arms that are not vertical, but inclined towards the lateral walls, and two protrusions.

Figure 13 pictures the detachable accessory placed in the articulated guide in lateral view (13a), front view (13b), top view (13c) and perspective view (13d) when this has double bilateral arms that are not vertical but inclined towards the lateral walls, and two protrusions.

**[0014]** An example implementing this invention follows, with a detailed description and reference to the attached figures.

**[0015]** The articulated guides are a known element of the state of the art and have an external H-like shape (figure 11b), with two vertical lateral walls parallel to each other. In each vertical lateral wall they have a protrusion and a recess, so that each piece "fastens" with the previous and with the next piece of the articulated guide ("chain", figures 1a, 11d, 13d).

**[0016]** The articulation piece (2) of the articulated guide (3) that is a known element of the state of the art with the form that was above described, has, in the present invention, as additional technical characteristics, recesses and a tooth (6 and 7) (fig. 3-6, 9, 10 and 11).

**[0017]** The detachable accessory (1) has a shape similar to the shape of the interior of the articulation piece (2) (figures 3-7, 9 and 13). At the figures that illustrate this example of implementation of this invention, the detachable accessory (1) has a reverse "II"-like shape. Of course, concerning this invention, it could have a "V"-like shape or a "U"-like shape with the protrusions at any point of the outer surface. The interior part of the articulation piece (2) would be formed in a respective shape.

**[0018]** Hereupon, as illustrated in figures 3 and 4, the detachable accessory (1), which is adapted at each articulation piece (2) of the articulated guide (3) has support protrusions (5) at its lower part, which are adjusted, and fasten in the respective receptions (6) of each articulation piece (2) of the guide at the two vertical lateral walls.

**[0019]** The protrusions may differ in number and shape, such as being two protrusions to the exterior part of the two vertical lateral walls of the accessory (1) (figures 3 & 4), or to have only one protrusion to the exterior part of the lower part of the accessory (1) (figure 7), etc. The receptions (6) of the articulation piece (2) are each time proportional to the support protrusions (5) of the accessory (1), so that the accessory will fasten on the articulation piece (2), and be stabilized.

**[0020]** Furthermore, each articulation piece (2) of the articulated guide (3) has at the lower part an additional reception (7) "tooth", that accepts the lower part - basis (8) of the detachable accessory (1) (figures 3, 4, 7, 9, 11, 13). The accessory (1) fastens with the two, or one, protrusions (5) at the respective reception or receptions (6) of the articulation piece (2) (fig. 3, 4 and 7). Simultaneously, its lower part, the basis (8), is adjusted and stabilized on the reception (7) "tooth" of the articulation piece (2). The height of the reception (7) is equal to the thickness of the lower part (8), and as a result, when the accessory (1) is placed on the articulation piece (2), the lower part - basis (8) creates a uniform flat uniform surface with the lower internal surface of the articulation piece (2). The creation of this uniform flat internal surface is necessary for the unhindered restraint of the mosquito screen (fig. 1 and 2).

**[0021]** The ends of the detachable part (1) have facing brushes (10), that have an equal length to each other

and adjoin at their ends (fig. 1b, 3 and 5), in the middle of the lower part-basis (8). The brushes (10) may have various inclination angles, but they always adjoin at their ends (fig. 3, 5 and 9). The fact that the brushes adjoin each other brings the desirable result, that is, when the mosquito screen (9) is stretched, it remains in a straight line. Thus, the technical problem of the mosquito net (9) getting out of the articulated guide (fig. 1b, 1c) due to wind, as well as the problem of the entrance of crawling insects (figure 8) is solved.

**[0022]** The brushes (10) are placed in the respective receptions (4) of the accessory (1) (fig. 3a and 9a and 10 and 12b and 12d and 13b and 13d).

**[0023]** Instead of the facing brushes, the detachable accessory (1) may have as an extension of its ends two or four facing bilateral arms (10), vertical to the lateral walls or inclined (fig. 4, 6, 12 and 13), which again will be of equal length to each other and their ends will adjoin.

**[0024]** In any case, the detachable accessory (1) may have at its ends cumulative facing brushes (10) and also bilateral arms (10) as an extension of its ends (vertical to the lateral walls or inclined, two or four) (figures 6, 7, 9 and 10).

**[0025]** The height of the detachable accessory (1) is such that when it is mounted on and "fastened" within the articulation piece (2), the brush (10) or the arms (10) exceed the height of the articulated guide (3) and protrude thereof, and thus leave a sufficient void in the detachable accessory (1) for the net. Therefore, the biggest is the distance between the brush or the arm and the net finishing, the more difficult it is for the net to get out of the guide (figures 1, 3, 5, 6, 8, 10 and 13).

**[0026]** The detachable accessory (1) either has two or four bilateral arms (10) as an extension of its ends (vertical to the lateral walls or inclined), and / or a brush, it is always made of a soft material for two reasons: On the one hand, in order the arm ends not to tear the net when they come into contact with it, as well as stabilize thereof, mainly when pressure is exercised on the mosquito net by the wind (figure 8). On the other hand, in order the detachable accessory (1) to have the elasticity required for the easy placement and removal from the articulation piece (2), i.e. by exercising mere pressure on both ends, these to bent and the accessory (1) to enter or be removed from the receptions (6) of the articulation piece (2).

**[0027]** Thus, wear, break, etc. of a detachable accessory (1) does not create the need to replace the whole articulated guide (3) nor even the need to replace the articulation piece (2). The detachable accessory (1) that is worn is simply removed from the piece (2) and it is replaced by a new one.

**[0028]** On the contrary, the articulation piece (2) in which the detachable accessory (1) is adjusted is made of hard material, such as polyamide, pursuant to the currently valid state of art.

**[0029]** The property of the detachable accessory (1) to be mounted on and removed from the articulation piece (2) of the sliding articulated guide (3) succeeds in main-

taining all the advantages that the implementation of the sliding articulated guide (3) has, i.e. the "breaking" of its joints, allowing its entrance and exit in the vertical opening frame, on which the anti-mosquito screen was mounted.

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**[0030]** The present invention is applied for any opening on which the anti-mosquito screen is mounted, with a horizontal movement and a stretched net.

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## Claims

1. Anti-mosquito screen restraint system within articulated guide that is **characterized by** the fact that it consists of:

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i. an accessory (1) that is mounted and removed on an articulation piece (2) ("joint") of the articulated guide (3), and

ii. an articulation piece ("joint") (2) that accepts the accessory (1), where the detachable accessory (1) has at least one protrusion (5) at its exterior surface, a base (8) and also has at its ends either brushes (10) or arms extending its ends (10), or both, of equal length to each other are facing each other and adjoin at their ends,

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whereas each articulation piece (2) has in its internal surface, at least one reception (6), suitable for adjusting the respective protrusion (5) of the accessory (1) and also has one more reception (7) "tooth", that holds the base (8) of the accessory (1), with a height of the holder (7) equal to the height of the accessory (1) base (8).

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2. Anti-mosquito screen restraint system, according to claim 1, **characterized by** the fact that the brushes (10) and the arms (10) extending the ends of the accessory (1) that are facing each other, may have various inclination angle, always equal to each other, with their ends always adjoining.

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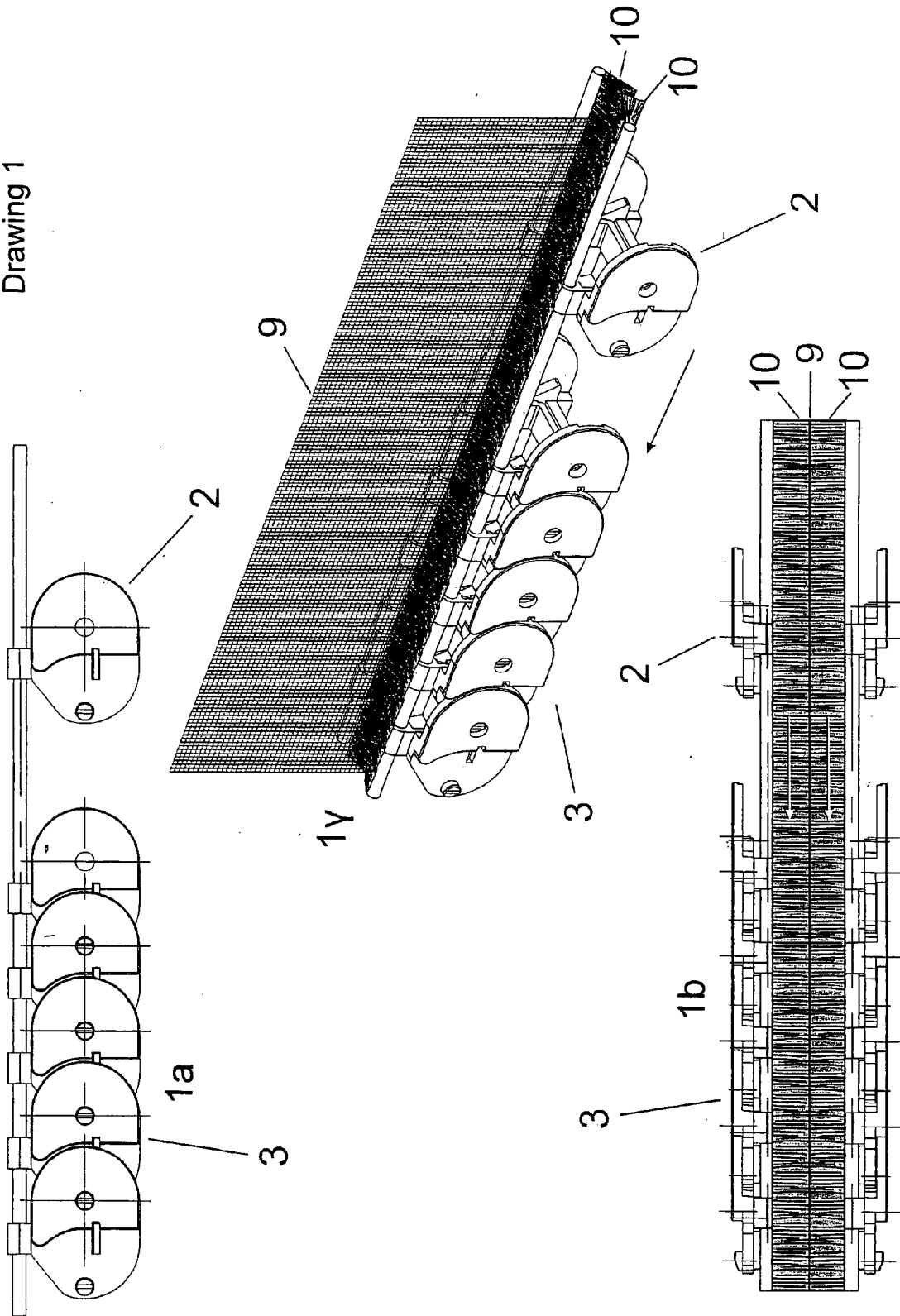
3. Anti-mosquito screen restraint system, according to claims 1 and 2, **characterized by** the fact that the accessory (1), is made of any soft material, capable of allowing the mounting and removal of the accessory (1) from the articulation piece (2), whereas the articulation piece (2) is made of hard material.

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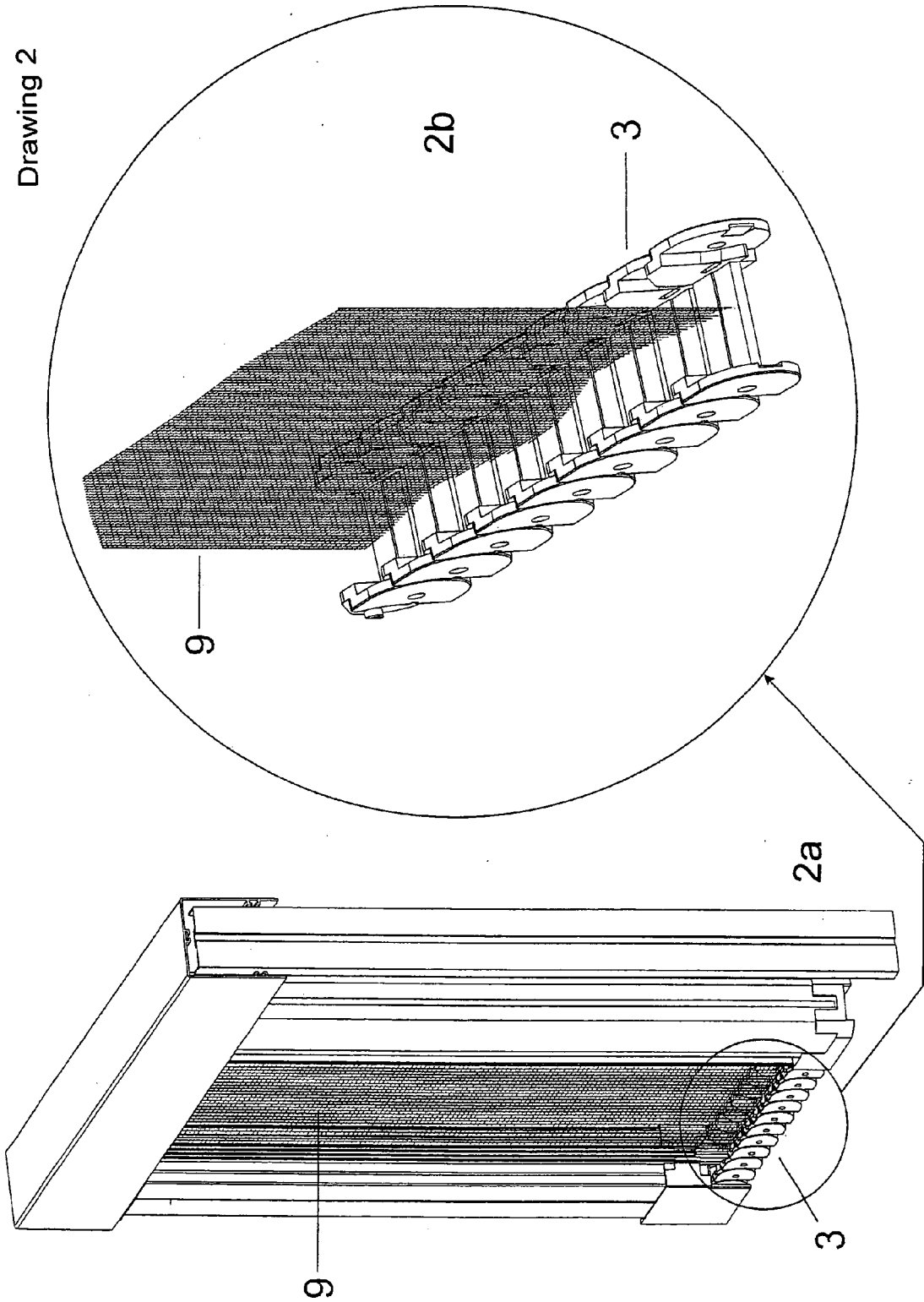
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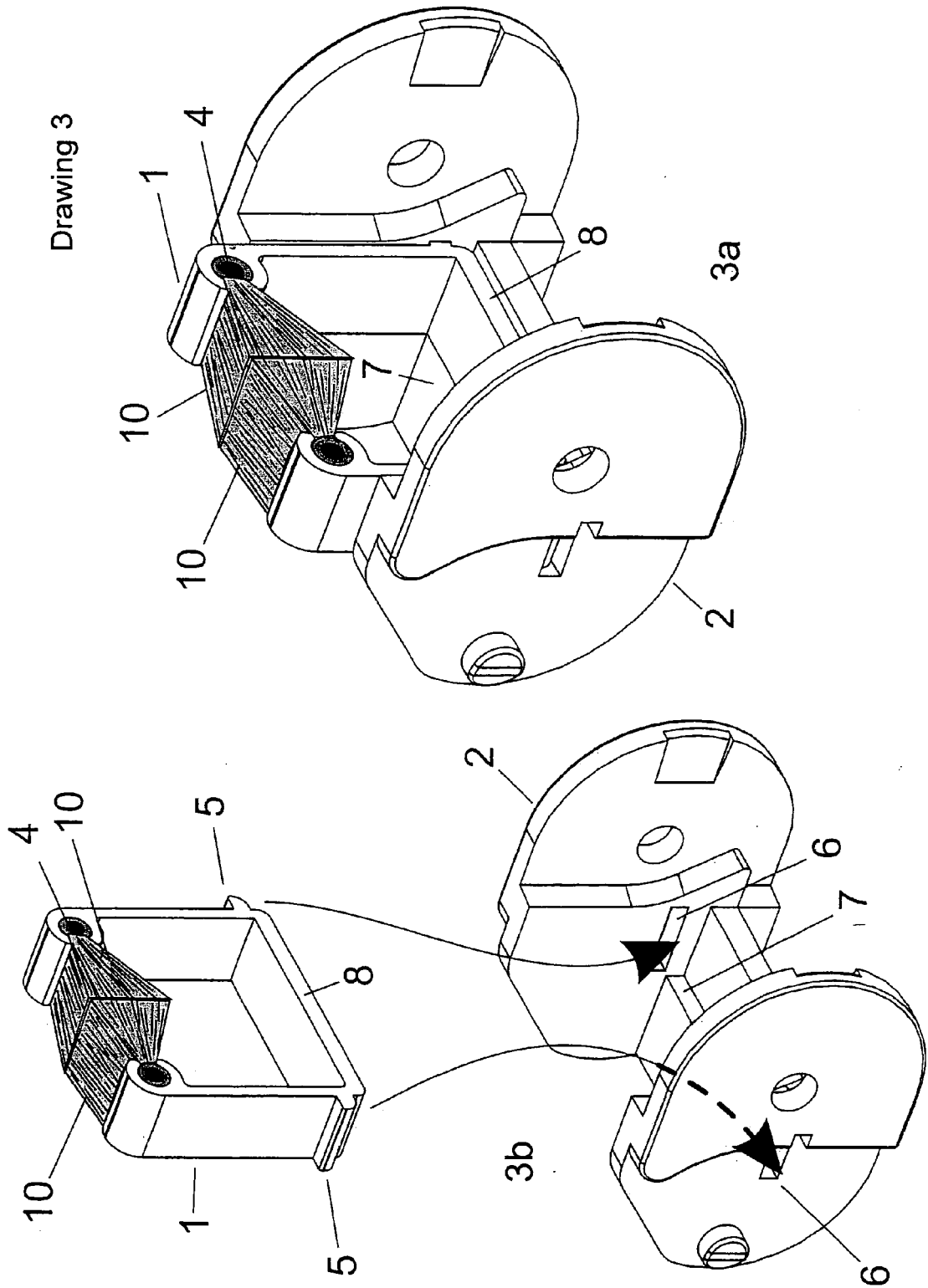
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Drawing 1



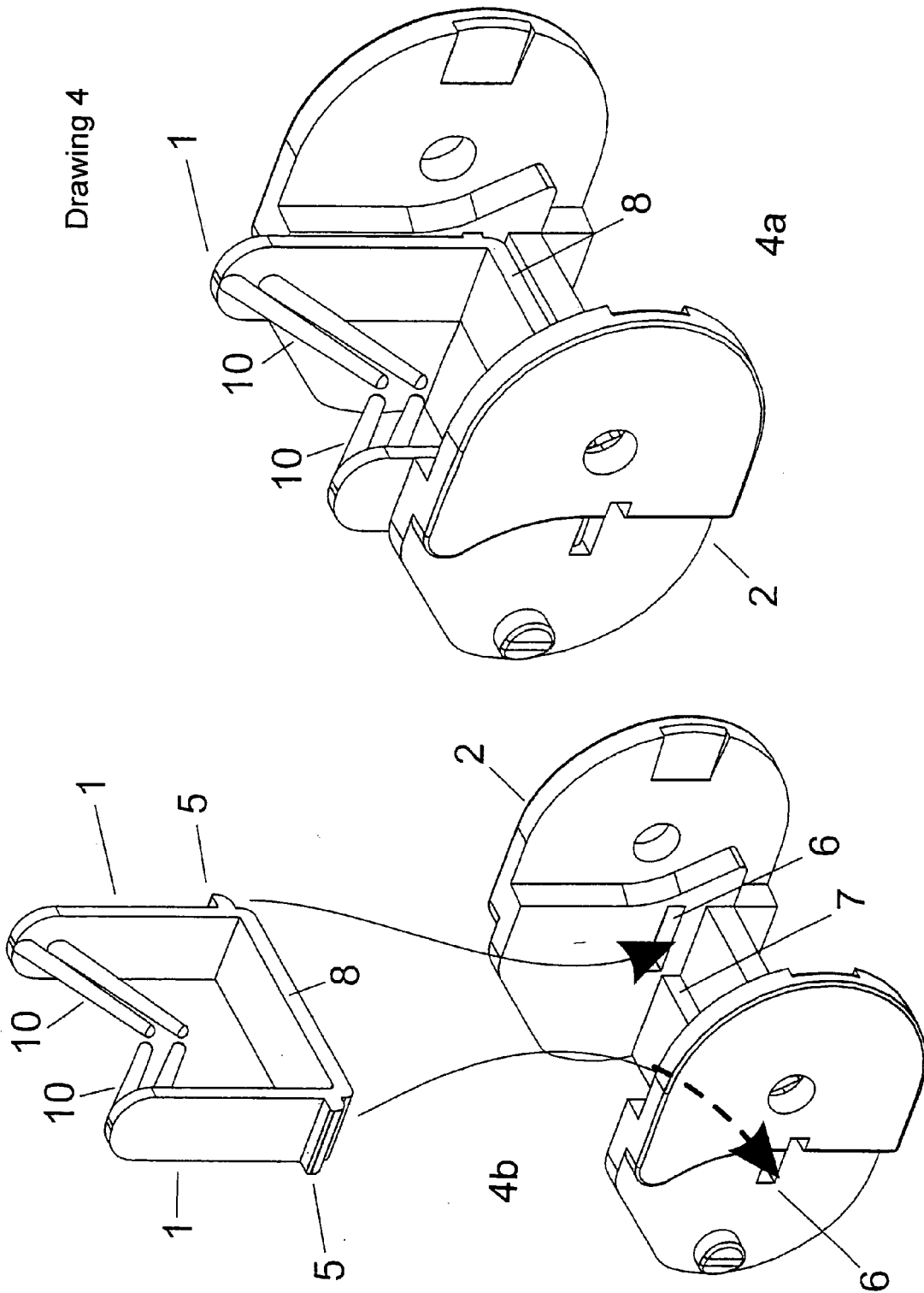
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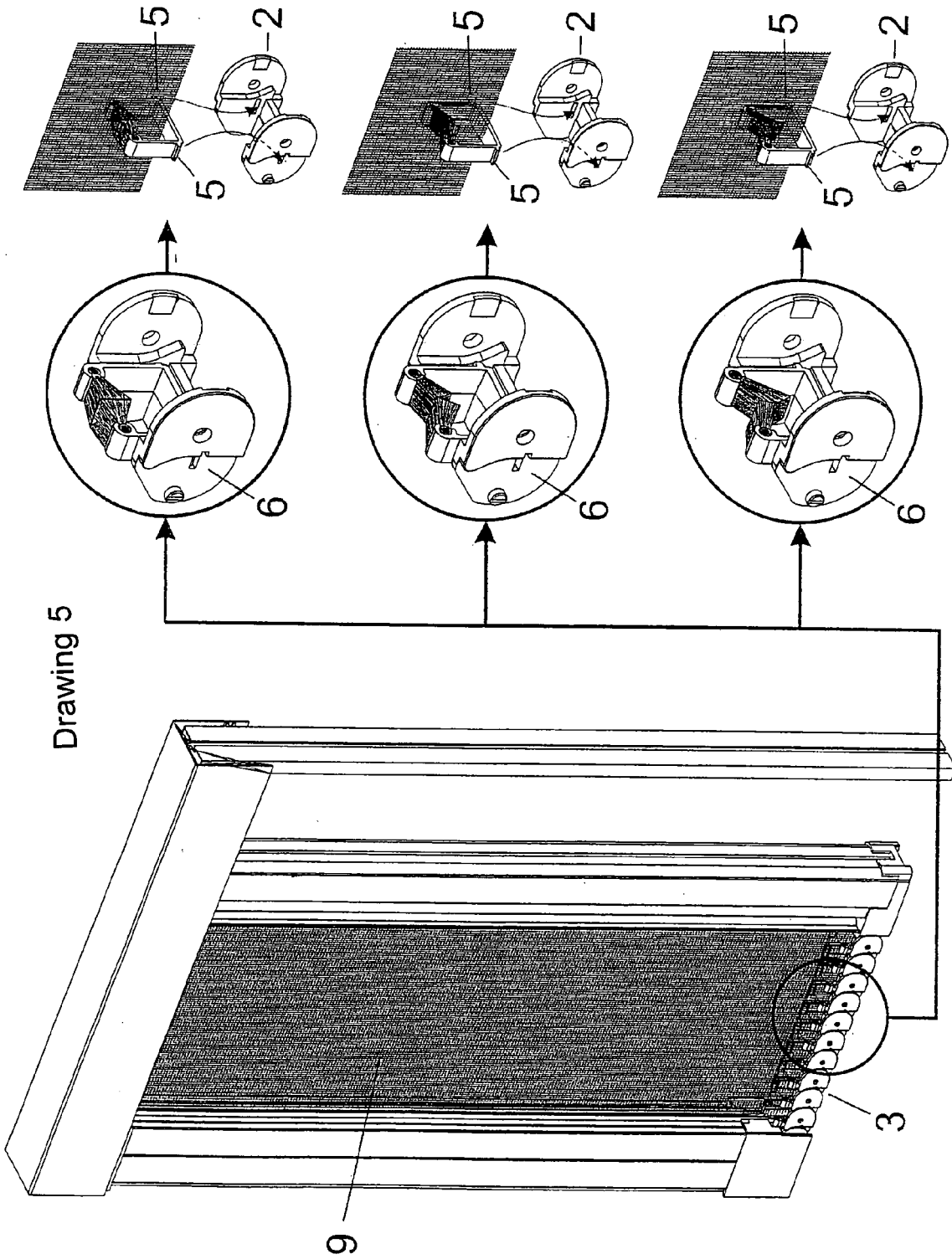


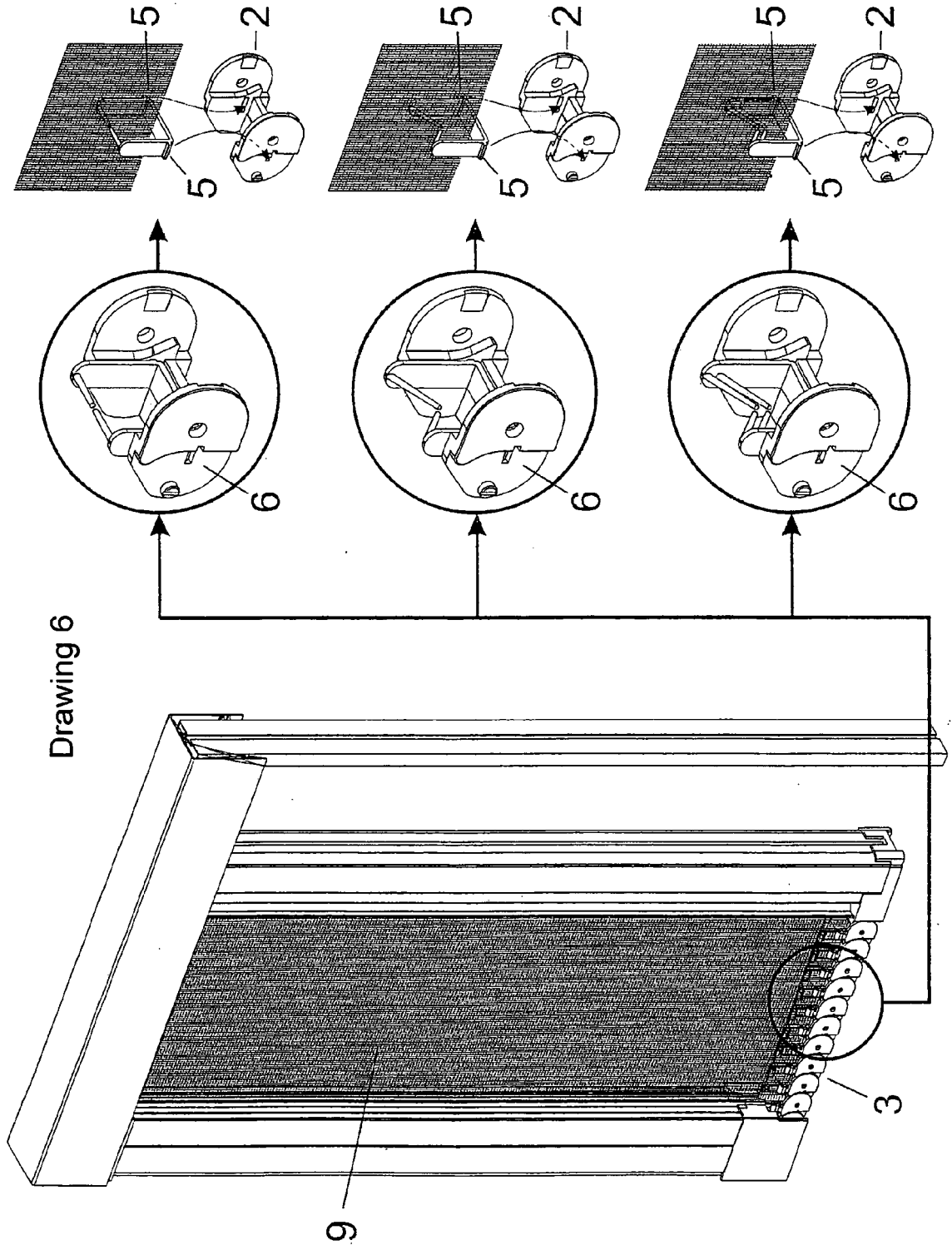


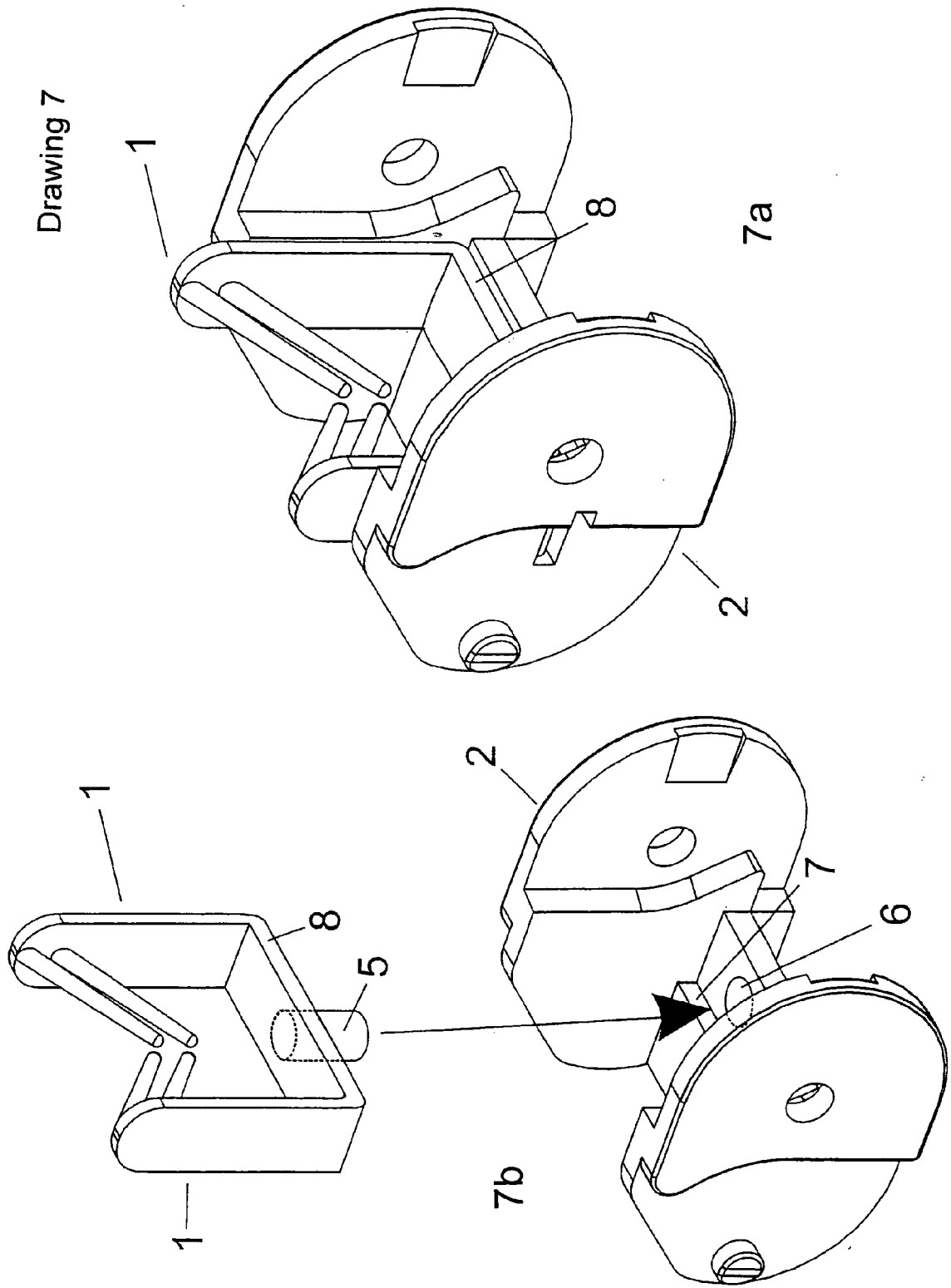


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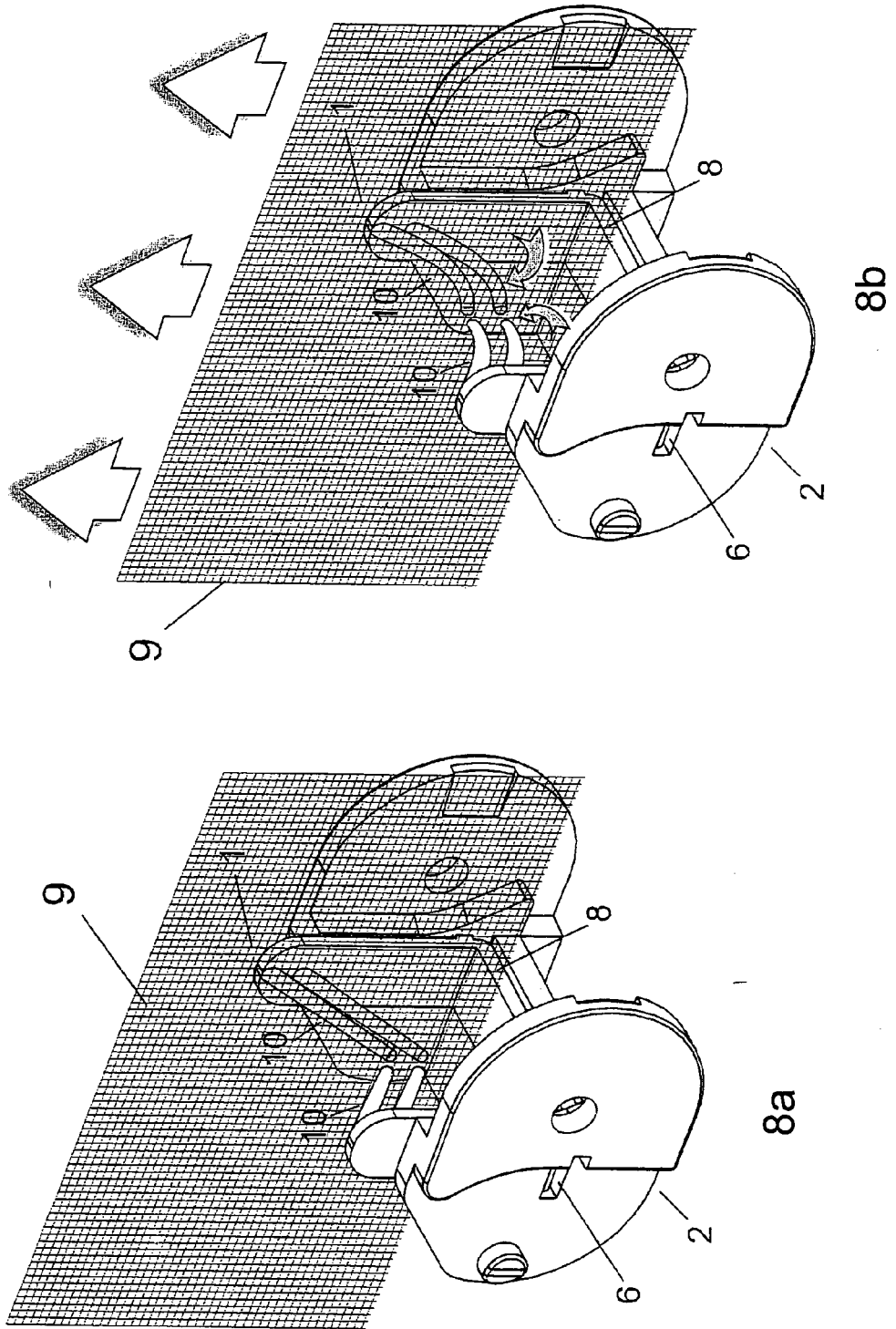


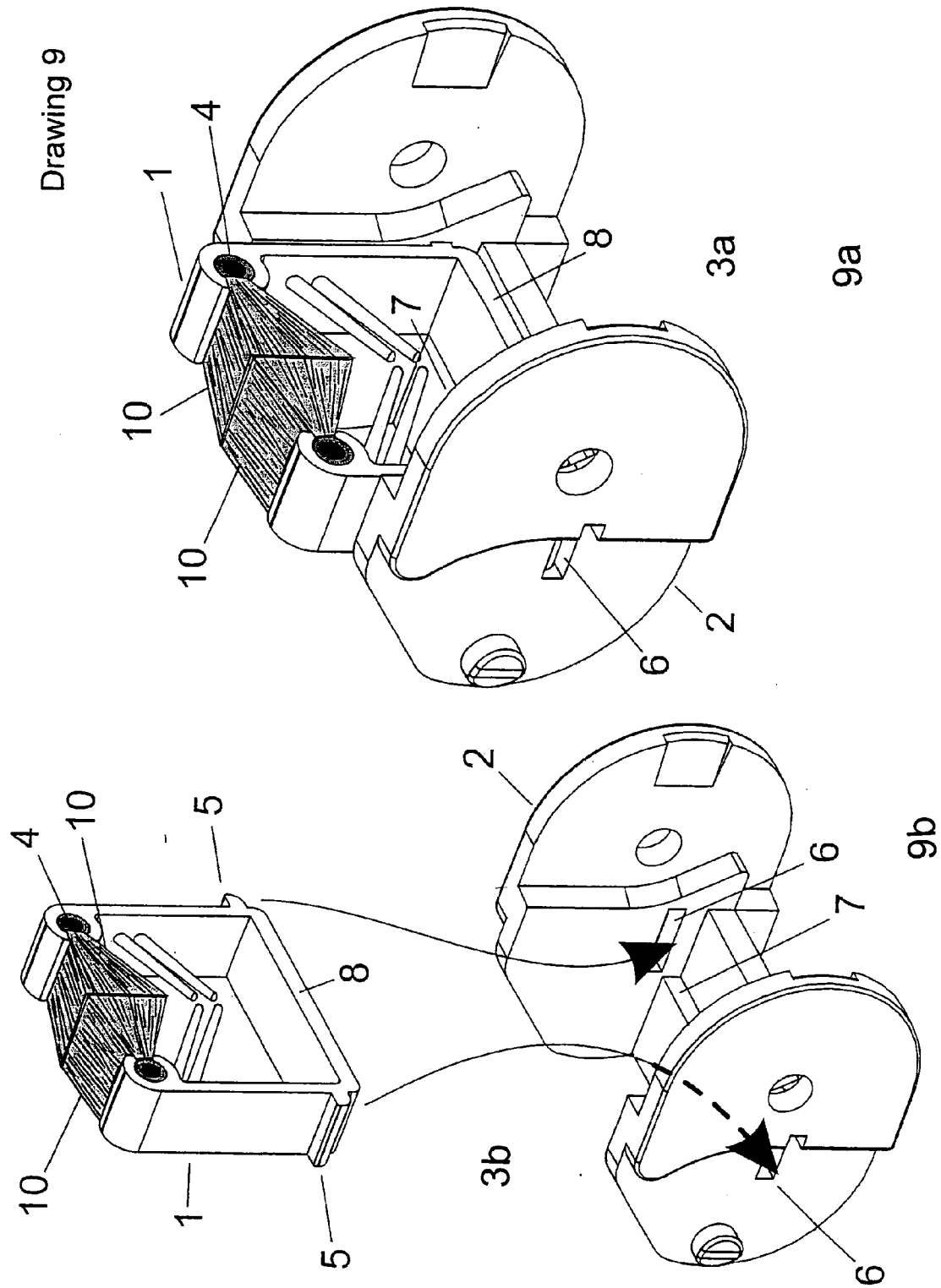


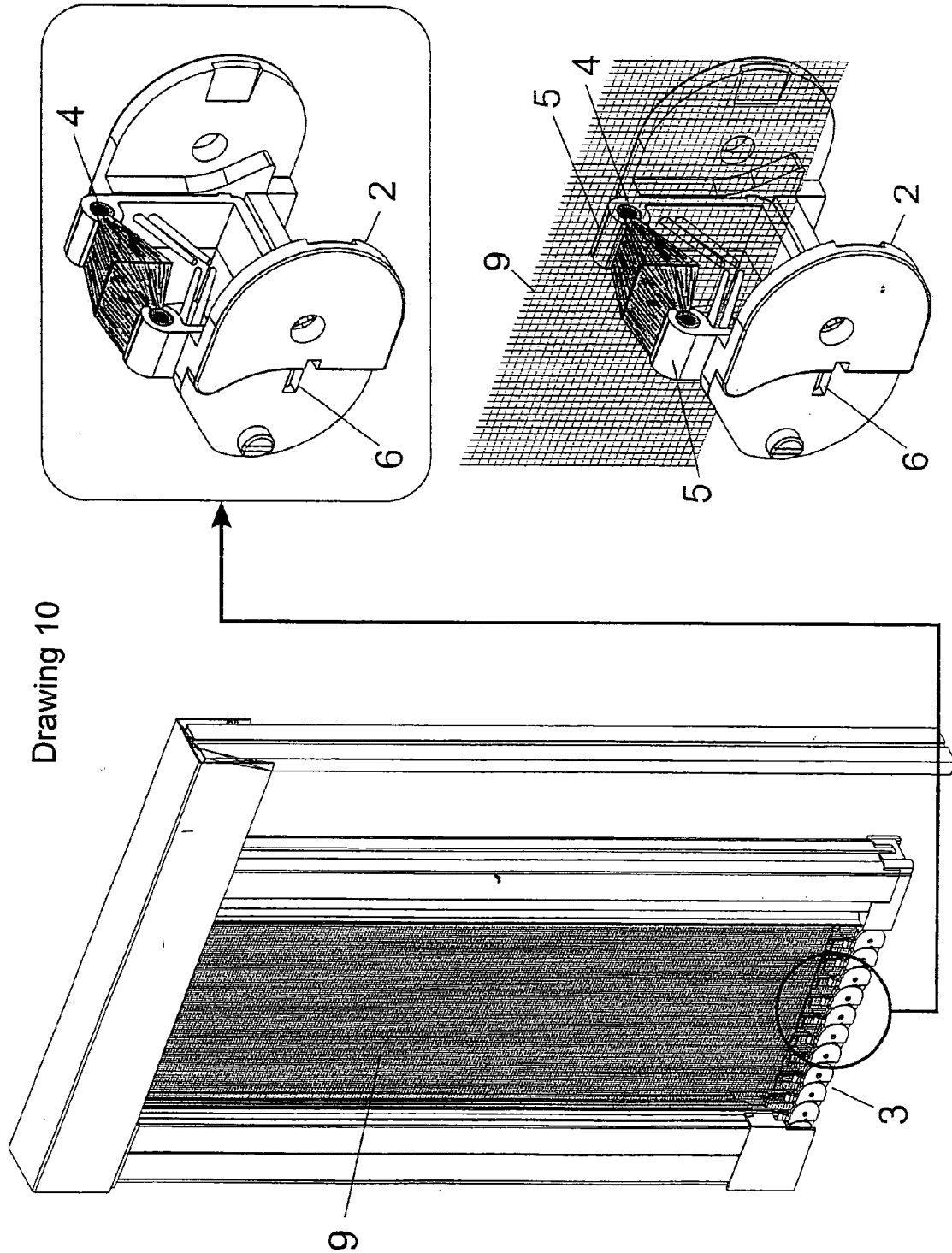




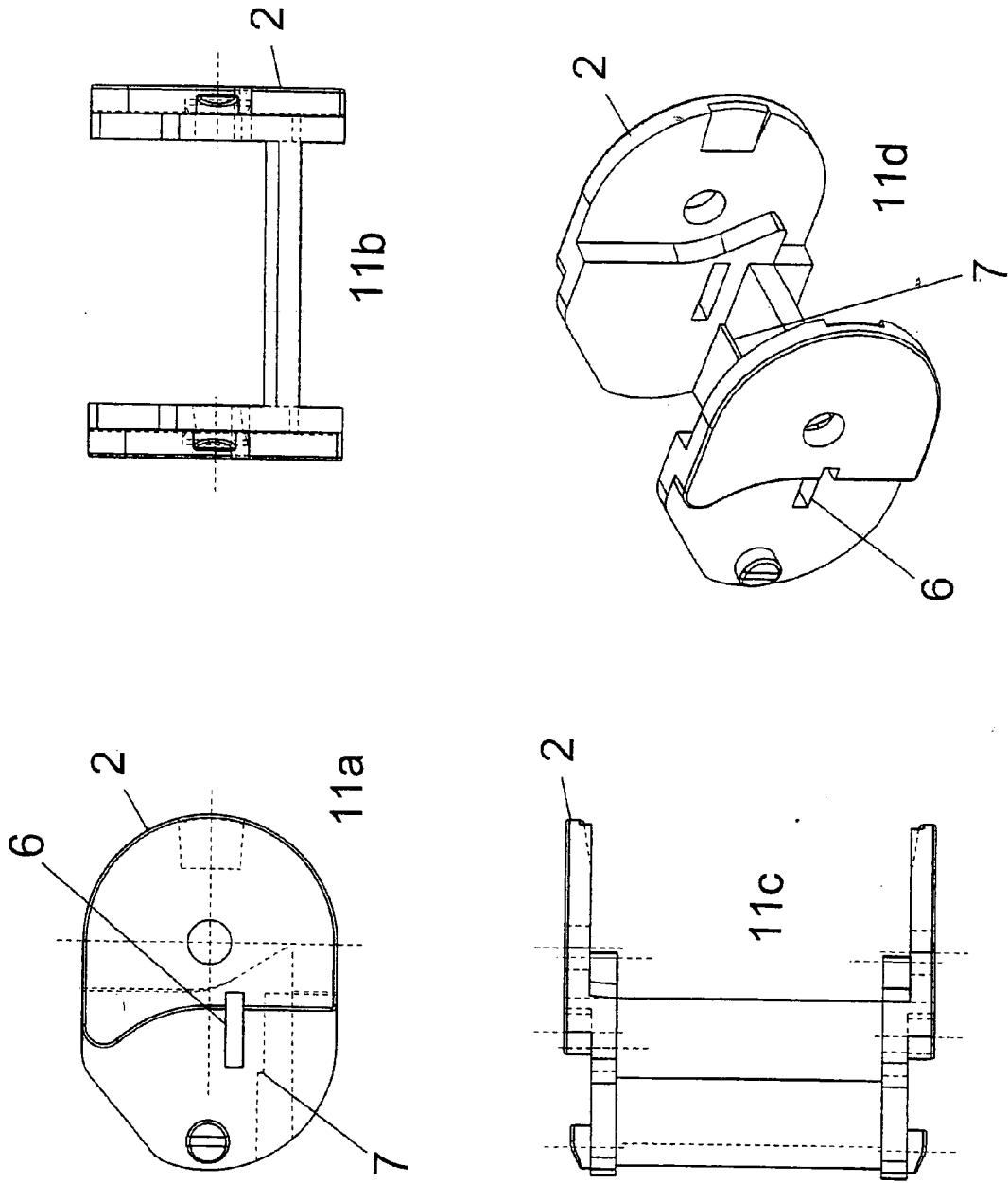
Drawing 8





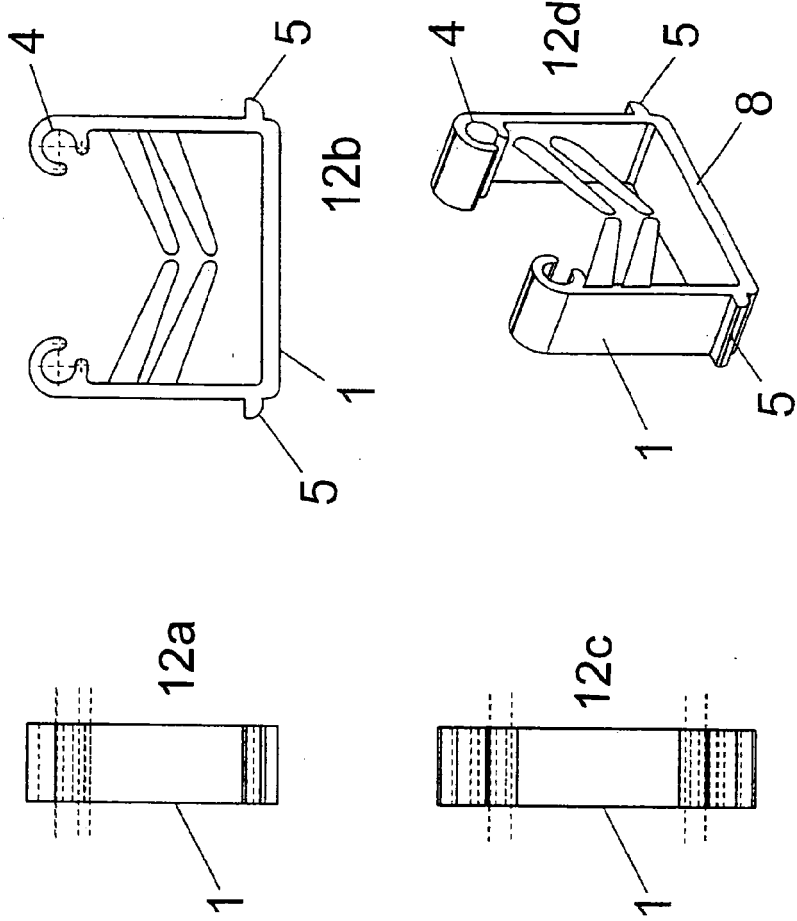


Drawing 11

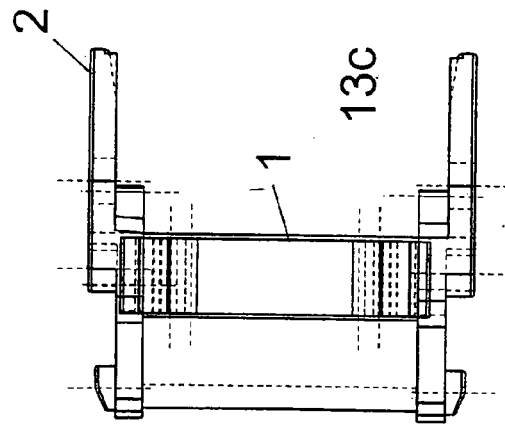
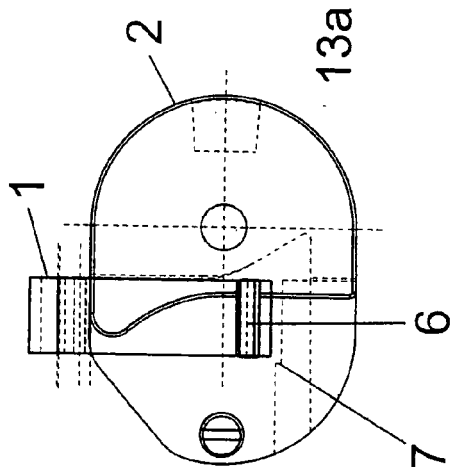
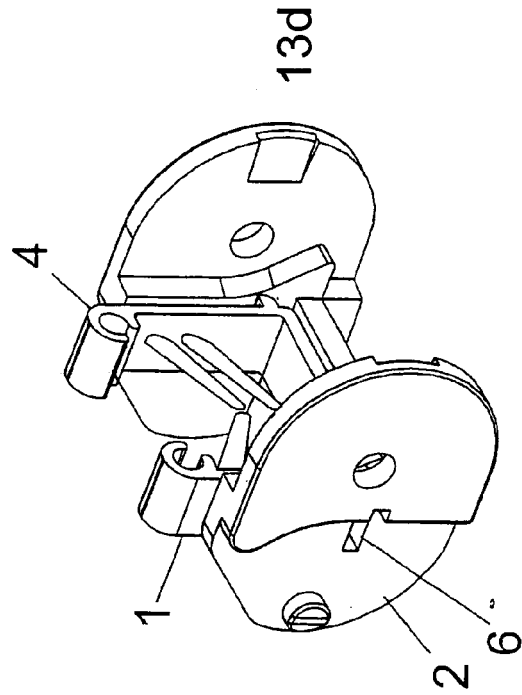
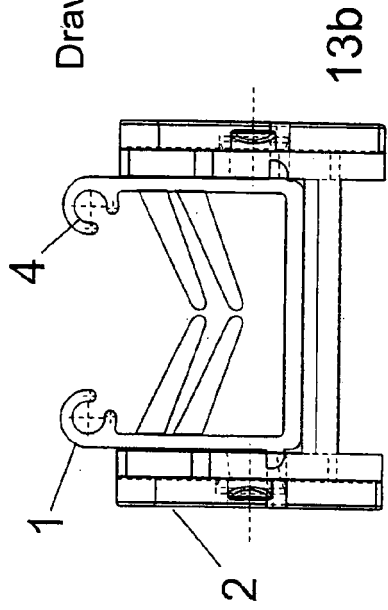




Drawing 12



Drawing 13



**REFERENCES CITED IN THE DESCRIPTION**

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