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Paper A(E/M)

Electricity / Mechanics

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Client's Letter

Dear Piotr,

[001] I am a vegetarian and eat all sorts of nuts. I have several nutcrackers at home. Some of them are better at cracking large nuts, such as walnuts, and others are better at cracking small nuts, such as hazelnuts. I have invented a nutcracker that can crack nuts of different sizes.

[002] Fig. 1 shows a perspective view of a first example of my nutcracker. It has an upper plate 1 in the form of a disc and a lower plate 2 in the form of a disc. Each plate 1, 2 has a through-hole in the middle. The plates 1 and 2 are connected to each other by means of three rods 3, 4 and 5. The diameter of the plate 1 is larger than the diameter of plate 2. The rods 3, 4 and 5 are of equal length.

[003] The rods 3, 4 and 5 are attached at their upper ends to the plate 1 by means of three ball-joints 13, 14 and 15. The ball-joints 13, 14 and 15 are equally spaced from each other and from the centre of the plate 1. Similarly, the rods 3, 4 and 5 are attached at their lower end to the plate 2 by means of three ball-joints 23, 24 and 25. The ball-joints 23, 24 and 25 are equally spaced from each other and from the centre of the plate 2.

[004] By way of example, Fig. 2 shows the ball-joint 25 in a vertical cross section. The ball-joint 25 comprises a ball arranged on the end of the rod 5 and a socket 10 arranged in the plate 2 for retaining the ball. The ball joint 25 allows the rod 5 to rotate with respect to the plate 2 in any direction, within about 30° from the vertical. Such ball joints are known.

[005] Referring to Figs. 3 to 5, I will now describe how to use the nutcracker to crack a walnut.

[006] Firstly, a walnut is inserted into the nutcracker from above through the through hole in the plate 1. Alternatively a small walnut can be inserted from the side by pushing it through the gap between two rods. Fig. 3 shows the walnut held in the space between the plates 1, 2 and the rods 3, 4, 5, approximately halfway between the plates.

[007] Secondly, holding the plate 1 in one hand and the plate 2 in the other hand, I rotate the plate 1 (arrow A) relative to the plate 2 (arrow B). This causes the rods 3, 4 and 5 to move relative to each other so that the space between the plates 1, 2 and the rods is restricted and the walnut is squeezed by the rods (Fig. 4).

[008] The plates 1 and 2 are further rotated relative to each other and the space between the plates and the rods 3, 4 and 5 is further restricted until the walnut is cracked by the rods (Fig. 5).

[009] To crack a small nut, such as a hazelnut, the plates 1 and 2 must be slightly rotated before the nut is inserted. This restricts the space between the plates 1, 2 and the rods 3, 4 and 5, so that the nut can be held in the space, approximately halfway between the plates.

[010] The nutcracker could be improved in many ways. For example, in order to prevent a nut from slipping on the rods, the rods could be curved or have ridges or protrusions. Alternatively the rods could be coated with non-slip paint. To prevent a nut from jumping out of the nutcracker whilst it is being squeezed, four or even five rods could be used instead of three. In any case, at least three rods are necessary to securely hold the nut. Furthermore, the rods do not have to be of exactly equal length. The upper and lower plates could also have the same size.

[011] I have noticed that if a nut is particularly hard, my hands slip on the plates 1 as I rotate them, so that I am unable to crack the nut. To solve this problem, other support elements for supporting the rods, such as cubes, could be used instead of plates. Another idea for overcoming this problem is to change the form of the plates, as I will explain below with reference to Fig. 6.

[012] The nutcracker of Fig. 6 differs from that of Fig. 1 in that the plates 1 and 2 have handles 11 and 12. The handles 11 and 12 form levers, which increase the force that can be exerted on a nut. I have not had time to make a prototype of this nutcracker, so I tried to solve the problem in a different way. I screwed the lower plate 2 of the nutcracker shown in Fig. 1 to a table. In this way I was able to rotate the upper plate 1 using both hands, which is easier than using only one hand.

[013] The table I was using was a folding table having legs attached to the tabletop by means of hinges. Unfortunately, the table collapsed as I was cracking a walnut. However, this gave me an idea for a second example of my invention that is shown in perspective in Fig. 7.

[014] The nutcracker of Fig. 7 has a rectangular upper plate 1 and a rectangular lower plate 2. The plate 1 has the same size as the plate 2. Plates 1 and 2 are connected to each other by means of four rods 3, 4, 5 and 6 that are parallel to each other. The rods 3 and 4 are separated by a gap through which a large nut, such as a walnut, can be inserted. The rods 4 and 5 are separated by a smaller gap through which even a small nut, such as a hazelnut, cannot pass.

[015] The upper ends of the rods 3, 4, 5 and 6 are attached to the plate 1 by means of four hinges 13, 14, 15 and 16. The hinges 13, 14, 15 and 16 are arranged at the corners of the plate 1. The hinges 13 and 14 constrain the movement of the rods 3 and 4 relative to the plates 1 and 2 to a first plane. The hinges 15 and 16 constrain the movement of the rods 5 and 6 relative to the plates 1 and 2 to a second plane. The lower ends of the rods 3, 4, 5 and 6 are attached to the plate 2 by means of four hinges 23, 24, 25 and 26. Because the rods 3, 4, 5 and 6 are of equal length, the rods can rotate through 180° relative to the plates 1, 2.

[016] By way of example, Fig. 8 shows a vertical cross section of the hinge 23. The hinge 23 comprises a pin 10, which is fixed to the plate 2. The pin 10 passes through a hole in the lower end of the rod 3. The hinge 23 allows the rod 3 to rotate by up to 180° about the pin 10 in the first plane. Such hinges are known.

[017] Referring to Figs. 9 to 11, I will now describe how to use the nutcracker to crack a walnut.

[018] Firstly, a walnut is inserted into the nutcracker through the gap between the rods 3 and 4. Fig. 9 shows the walnut held on the plate 2 between the rods 3, 4, 5 and 6 (the rods 5 and 6 cannot be seen).

[019] Secondly, the plate 1 is moved (Fig. 10, arrow A) relative to the plate 2. This causes a rotation of the rods 3, 4, 5 and 6 relative to the plates 1 and 2. The rods 3 and 4 move relative to each other. The same applies to the rods 5 and 6. However, the rods 3 and 6 do not move relative to each other. The same applies to the rods 4 and 5. The space between the plates 1, 2 and the rods 3, 4, 5, 6 is restricted, so that the walnut is squeezed by the plate 2 and the rods (Fig. 10).

[020] If the plates 1 and 2 are moved further relative to each other, the walnut is c by the plate 2 and the rods 3, 4, 5 and 6 (Fig. 11). When cracking a hazelnut, the plates 1 and 2 must be moved even further relative to each other before the hazelnut is cracked.

[021] To make the nutcracker more stable when standing on a table, the lower plate 2 can be fixed to a surface, for example the tabletop. Furthermore, the hinges do not have to be arranged at the corners of the plates. The nutcracker could have more than four rods. When I tried to reduce the number of rods below four, I realised that the nut tended to jump out of the nutcracker before being cracked. I found that at least three rods are necessary. For example, in the nutcracker of Fig. 7, the rods 3 and 6 could be replaced by a single rod.

[022] In principle, in both examples of my invention, the rods could be attached to the plates elsewhere than at their ends. For example, the rods could extend above the upper plate as a decorative feature. In both examples of my invention, instead of connecting the plates to each other by rods, other connecting elements, such as tubes, could be used. The nutcrackers should be made from a stiff material such as stainless steel.

[023] For your information documents D1 and D2 are annexed to this letter. D1 and D2 describe nutcrackers that are currently available on the market. Like my invention, the nutcracker of D1 uses a lever effect. This effect minimises the strength a person needs to crack a nut. The nutcracker of D2 can crack nuts of different sizes. However, with the nutcracker of D2, skill is needed to crack nuts without completely crushing them.

[024] Please draft a set of claims and an introductory part of the description for a European patent application to protect my invention, assuming that the drawings accompanying this letter will form part of the application. Please note that I will not pay any claims fee for this patent application or any fees for further patent applications.

Best regards,

Marius

Client's Drawings

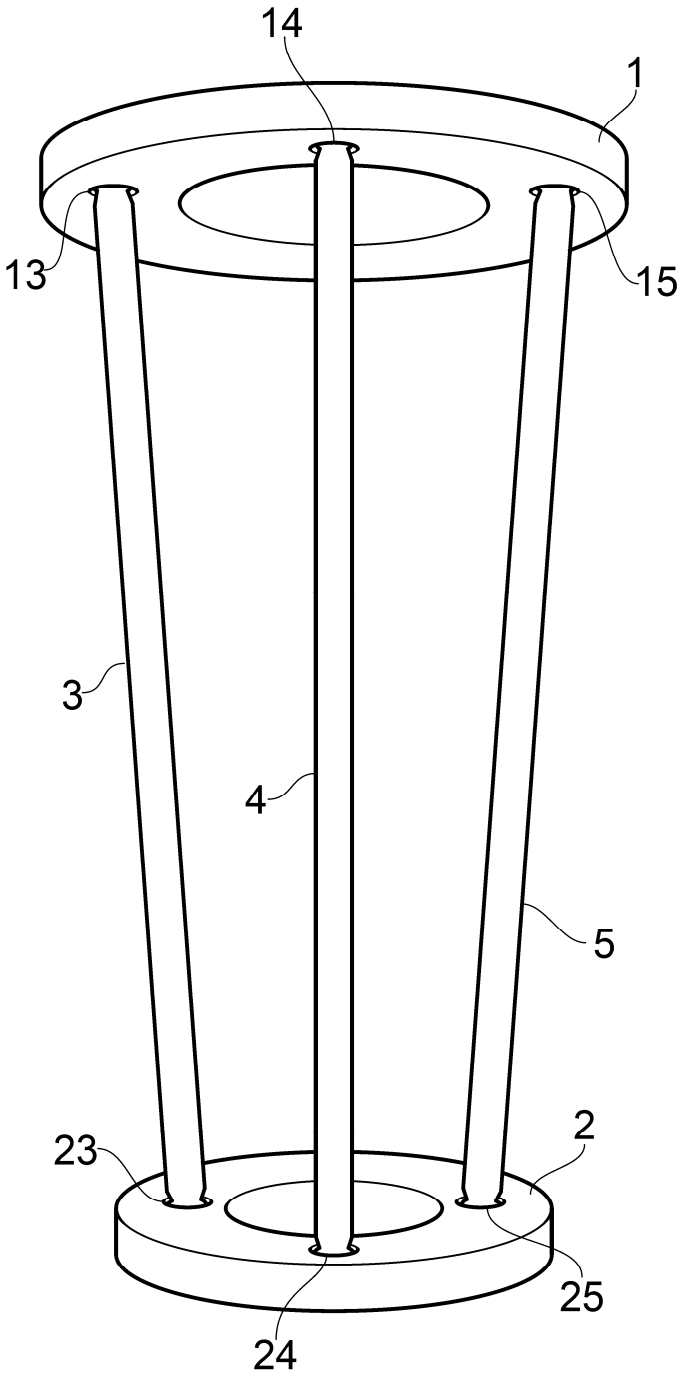

FIG. 1

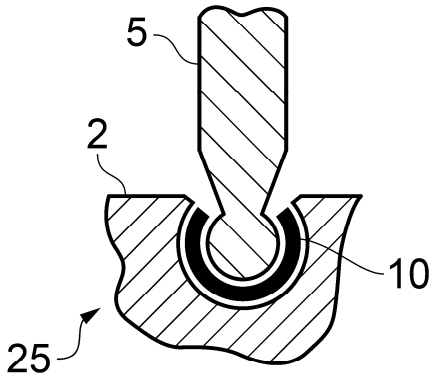

FIG. 2

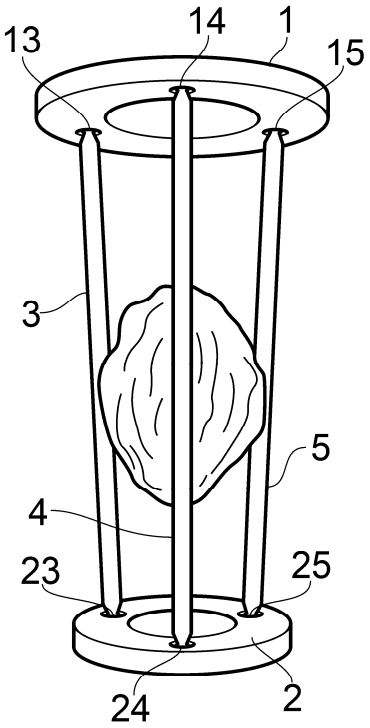

FIG. 3

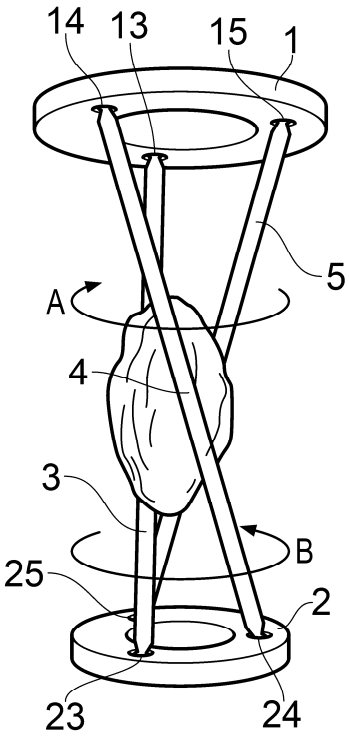

FIG. 4

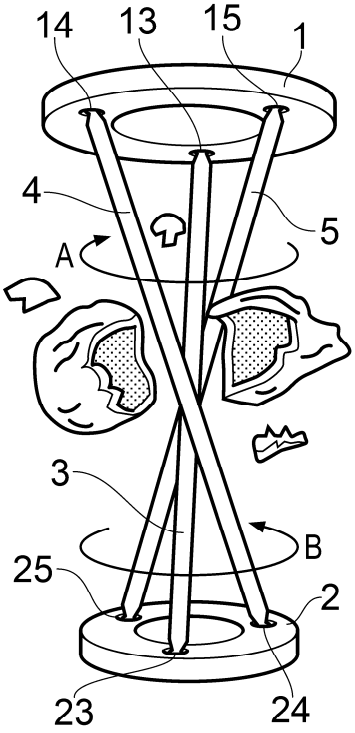

FIG. 5

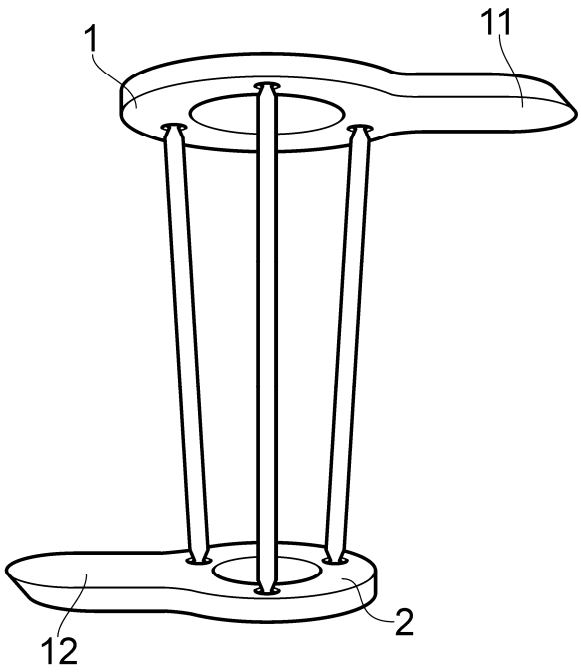

FIG. 6

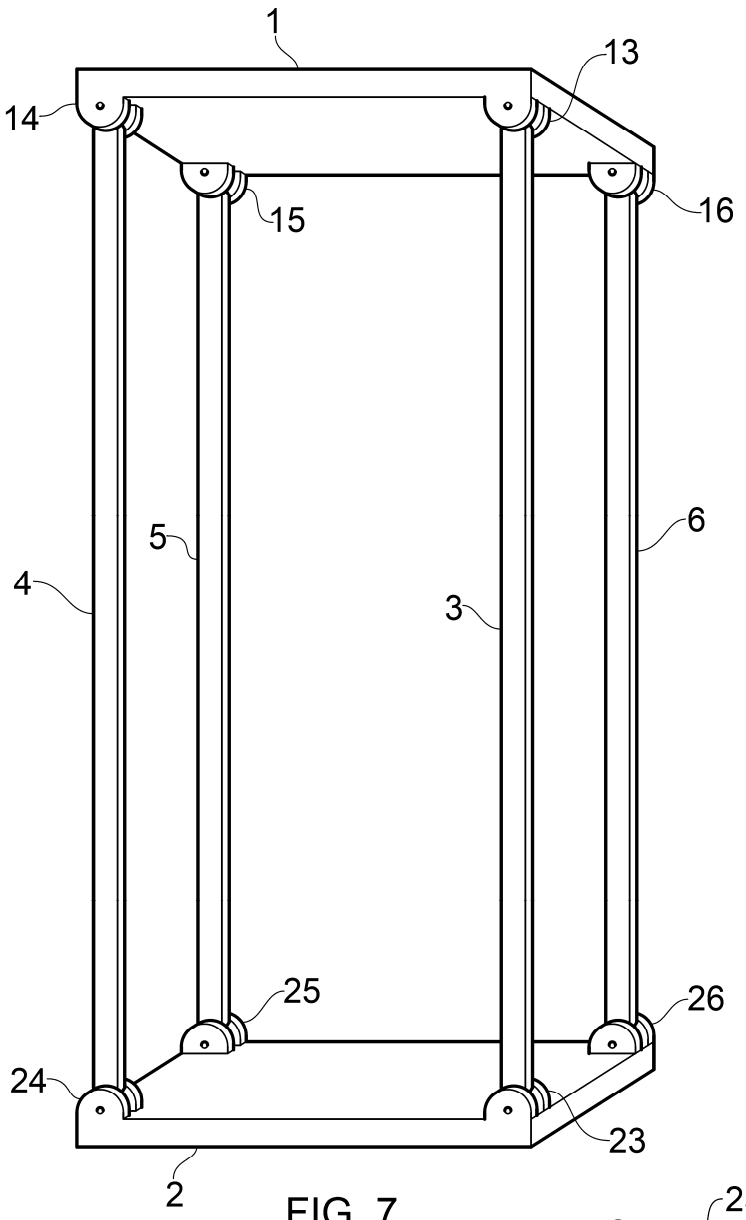

FIG. 7

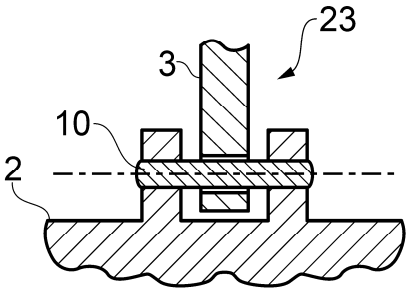

FIG. 8

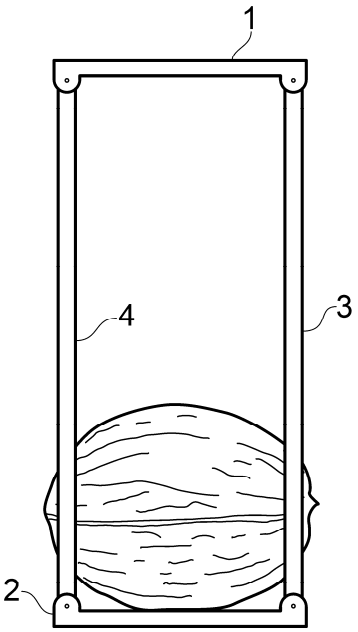

FIG. 9

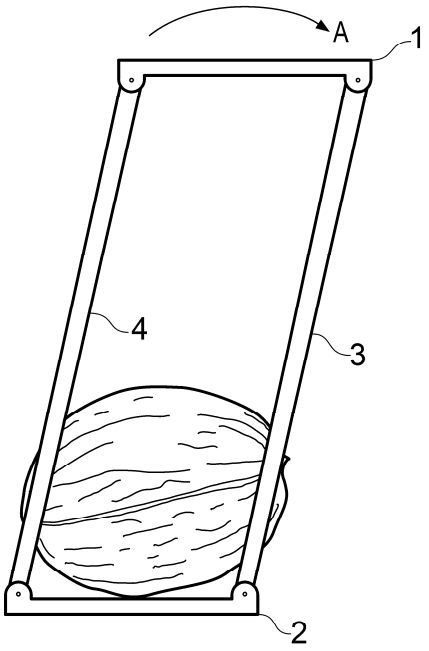

FIG. 10

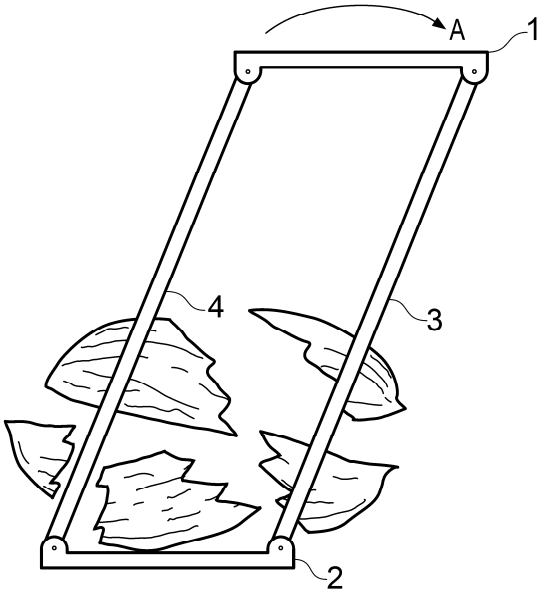

FIG. 11

Document D1

[001] This article describes a nutcracker made of stainless steel. Fig. 1 shows a perspective view of the nutcracker. It has two elongate levers 4 and 5 that are connected to each other by three connecting elements 1, 2 and 3. The connecting elements 1 and 2 are straight. The connecting element 3 is arranged between the connecting elements 1 and 2 and is curved. The lever 4 is pivotally attached at one of its ends to each of the connecting elements 1, 2 and 3 by means of a pin 6. The lever 5 is pivotally attached at one of its ends to each of the connecting elements 1, 2 and 3 by means of a pin 7. The pins 6 and 7 constrain the movement of the connecting elements 1, 2 and 3 so that they cannot move relative to each other. The levers 4 and 5 and the connecting elements 1, 2 and 3 define a space for receiving a walnut. The sides of levers 4 and 5 facing each other have ridges to prevent the walnut from slipping.

[002] With reference to the figures it will now be explained how the nutcracker is used to crack a walnut (the connecting element 2 shown in Fig. 1 cannot be seen in Figs. 2 to 4).

[003] The walnut is first placed in the space between the levers 4 and 5 and the connecting elements 1, 2 and 3 (Fig. 2). The lever 5 is then pushed towards the lever 4 so that it rotates about the pin 7 (Fig. 3, arrow A). The space is thereby restricted until the lever 5 comes into contact with the walnut. If the lever 5 is pushed further, the shortest distance between the levers 4 and 5 decreases further, so that the space is further restricted and the walnut is cracked by the levers 4 and 5 and the connecting elements 1, 2 and 3 (Fig. 4).

[004] The length of the connecting elements 1, 2 and 3 shown in the figures is chosen for cracking walnuts. For cracking smaller nuts, such as hazelnuts, a nutcracker having shorter connecting elements would be better.

Drawings Document D1

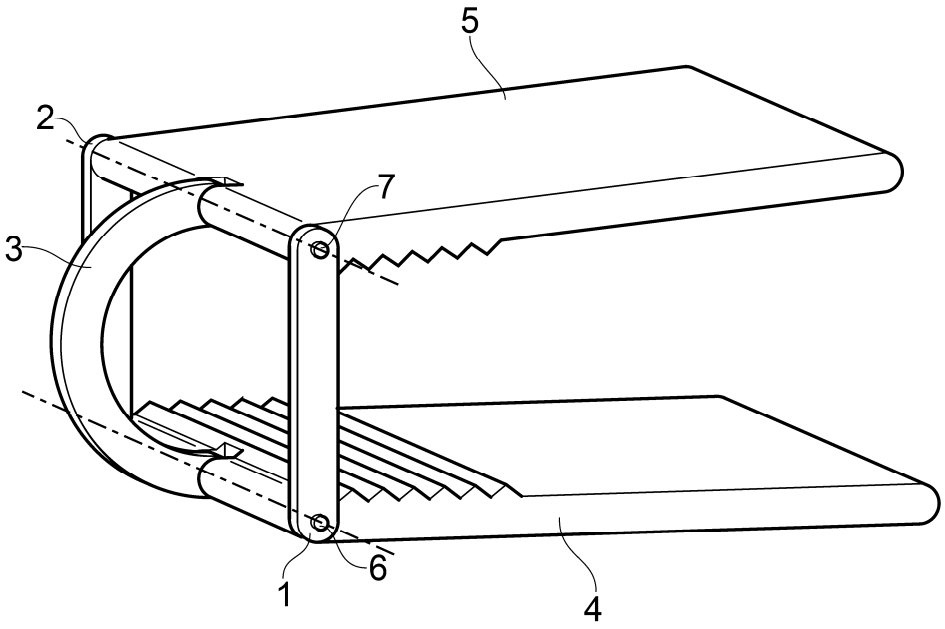

FIG. 1

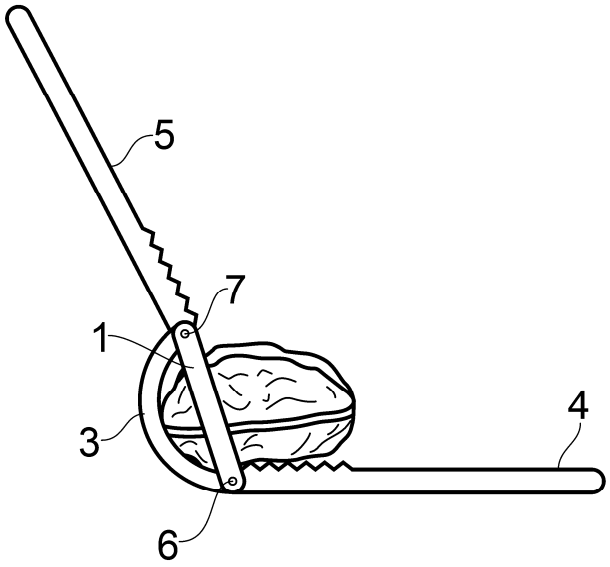

FIG. 2

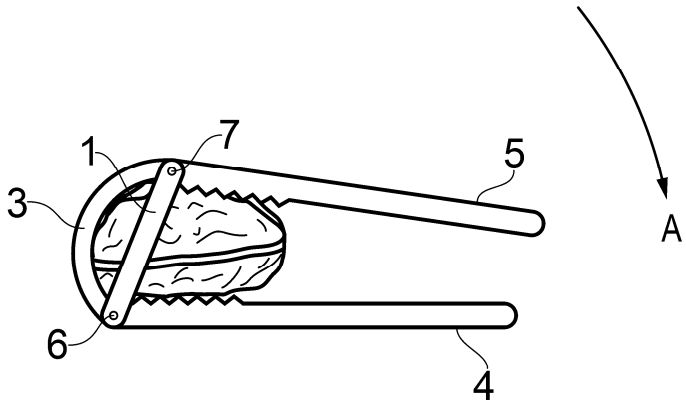

FIG. 3

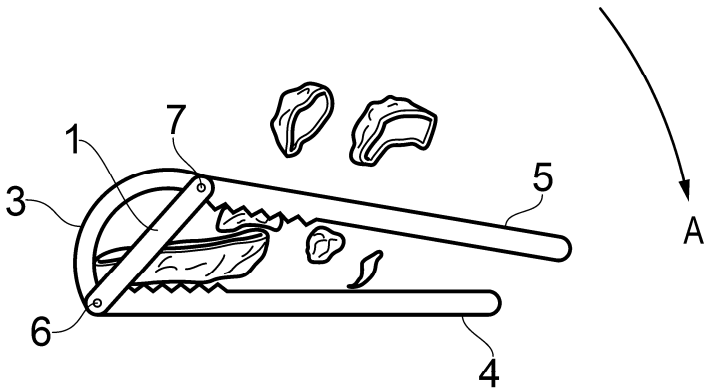

FIG. 4

Document D2

[001] This article describes a nutcracker. Fig. 1 shows a perspective view of the nutcracker. Figs. 2 to 4 show side views of the nutcracker. The nutcracker comprises two blocks 1, 2 and four parallel cylindrical rods 3, 4, 5 and 6. Each block 1 and 2 has four circular through-holes. The rods 3 to 6 are mounted in the through-holes. The diameter of the rods 3 to 6 is slightly smaller than the diameter of the through-holes, so that the rods can rotate in the through-holes without the blocks 1 and 2 moving and the blocks can slide along the rods without the rods moving.

[002] The rods 4 and 5 are connected to each other at their respective ends by rigid strips 7 and 10. The rods 3 and 6 are connected to each other at their respective ends by rigid strips 8 and 11. The strips 7, 8, 10 and 11 ensure that the rods 3 to 6 are permanently attached to the blocks 1 and 2. A ring 9 is fixed to the strip 8. A ring 12 is fixed to the strip 10.

[003] To crack a walnut, the walnut is placed in the space between the blocks 1, 2 and the rods 3 to 6 (Fig. 2). The rings 9 and 12 are then abruptly pulled apart (arrows A and B), so that the strip 11 pushes the block 1 in the direction of arrow A and the strip 7 pushes the block 2 in the direction of arrow B. The block 1 slides along the rods 4 and 5 in the direction of arrow A and the block 2 slides along the rods 3 and 6 in the direction of arrow B. The space is thereby restricted until the blocks 1 and 2 come into contact with the walnut (Fig. 3). The blocks 1 and 2 move further so that the space is further restricted and the walnut is cracked by the blocks (Fig. 4).

[004] After cracking the walnut, the blocks 1 and 2 are pulled apart. The block 1 sl
along the rods 4 and 5 in the direction of arrow B and the block 2 slides along the rods
and 6 in the direction of arrow A. This causes the rods 3 and 6 to move in the opposite
direction to the rods 4 and 5. The space is enlarged until the nutcracker is again in the
5 position shown in Fig. 2. In this position the cracked walnut can be removed from the
nutcracker.

[005] Although the figures show the nutcracker cracking a walnut, it can also be used to crack a smaller nut, such as a hazelnut.

Drawings Document D2

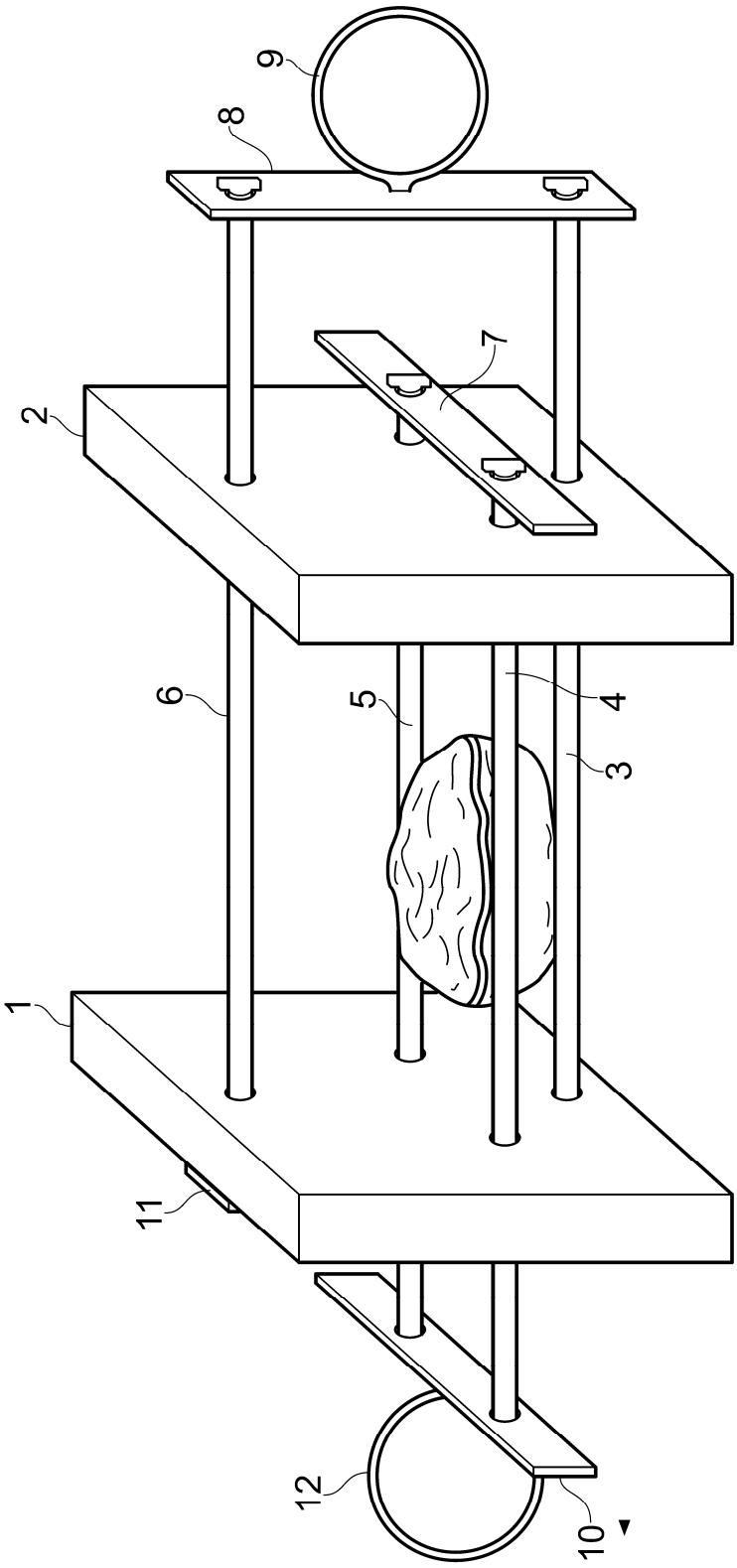

FIG. 1

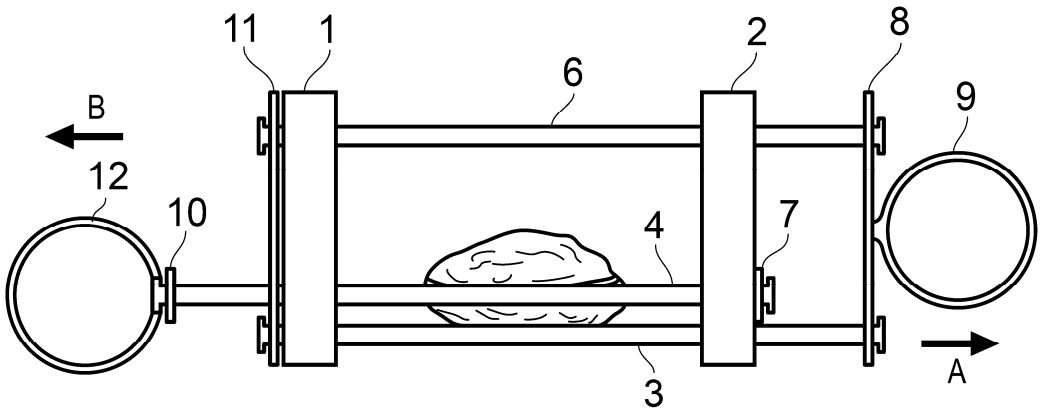

FIG. 2

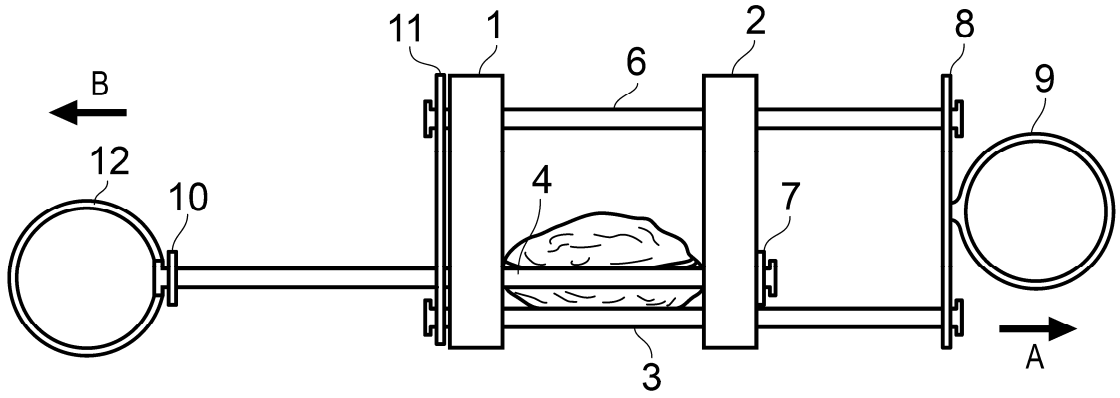

FIG. 3

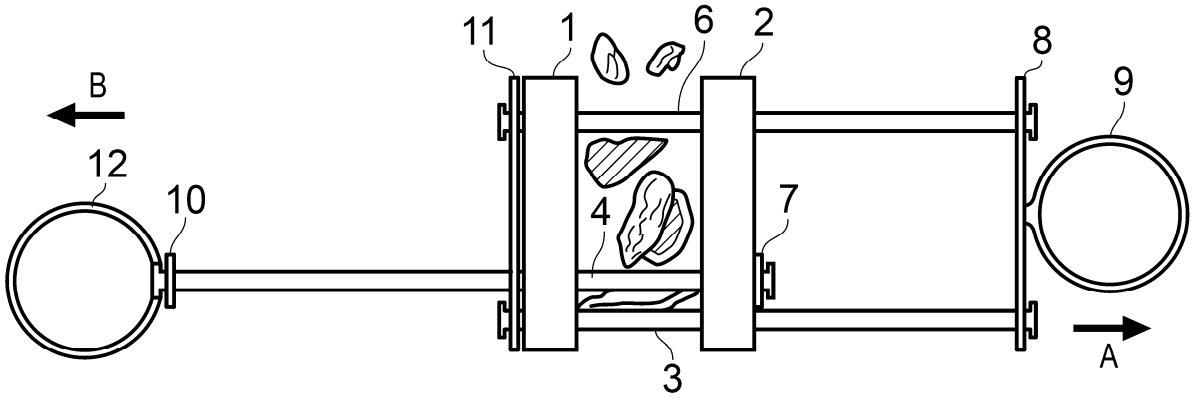

FIG. 4