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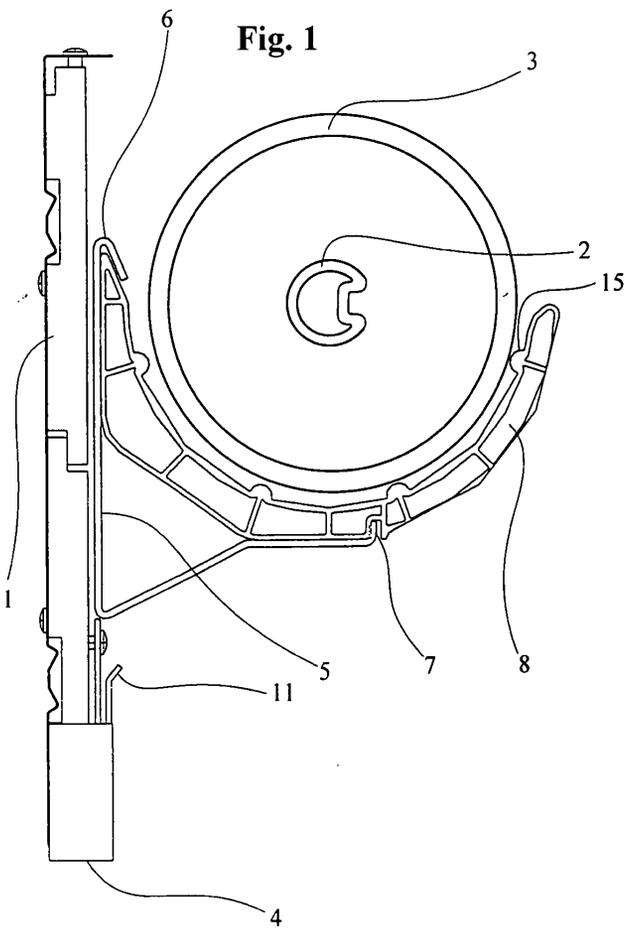
(54) Spring supports for sectional doors

(57) This is a saddle (8), with a circular cavity supporting surface, which corresponds to the diameter of an unloaded balancing spring (3) for a sectional door, with a development less than 180° to allow fitting the saddle (8) to the spring (3) it must support.

The saddle (8) is fitted beneath the spring (3) and supported by a bracket (5) fixed to the crosspiece (1) of the fixed frame of the sectional door. The saddle (8) clicks and releases from the bracket (5).

Fig. 1



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Description

[0001] On garage doors, especially sectional doors, in the top part fixed to the frame inside the garage, also known as the 'box', there can be rods, helical springs, wheelworks, drums, brackets, etc.

[0002] Recently, door makers, having realised that there are rotary parts inside these boxes, have decided to close the boxes for safety reasons, with a casing called the "rod cover".

[0003] However, there are problems with this casing when the box contains a helical spring for balancing the door.

[0004] As we know, the spring is dimensioned to balance the weight of the door and can be very large and heavy.

[0005] When the door is completely lowered, the spring is preloaded to the maximum with the coils as close as possible to the geometric axis of the spring, therefore, with a minimum amount of diametric volume.

[0006] As the door is slowly raised, the spring preload reduces and the coils gradually move away from the spring axis, and reach their maximum diametric expansion when the door is completely open.

[0007] Due to the weight of the helical spring, with a horizontal position, it follows a curved line which curves downwards with the maximum camber in the intermediate area with respect to the through straight line where it is fixed at the ends.

[0008] In these circumstances, as the spring has one end fixed to the structure of the permanent frame and the other end fixed to the rotary rod, when the sectional mantle of the door is raised and lowered, if the door is lifted the spring, with its curved geometric axis, can be forced to rotate with considerable deviation all round, causing it to knock against the surrounding walls.

[0009] If the carter were fixed to the box with a spring that is free to belly and knock, the casing would have to be big enough to avoid the spring knocking against it and creating a lot of noise.

[0010] If a big enough box were made, it would mean lowering the bottom edge of the box and therefore reducing the free space when the door is open.

[0011] To reduce problems with helical balancing springs as explained, certain solutions have been adopted, the most common of which are briefly described below.

[0012] With one of the solutions currently used by sectional door manufacturers, the rod that passes inside the spring is fitted with a radially winged bushing (along the entire length or just stretches), which occupies the space when the spring is at maximum shrinkage (when the door is closed).

[0013] However, although the problem is partly resolved, it still persists when the spring widens, as it creates a tubular space inside that is larger than the winged bushing, and therefore the spring, to a lesser extent, can still curve downwards and rotate within the door movement, therefore knocking against it and making a noise.

[0014] Another solution that is currently used by sectional door manufacturers, involves fitting the rod inside the spring with a yielding material (for the entire length or just stretches), which occupies the space when the spring is at maximum expansion (when the door is completely open). This solution virtually solves the problem of gravitational curving and sideways movement when the door is being opened or closed.

[0015] This second solution causes serious problems however, because each time the spring goes from maximum expansion to maximum shrinkage, there is a great deal of friction and the yielding material on the bushing, which is pressed and rubbed by the coils that close against it, and therefore does not last long and is costly, as the new bushing with yielding material would have to be replaced.

[0016] We should also mention that, in both cases, when changing either the winged or yielding material bushing, the entire spring and rod system would have to be dismantled and then reloaded, which is a lengthy and costly process.

[0017] These problems can be solved with this invention, which costs little, is practical and, above all, very efficient.

[0018] It involves making a specially shaped sufficiently long saddle that is fitted below the spring and supports it on the outside, obliging it to stay within in its housing.

[0019] The saddle is attached by a projecting hook to a special bracket which is fixed by clamps to the box. The extension of the saddle in the axial direction of the spring can be continuous or limited to one or more segments.

[0020] It is sufficient to limit the circumferential development of the supporting surface of the saddle to 180°, this way it does not exceed the diametric volume of the spring, thus meaning it is very easy to assemble and remove from the spring.

[0021] This means that if the, saddle needs changing, the spring does not need touching thus avoiding the costly dismantling and reassembling of the rod.

[0022] The rod casing in the box can be reduced to a minimum, without effecting the external volume of the saddle and is not effected by the vibrations of the saddle itself, allowing maximum door height when it is open.

[0023] This is clearly shown in the enclosed tables and drawings.

Fig. 1 gives a schematic diagram of the helical spring support saddle with the rod in the centre which it is connected to at one end, positioned beneath the spring and supported by a bracket which is clamped to the top crosspiece of the fixed doorframe.

Fig. 2 is the corresponding diagram to Fig. 1 but without the saddle fitted, but which shows the spring with the rod in the centre, the brackets with the

clamps fixed to the top crosspiece of the fixed doorframe.

Fig. 3 and Fig. 4 show the saddle and the brackets, with the clamps shown in Fig. 1 separate.

Fig. 5 shows the saddle and brackets shown in figs. 3 and 4 coupled to each other.

Fig. 6 shows an axonometric portion of the top crosspiece of the fixed doorframe, in correspondence with one end with the extension where the support pulley of the mantle integral with the rod is held up, showing where an end of the helical spring is hooked, and shows a cross-section of the rod, helical spring, brackets with the clamps that hold the spring support saddle.

Fig. 7 shows a section of the box containing the assembly, with the spring support saddle invention supported by the brackets with the clamps fixed to the top crosspiece of the fixed doorframe and the casing that closes the box. Note the free space between the rod and the spring.

Fig. 8 shows a section of the box, where the work can be seen to stop the spring bellying, leaving it free to rotate when the mantle is lowered and raised, which is obtained with this solution by placing a bushing on the rod in the space between the rod and the mantle; this bushing has three winged radial expansions which can expand during rod rotation and are compressed when the spring shrinks towards the rod.

[0024] The problems involved with this solution are more or less the same as those where a bushing with yielding material is placed around the rod.

[0025] By examining Figs. 1, 2, 3, 4 and 5, we can see that the work is not done to the rod (2) or inside the space between the rod (2) and the spring (3), as is the case in the other solutions that are currently used with the bushing fitted with 12 winged radial expansions.

[0026] The bracket (5) is fixed to the internal facing on the top crosspiece (1) of the fixed doorframe, with the clamps (6) and (7) fixed to the ends.

[0027] These clamps (6) and (7) support the saddle (8) and its surface is used to support the circular spring, related to the external diameter of the spring (3) when it is unloaded, developing the circular cavity by no more than 180° so it is easy to fit below the spring (3) to support its weight.

[0028] On the outside, the saddle is fitted with strikers (9) and (10), which correspond to the clamps (6) and (7) of the bracket (5), and is introduced below the spring (3), fitting onto the bracket (5), which has a special arm that offers sufficient elastic compliance.

[0029] The saddle (8) inside the cavity, has a number of rises (15) made in a lengthways direction which reduce the surface that is in contact between the spring (3) and the saddle itself (8).

[0030] As we know, for it to work the spring (3) has one end fixed to the rod (2) integral with the pulley (17), which is used for moving the mantle, and the opposite end fixed to an expansion (16) of the box crosspiece (1).

[0031] The rod casing (14), which completes the box closing, is hooked to the strikers, (11) and (13) of the fixed structure, at a sufficient distance from the bottom edge (4) of the crosspiece (1).

[0032] This patent also covers any possible improvements that experts in the field could construct, based on the teachings of this patent.

Claims

1. Spring support for a sectional door, formed of a saddle (8) which supports the balancing spring for a sectional door (3), related to the external diametric dimensions of the spring (3) unloaded which is used to support the weight and limit gravitational bellying.

2. Spring support for a sectional door according to claim 1, **characterised by** the fact that the saddle (8) is held in the operating position by a bracket (5), which is fixed to the internal facing of the crosspiece (1) of the fixed frame of the sectional door by clamps (6, 7) which hold the saddle against the special strikers (9, 1.0).

3. Spring support for a sectional door according to claim 1, **characterised by** the fact that the saddle (8) is clicked into place and released from the bracket (5) with clamps (6, 7) for supporting the saddle (8), because the jutting arm at the end of the clamp (7) on the bracket (5) fixed to the sectional door crosspiece (1) is elastically compliant which means that the clamp (7) can easily engage and release from the corresponding striker (10) on the saddle (8).

4. Spring support for a sectional door, according to the previous claim, **characterised by** the fact the saddle (8) can be assembled and removed from the bracket (5), even when the spring (3) is already installed in the operating configuration.

5. Spring support for a sectional door, according to claim 1,
characterised by the fact that the surface of the saddle (8) used to support the circular spring (3), has a number of rises (15) which reduce the extension of the surface that comes into contact between the spring (3) and the saddle (8).

6. Spring support for a sectional door, according to claim 1, **characterised by** the fact that the saddle (8) development does not exceed 180°, to make it easy to fit beneath the spring (3) assembled on the rod with the sectional door pulley.

7. Spring support for a sectional door, according to claim 1, **characterised by** the fact that the saddle (8) is sufficiently far away from the rod casing (14) which closes the box, and does not transmit vibrations from the saddle (8) to the casing (14).

8. Spring support for a sectional door, according to claim 1, **characterised by** the fact that the extension of the saddle (8) is reduced to just one or more stretches that are shorter than the lengthways extension of the spring (3).

Fig. 1

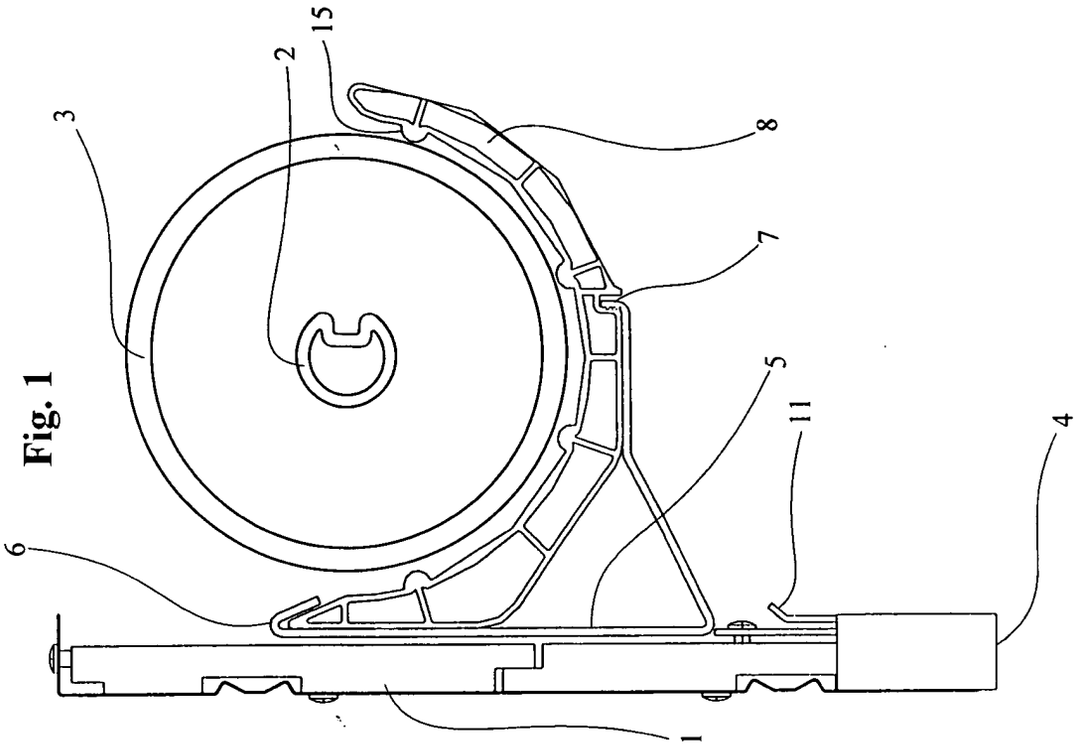
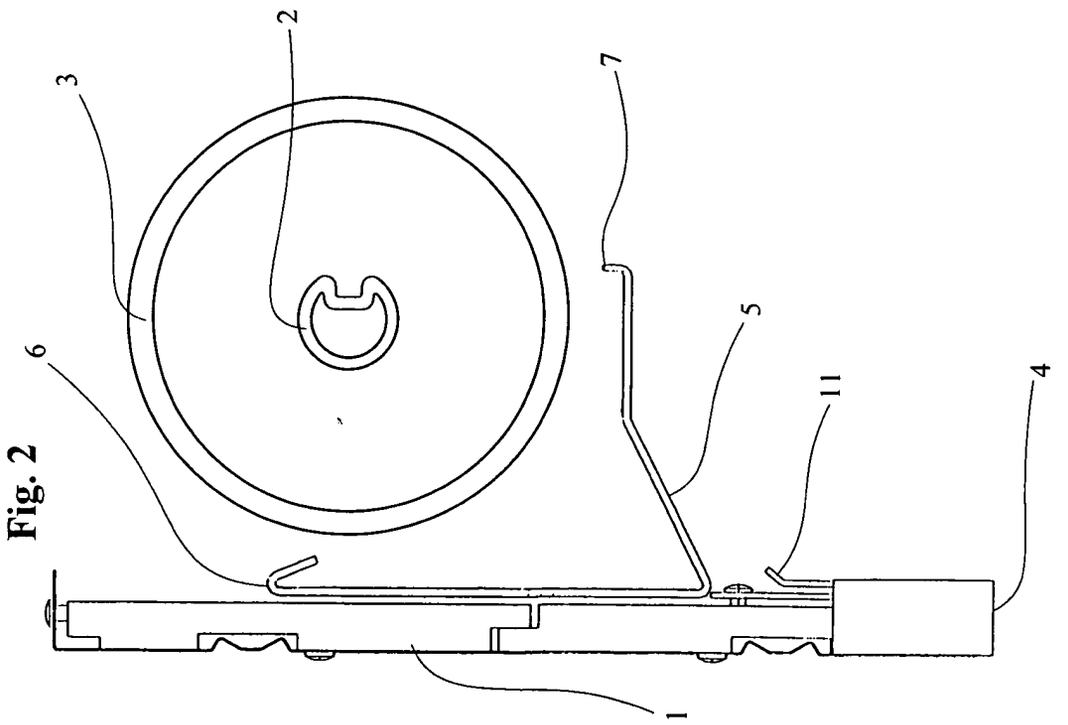


Fig. 2



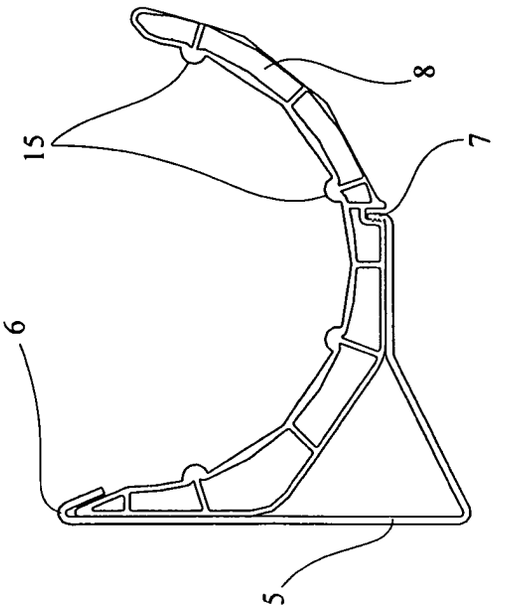


Fig. 5

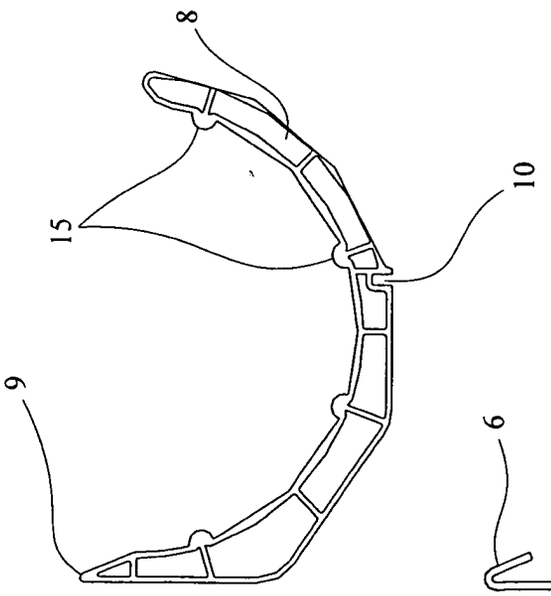


Fig. 3

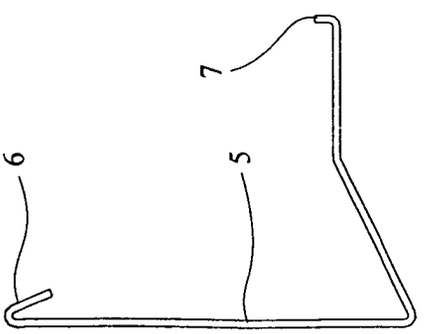


Fig. 4

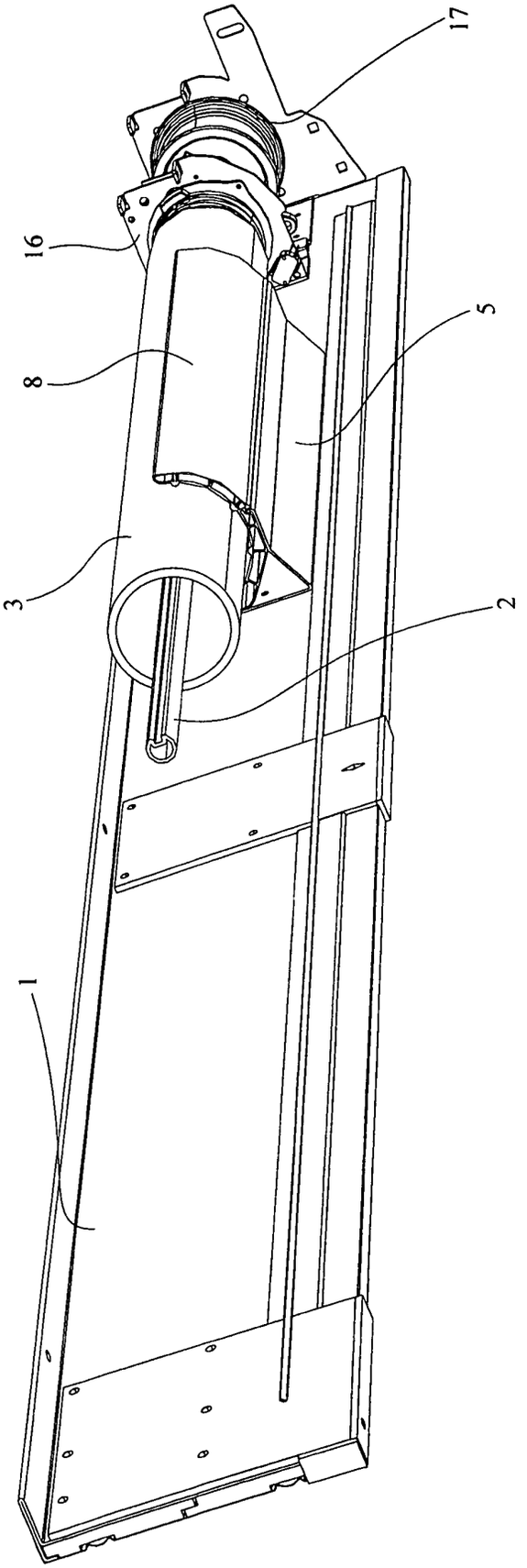


Fig. 6

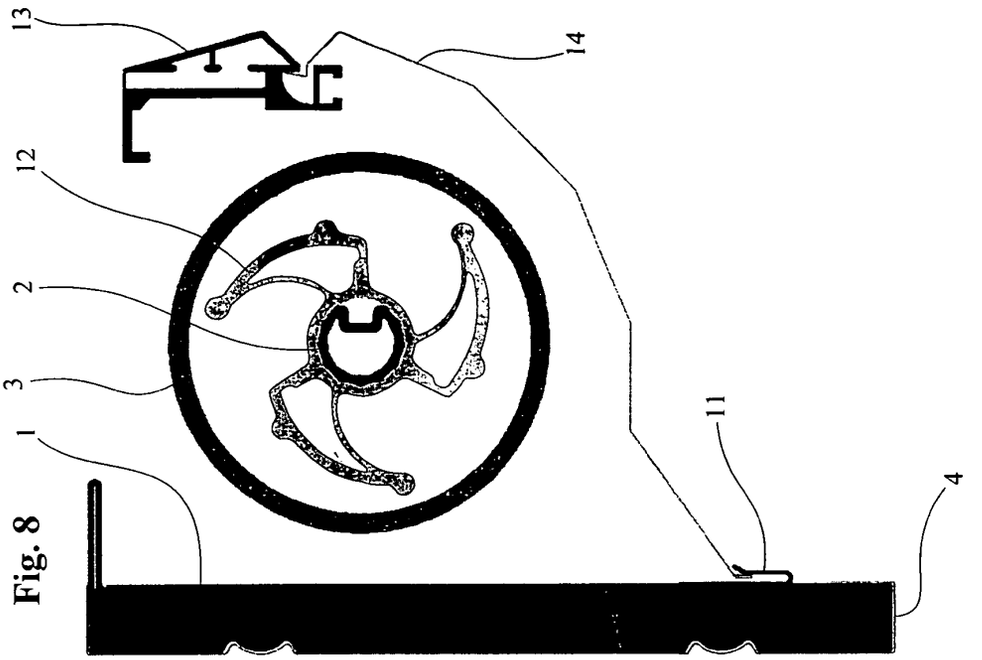


Fig. 8

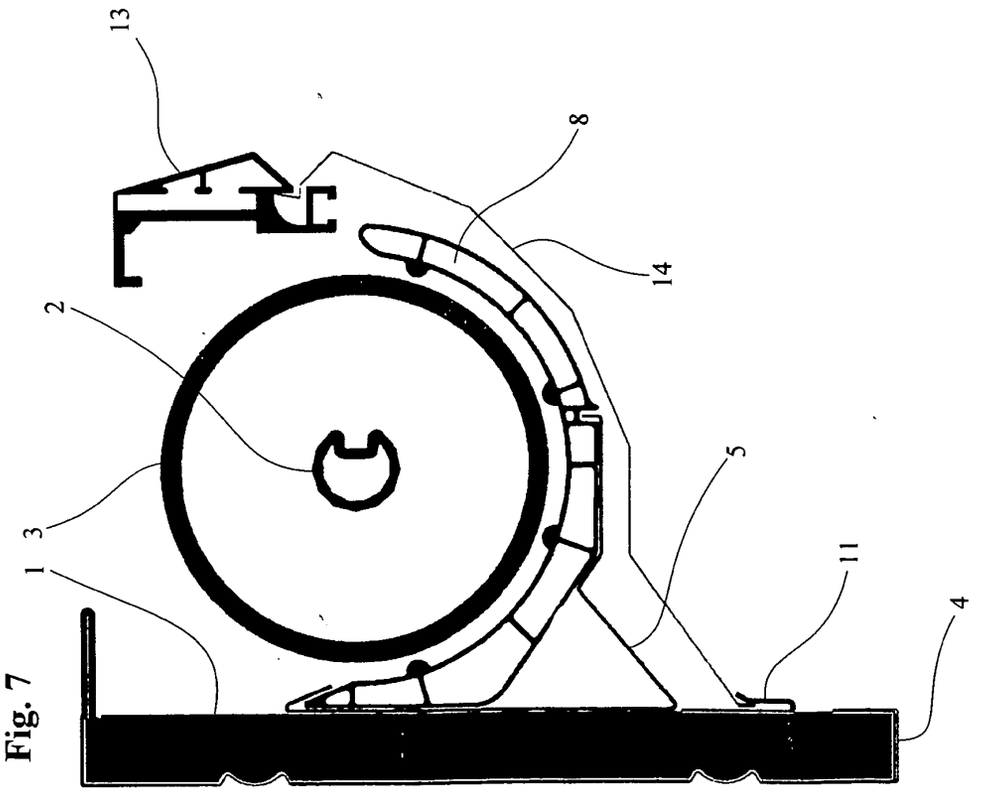


Fig. 7