

## CUTTING DEVICE FOR PROFILE-EMBEDDED RUBBER STRIP

### Field of the Invention

5           The present invention relates to a cutting device, in particular to a cutting device for cutting a rubber strip embedded in a profile.

### Background of the Invention

10           In prior arts, some profiles should be embedded with a rubber strip so as to achieve effects such as water-proofing, sound-proofing, or the like. For example, aluminum profile 7 used for door frames or window frames, as shown in Fig. 9, is provided with an rubber strip mounting groove 73, in which the rubber strip can be mounted, along a lengthwise direction thereof. Each end face of the aluminum profile  
15   7 is generally configured to be a slope, so as to facilitate joint of aluminum profiles arranged in a horizontal direction and in a vertical direction respectively. In addition, the slopes of two end faces are normally not parallel to each other, but form an angle of 90 degrees therebetween. Accordingly, the rubber strip embedded in the aluminum profile also has to have two end faces respectively parallel to the two end faces of the  
20   aluminum profile. That is, the two end faces of the rubber strip are also configured to be slopes with corresponding angles.

          Conventionally, the rubber strip is embedded in the profile and cut there as follows. First, the rubber strip is guided into the rubber strip mounting groove of the  
25   profile by hands. Then, the rubber strip is cut off along the sloping end faces of the profile with a pair of scissors; that is, two cutting operations with different cutting angles are necessary for each profile. This procedure lacks efficiency and causes operator tedious, thus wasting labor. Moreover, operator's hands may be injured due to contact with sharp corners at the end faces of profiles. Therefore, there exists a risk  
30   in safety.

## **Summary of the Invention**

The present invention aims to propose a cutting device for profile-embedded  
5 rubber strip, which can perform two cutting actions in one operation with high safety.

The technical solution proposed by the present invention is a cutting device for  
profile-embedded rubber strip, which is configured to cut off a rubber strip according  
to angles of two end faces of a profile, including an upper cutter and a lower cutter  
10 which can perform cutting together through an offset movement toward each other.  
The upper cutter includes a cutter rest, and two blades respectively fixed on two side  
faces of the cutter rest at a lower portion thereof. An angle of a front blade is the same  
as that of a rear end face of the profile, and an angle of a rear blade is the same as that  
of a front end face of the profile.

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The lower cutter includes a cutter seat, which has a notch at a position directly  
under the upper cutter. Two side faces of the notch form two sharp edges with a top  
surface of the cutter seat, the sharp edges being cooperated with the two blades for  
achieving cutting function.

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The cutting device according to the present invention further includes a powering  
mechanism for controlling movement of the upper cutter along a vertical direction.

The powering mechanism can be a cylinder.

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The cutter rest is provided with a guiding shaft, which extends downwardly  
along a vertical direction, at the lower portion thereof in the region where two blades  
connect with each other. The cutter seat is provided with a concave, vertical guiding  
groove at a corner of the notch, so that the guiding shaft can be inserted in the vertical  
30 guiding groove and slide along the vertical guiding groove up and down.

The cutter rest is provided with a recess in a bottom portion thereof, for providing clearance for the rubber strip during cutting.

5        A cutting edge of each blade forms an angle of 20 to 40 degrees with a horizontal direction.

10        A front side face and a rear side face of the cutter rest each have an inwardly concave area, on which two blades are mounted and fixed respectively. The outer surfaces of two blades are flush with the front and rear side faces of the cutter rest, respectively.

15        The cutting device according to the present invention further includes a guiding mechanism for restricting moving direction of the upper cutter. The guiding mechanism comprises at least two vertical guiding columns, and a cutter mounting plate through which the vertical guiding columns pass. The cutter rest is fixed on the cutter mounting plate at its upper portion.

20        Two side faces of the cutter rest are fixedly connected with a bottom portion of the cutter mounting plate through angles and screws.

25        Compared with the prior arts, the cutting device for profile-embedded rubber strip according to the present invention is provided with two blades, which have angles equal to those of the front and rear end faces of the profile respectively. Therefore, two cutting actions respectively for the rear end of a previous rubber strip and for the front end of a next rubber strip can be performed in one operation, thus significantly enhancing the cutting efficiency and saving labor cost. In addition, the operation is more convenient, and at the same time the contact between operator's hands and the end faces of the rubber strip can be avoided, thus achieving higher safety.

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### **Brief Description of the Drawings**

Fig. 1 schematically shows the structure of a cutting device for profile-embedded  
5 rubber strip according to the present invention;

Fig. 2 schematically shows the structure of a cutter rest;

Fig. 3 schematically shows the structure of a lower cutter;  
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Fig. 4 schematically shows the structure of the cutter rest from below;

Fig. 5 schematically shows an upper cutter from a side of a guiding shaft thereof;

15 Fig. 6 schematically shows a side view of the upper cutter;

Fig. 7 is a horizontal cross section view of a bottom portion of the upper cutter;

Fig. 8 schematically shows a top fixing structure of the upper cutter; and  
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Fig. 9 schematically shows the structure of a profile.

### **Detailed Description of the Embodiments**

25 The present invention will be described in further detail with reference to the  
embodiments as shown in the accompanying drawings.

The cutting device for profile-embedded rubber strip according to the present  
invention can cut off a rubber strip in such a manner that both end faces of the cut  
30 rubber strip have respective angles corresponding to the angles of two end faces of  
profile. As shown in Fig. 9, a front end face 71 of the profile 7 forms an angle A1 with  
the lengthwise direction of the profile 7, and a rear end face 72 thereof forms an angle  
A2 with the lengthwise direction of the profile 7. Of course, the angles of two end

faces of the profile 7 means those of end faces of the profile at a position where the rubber strip mounting groove is located. In this manner, the end faces of the cut rubber strip can be flush with the end faces of the profile at a position where the rubber strip is embedded, respectively.

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As shown in Fig. 1, the cutting device for profile-embedded rubber strip according to the present invention mainly includes an upper cutter 1, a lower cutter 2, and a guiding mechanism. The upper cutter 1 and the lower cutter 2 are opposed to each other, and can perform cutting through offset movements thereof toward each other. The guiding mechanism is used to restrict the moving direction of the upper cutter 1. In addition, in order to save labor, a powering mechanism 3 may be provided for controlling the vertical movement of the upper cutter 1.

As shown in Figs. 5 and 6, the upper cutter 1 includes a cutter rest 11, and two blades 12 fixed on a lower portion of the cutter rest 11. The cutter rest 11 is generally shaped as a triangular prism arranged uprightly, and as shown in Fig. 7, it has a cross-sectional shape of isosceles triangle. As shown in Fig. 2, a front side face and a rear side face of the cutter rest 11, i.e., the two side faces corresponding to two equal sides of the isosceles triangle in Fig. 7, each have an inwardly concave area 16, which is provided with a threaded hole 18. The two blades 12 are mounted on two concave areas 16 respectively, and each fixed thereon with a screw 63 passing through the threaded hole 18. In this case, the outer surfaces of two blades 12 are flush with the front and rear side faces of the cutter rest 11, respectively, thus providing a clean and aesthetics outer appearance for the upper cutter 1.

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As shown in Fig. 7, when the blades 12 are fixed, the angle formed by a front blade 12 and the lengthwise direction of the rubber strip to be cut is A2, which is identical to that formed by the rear end face 72 of the profile 7 and the lengthwise direction of the rubber strip to be cut, and the angle formed by a rear blade 12 and the lengthwise direction of the rubber strip to be cut is A1, which is identical to that

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formed by the front end face 71 of the profile 7 and the lengthwise direction of the rubber strip to be cut. That is, the angle B formed by the two blades 12 is equal to that formed by the front end face and the rear end face of the profile 7. If the front end face and the rear end face of the profile 7 each have a slope with 45 degrees as  
5 conventionally, the angle B formed by the two blades 12 is 90 degrees.

As shown in Fig. 3, the lower cutter 2 includes a cutter seat 21 that can be fixed on a workbench 4. The cutter seat 21 has a V-shape notch 22 directly facing the upper cutter 1 from below. The two side faces 24 of the V-shape notch 22 of the cutter seat  
10 21 form two sharp edges respectively with a top surface of the cutter seat 21. When the upper cutter 1 moves downwardly to the notch 22, the two sharp edges will be in close engagement with the two blades 12 respectively, so that the cutting operation can be realized. In this manner, the rubber strip can be smoothly cut off.

During cutting, the rubber strip to be cut is placed on the top surface of the lower  
15 cutter 2, under the upper cutter 1. Then, the blades 12 of the upper cutter 1 are moved downwardly to the notch 22 of the lower cutter 2, thus cutting off the rubber strip into two sections. A front section cut from the rubber strip has a slope angle the same as the rear end face 72 of a previous profile 7, while a rear section cut therefrom has a  
20 slope angle the same as the front end face 71 of a next profile 7. Therefore, two cutting actions can be performed with one operation.

In order to prevent the upper cutter 1 from deviation during movement to negatively influence on the cutting quality, the cutter rest 11 is provided with a  
25 guiding shaft 13, which extends downwardly along the vertical direction, at the lower portion thereof in the region where two blades connect with each other, as shown in Fig. 2. Accordingly, the cutter seat 21 is provided with a vertical guiding groove 23 at a corner of the notch 22. The guiding groove 23 is concave relative to the notch 22. Such being the case, the guiding shaft 13 can be exactly inserted in the vertical  
30 guiding groove 23 and slide along the vertical guiding groove 23 up and down. With

this structure, the moving direction of the upper cutter 1 can be effectively guided and restricted.

As shown in Fig. 4, the cutter rest 11 is provided with a recess 15, for providing  
5 clearance for the rubber strip during cutting. In the embodiment, the recess 15 is configured as having a right angle.

As shown in Fig. 6, in order to cut the rubber strip easily, an angle  $\alpha$  formed by  
the cutting edge of each blade 12 and the horizontal direction ranges from 20 to 40  
10 degrees, and is 30 degrees in the present embodiment. As shown in Fig. 5, the nose of the cutting edge of each blade 12 is far away from the guiding shaft 13, so that two blades 12 can cut off the rubber strip at the same time during cutting.

As shown in Figs. 1 and 8, in the present embodiment, the powering mechanism  
15 is a cylinder 3, which is mounted on a cylinder mounting plate 31. The cylinder 3 is connected with a cutter mounting plate 52 through a cutter rest connector 32 located under the cylinder mounting plate 31.

The guiding mechanism includes at least two vertical guiding columns 51, the  
20 cutter mounting plate 52, and shaft sleeves 53. The shaft sleeve 53 is fixed in a shaft hole of the cutter mounting plate 52, and movably mounted around a respective vertical guiding column 51. The two side faces of the cutter rest 11 are fixedly connected with the bottom of the cutter mounting plate 52 through angles 61 and screws 62. The engagement between the guiding shaft 13 and the vertical guiding  
25 groove 23 can be controlled through adjustment on the screws 62. The top portion and the bottom portion of the vertical guiding column 51 are fixedly connected with the cylinder mounting plate 31 and the workbench 4 respectively. In this manner, the upper cutter 1 can, driven by the cylinder 3, move only along the vertical guiding column 51 up and down.

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The foregoing description is merely illustrative of preferred embodiments of the present invention, and is not intended to limit the present invention. Various changes and modifications may be made by those skilled in the art. Any modifications, equivalent substitutions, improvements, and the like within the spirit and principles of  
5 the present invention are intended to be included within the scope of the present invention.

## CLAIMS

1. A cutting device for profile-embedded rubber strip, which is configured to cut off a rubber strip according to angles of two end faces of a profile, including an upper  
5 cutter (1) and a lower cutter (2) which can perform cutting together through an offset movement toward each other,

characterized in that the upper cutter (1) includes a cutter rest (11), and two blades (12) respectively fixed on two side faces of the cutter rest (11) at a lower portion thereof, an angle of a front blade (12) being the same as that of a rear end face  
10 of the profile, and an angle of a rear blade (12) being the same as that of a front end face of the profile.

2. The cutting device for profile-embedded rubber strip according to claim 1, characterized in that the lower cutter (2) includes a cutter seat (21), which has a notch  
15 (22) at a position directly under the upper cutter (1), and two side faces of the notch (22) form two sharp edges with a top surface of the cutter seat (21), the sharp edges being cooperated with the two blades (12) for achieving cutting function.

3. The cutting device for profile-embedded rubber strip according to claim 2,  
20 characterized in that the cutting device further includes a powering mechanism (3) for controlling movement of the upper cutter (1) along a vertical direction.

4. The cutting device for profile-embedded rubber strip according to claim 3,  
characterized in that the powering mechanism (3) is a cylinder.

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5. The cutting device for profile-embedded rubber strip according to any one of claims 1 to 4, characterized in that the cutter rest (11) is provided with a guiding shaft (13), which extends downwardly along a vertical direction, at the lower portion thereof in the region where two blades (12) connect with each other, and the cutter  
30 seat (21) is provided with a concave, vertical guiding groove (23) at a corner of the

notch (22), so that the guiding shaft (13) is able to be inserted in the vertical guiding groove (23) and slide along the vertical guiding groove (23) up and down.

6. The cutting device for profile-embedded rubber strip according to any one of  
5 claims 1 to 4, characterized in that the cutter rest (11) is provided with a recess (15) in a bottom portion thereof, for providing clearance for the rubber strip during cutting.

7. The cutting device for profile-embedded rubber strip according to any one of  
10 claims 1 to 4, characterized in that a cutting edge of each blade forms an angle of 20 to 40 degrees with a horizontal direction.

8. The cutting device for profile-embedded rubber strip according to any one of  
claims 1 to 4, characterized in that a front side face and a rear side face of the cutter  
rest (11) each have an inwardly concave area, on which two blades (12) are mounted  
15 and fixed respectively, and the outer surfaces of two blades (12) are flush with the front and rear side faces of the cutter rest (11), respectively.

9. The cutting device for profile-embedded rubber strip according to any one of  
claims 1 to 4, characterized in that the cutting device further includes a guiding  
20 mechanism for restricting moving direction of the upper cutter (1), the guiding mechanism comprising at least two vertical guiding columns (51), and a cutter mounting plate (52) through which the vertical guiding columns (51) pass, wherein the cutter rest (11) is fixed on the cutter mounting plate (52) at its upper portion.

25 10. The cutting device for profile-embedded rubber strip according to claim 9, characterized in that two side faces of the cutter rest (11) are fixedly connected with a bottom portion of the cutter mounting plate (52) through angles (61) and screws (62).