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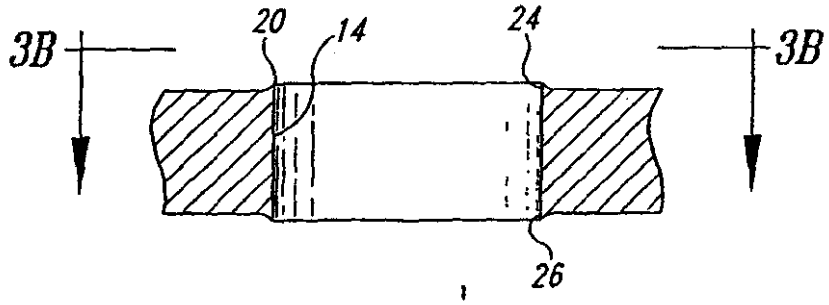
(54) Title: IMPROVED GRATER AND METHOD OF MAKING A GRATING DEVICE

(57) Abstract

A cheese grating plate (10) having a plurality of staggered rows of apertures (14), each aperture formed by fitting an insert (90) into a hole or pushing a member (30, 80) into the hole, the aperture having a sharp raised edge (20) around a substantial portion of at least one end of each aperture. In one embodiment the sharp raised edges being formed by a member (80) pushed into the hole. The height of the sharp raised edges extends out no further than twenty thousands of an inch and preferably only ten thousands of an inch. In one embodiment the member (30) forming the sharp raised edge is tapered, cylindrical and has circumferentially spaced edges (31). In other embodiments the member is a drill bit (85), or a tapered member (80) that is rocked in the hole. In other embodiments the insert (90) is pressed into the hole and extends out from the plate to form the raised edge.



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IMPROVED GRATER AND METHOD OF MAKING A GRATING DEVICE

TECHNICAL FIELD

This invention relates to a grating device or grater for grating food products, such as cheese, chocolate, or the like, in which a slug of food can be rubbed across the grating device for shaving the food into fine flakes.

BACKGROUND OF THE INVENTION

The grating device of this invention is made from a plate having apertures with sharp raised edges around the perimeter of the apertures and an important feature of the invention is that the raised edges are sharp but extend out from the surface of the plate only less than twenty thousands of an inch. The apertures can be holes in the plate with raised edges or inserts inserted in holes in the plates.

In contrast to the sharp raised edges of the present invention the prior art grating devices use various different types of perforations for apertures in the grating device for grating the food. Patent 3,581,790 shows a grating surface in which the grating members are formed by piercing the surface of the plate to create raised points sticking out substantially a considerable distance from the plate.

Another patent 2,804,896 shows a grating surface in which the apertures are formed by piercing or pushing out the metal to create sharp cutting edges.

Another patent 3,589,421 shows circumferentially spaced spikes molded into the grating surface around the apertures.

Other grating devices form cupped-shaped apertures in the surface of the grater or use flat surfaces without any sharp edges at all.

While all of these prior art grating devices will grate or comminute food products, particularly slugs of cheese, none seems to do it in a manner which nicely shaves the food and does it with a minimum of effort needed by the person who is pushing the food across the grating device.

SUMMARY OF THE INVENTION

It is an object of this invention to provide a grating plate or surface which provides a nice shaving action to produce a flake like shaving but with a minimal amount of effort needed to move the food, particularly a slug or block of cheese or chocolate, across the grating surface.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 shows a grater with a handle and embodying the principles of the invention.

Figure 2 is a side elevation of the grater shown in Figure 1.

Figure 3A is an enlarged fragmentary detail of one of the apertures of the grater shown in Figure 1.

Figure 3B is a plan view of the detail shown in figure 3A.

Figure 4A is another embodiment of a grater showing the principles of the invention.

Figure 4B is an enlarged fragmentary detail of one of the apertures formed in a manner similar to Figure 3A but with a raised edge on only one side.

Figure 5A is still another embodiment showing the principles of the invention.

Figure 5B is an enlarged fragmenting detail of one of the apertures formed in a manner similar to Figure 3A but with a raised edge on only one side.

Figures 6, 7, and 8 the show method steps of one method involved in forming the desired sharp edge around the perimeter of the apertures of the grating plate.

Figure 9 shows the method steps of another method of forming the desired sharp edges around the perimeter of the apertures on one side only in a soft metal like aluminum.

Figures 10A and 10B show another embodiment with square apertures.

Figures 10C and 10D show a method of making the embodiment of Figures 10A and 10B.

Figure 11 shows a unique cutting tool for forming the raised edge around the hole in a material like stainless steel.

Figure 12 is a bottom end view of the tool of Figure 11.

Figure 13 is a plan view of another embodiment of the invention.

Figure 14 is a section taken along the line 14-14 of Figure 13.

Figure 15 is a fragmentary top plan view taken in the direction of the arrows 15 - 15 in Figure 14.

Figure 16 is a longitudinal section of another embodiment of the invention.

Figure 17 is a fragmentary detail taken at the reference number 17 in Figure 16.

Figure 18 is a bottom view of the grater shown in Figure 16.

DETAILED DESCRIPTION OF THE INVENTION

Figure 1 shows a plate 10 having a plurality of rows 12 of apertures 14. The rows 12 are staggered so that the apertures are offset from one another between adjacent rows. The plate 10 is preferably made from stainless steel and is approximately about 1/8 inch or less thick. The

precise dimensions, of course, can be varied depending upon the type of material and manufacturing techniques.

The plate 10 has an extension 16 to which is rigidly attached a handle 18.

It is a unique feature of this invention that each of the apertures 14 is provided with a sharp raised edge 20 around the perimeter 22 of each opposite ends 24 and 26 of holes in the plate. If desired, the sharp raised edges can be provided only on one side of the plate if the plate is used at all times only by rubbing the food across that one side. Advantageously if the sharp raised edges are on both of the opposite ends 24 and 26 of the apertures then the plate can be turned over and used on either side at the convenience of the user. In addition, the apertures can be in the form of rivets or inserts fitted into the holes, as in Figures 13 - 18. It is understood that apertures can mean a hole with a raised peripheral edge or a hole with an insert or rivet fitted in the hole.

It is also one of the unique features of this invention that the sharp raised edges of the apertures are not simply pierced or molded protrusions or spikes as in the prior art but are formed in a manner that extends the sharp raised edges from the side surface of the plate only a very small amount no greater than about twenty thousands of an inch [0.020 inches]. In one embodiment, the sharp raised edges preferably extend out only ten thousands of an inch [0.010 inches]. This sharpness of the edge but only slight extension out from the surface of the plate provides a shaving action on the food being rubbed across the surface comminuting the food into small flakes as opposed to slices or larger crumpled pieces of food as in other types of graters.

In preferred embodiments the sharp raised edges go around the entire perimeter of the ends of the apertures, however, it is possible that the sharp raised edges need only extend along the major portions of

the perimeter in the direction confronting the movement of the food over the apertures as shown in Figures 10A and 10B. Also see Figures 13 - 15.

The sharp raised edges are uniquely formed in stainless steel metal by a process, which includes first making holes in the plate as shown in Figure 6. Then after the holes are made a tapered metal tool or member 30 is pushed into and rotated in the hole from a first direction to form the raised edge as shown in Figure 7. If the raised sharp edges are wanted on opposite ends of the holes, then the tool 30 is pushed back through the hole in the opposite direction as shown in Figure 8.

The tool 30 has circumferentially spaced elongated cutting edges 31 that when pressed against the edge of the end of the hole and rotated forms the sharp raised edge 20.

The unique grating plate of this invention can also be manufactured in curved form as shown in Figure 4A. In Figure 4A a curved plate 40 is provided with apertures 42 with the apertures being formed with sharp raised edges in the same manner as in the embodiments of Figures 1 - 3 and Figures 6 - 8 but only on one side. A raised edge is needed only on one side of the plate in this embodiment. The curved plate can be rotated by a handle 44 and a hopper unit 46 placed above the curved plate to support a block of food such as the slug of cheese 50. A pusher 52 having protrusions 54 can be used to push the cheese against the rotating curved grating plate 40 as is well known.

Figures 5A and 5B show another embodiment in which the plate is in the form of a disc 60 again being provided with apertures 62 having sharp raised edges of the type shown in Figure 3A but only on one side. In the plate 60 and in the plate 40 the sharp raised edges will be provided only on the upper surface of the plates as this is the only surface that can be contacted by the soft food. Thus, it is unnecessary to have sharp raised edges on opposite ends of the apertures in the plate if only one side of the plate is to be used.

Figure 5A also shows a conventional cylindrical body 70 with a rotating plate 72 having protrusions 74 for gripping the cheese. The spring 76 holds the plate down while a handle 78 is used for rotating the plate and the rotating the cheese over the grating plate 60.

The embodiments of Figures 4 and 5 are provided to illustrate that the grating plate of this invention with its sharp raised edges around the perimeter of the apertures can be used for any type of grating surface, either static (that is, being held still) or movable and either powered manually or by motor.

The raised edges do not have to be around the entire periphery of the apertures although this is the preferred manner of forming the apertures. The apertures can be square, triangular, oval, and rectangular or any non-circular shapes so long as the sharp edges of this invention can be made on the ends of the apertures. Figures 10A and 10B, for example, show an embodiment that uses a square hole and with the sharp raised edges only on opposite opposed edges in the direction of rubbing of the food across the plate. The sharp raised edges for a square or rectangular hole can be formed by pushing a tapered member 80 into the hole and rocking it back and forth, with the tapered member being tapered only on two opposite opposed sides and not tapered on the other two opposed sides as shown in Figures 10C and 10D.

Figure 9 shows an embodiment of a plate 10a made from a softer metal like aluminum. In this embodiment the sharp raised edges are made by pressing a rotating drill bit 85 through holes of smaller diameter in the plate 10a with enough pressure to push the metal into the sharp raised edges 20a around the perimeter of the aperatures on one side only. The larger drill bit is about .015 to .020 inches larger in diameter than the diameter of the original apertures.

Figure 13 shows an embodiment like Figure 1 but with the sharp raised edges notched as at 87. In this embodiment the flakes that are formed when grating are cut or shredded into smaller ribbons.

Figures 16 - 18 show another form of the invention in which the plate 10b is curved and made from plastic. The plate is mounted on a housing or handle 18a that can fit into the palm of the user's hand. The housing is hollow and has an open end 19 for the discharge of the comminuted food product. However, it should be understood that the curved plate could also be used with a straight handle as Figure 1. In this form of the invention the apertures 14 are made by press-fitting metal, such as, stainless steel, inserts or rivets 90 into holes 14a. The rivets could also be made of other hard materials, such as, hard plastic. The rivets have an enlarged head 91 that rests against the inside surface of the plate 10b and are sealed into the holes by a second layer of plastic 92. The lower ends of the rivets extend outwardly beyond the lower surface of the plate by the same amount as for the other embodiments, namely, about no greater than .020 inches and preferably .001 inches. The inserts or rivets can be made with conventional rivet manufacturing techniques. This embodiment of the plate and the food shaving inserts is less expensive to manufacture than to form the raised edges directly in a single plate as in Figure 1.

While specific embodiments of the invention have been illustrated and described, it should be apparent to one of ordinary skill in this art that the invention is not to be limited to the specific embodiments illustrated in the drawings. The embodiments have been described as made from metal, such as aluminum or stainless steel, preferably stainless steel; however, it is possible to mold the plate with sharp raised edges out of plastic, or to use metal, plastic or other materials inserts embedded in plastic as shown in Figure 17 or embedded in other metal.

CLAIMS

1. A grater for foods, such as cheese, comprising

a plate having opposite sides,

a plurality of apertures in the plate and each aperture having an end with a perimeter,

each aperture having a sharp raised edge around substantially the entire perimeter of the end of the aperture,

the raised edge extending no more than .020 inches out from the side of the plate,

the raised edge providing a shaving edge for grating the food.

2. The grater of claim 1, each aperture having a second opposite end with a perimeter, and an identical raised edge formed on each of the second opposite ends.

3. The grater of claim 1, said plate being flat, and including a handle attached to the plate for a person supporting the plate on an angle in use.

4. The grater of claim 1, said plate being curved around a center of curvature, and including means for rotating the plate about its center of curvature.

5. The grater of claim 1, said plate being flat and circular, and including means for moving the food around the circular plate.

6. The grater of claim 1, said apertures including inserts fitted into holes in the plate and the ends of the inserts extending outwardly beyond the plate.

7. The grater of claim 1, the plate being slightly curved, a hollow housing attached to and supporting the plate, the housing having an opening for discharge of grated food product.

8. The grater of claim 6, the sharp edges extending out from the plate no more that .010 inches.

9. The grater of claim 1, the sharp raised edge going completely around the entire perimeter of the end of the hole.

10. The grater of claim 1, said apertures being square.

11. The grater of claim 1, said sharp raised edges lying only on opposite diametrically opposed sides of the perimeter of the apertures.

12. The grater of claim 1, the sharp edges extending out from the plate no more than .010 inches.

13. A grater for food, such as cheese, formed by the process of:

forming a plurality of staggered rows of apertures, each aperture having an end and a perimeter around the end, in a plate having opposite sides, the plate having holes,

pushing a member larger than the hole in a first direction into each hole to form a sharp raised edge around at least part of the perimeter of the end of the hole,

the sharp raised edge extending only slightly out from the side of the plate to form the aperture and shaving the food when rubbed across the edges of the apertures in the plate.

14. The grater of claim 13, said member being tapered.

15. The grater of claim 14, the plate being a flat plate, and further including forming a sharp raised edge on the opposite side of the plate by pushing a tapered member into each hole from a second direction opposite to said first direction to form said apertures on both sides of the plate.

16. The grater of claim 15, said plate being flat, and including a handle attached to the plate for a person supporting the plate on an angle in use.

17. The grater of claim 13, said plate being curved around a center of curvature, and including means for rotating the plate about its center of curvature.

18. The grater of claim 13, side plate being flat and circular, and including means for moving the food around the circular plate.

19. The grater of claim 13, the sharp edge extending out from the side of the plate no more than .020 inches.

20. The grater of claim 19, the sharp edge extending out from the side of the plate no more than .010 inches.

21. The grater of claim 13, the tapered member being tapered only on two opposed sides.

22. The grater of claim 13, the apertures being non-circular.

23. The grater of claim 22, the non-circular apertures each being a square.

24. The grater of claim 13, the member being a drill bit.

25. The grater of claim 13, said tapered member having a plurality of elongated cutting edges, said step of pushing the tapered member into the holes including rotating the tapered member in the holes.

26. A method of making a grater for foods, such as cheese, cc nprising,

forming a plurality of holes, each hole having an end and a perimeter around the end, through a plate having opposite sides,

pushing a member in a first direction into each hole to form an aperture with a sharp raised edge around substantially the entire perimeter of the end of the aperture,

the sharp raised edge extending only slightly out from the side of the plate and shaving the food when rubbed across the edges of the apertures in the plate.

27. The method of claim 26, wherein the plate is made from stainless steel, and the member is a cylindrical tapered member with circumferentially spaced elongated cutting edges, said step of pushing the tapered member into the hole including the step of rotating the tapered member in the hole.

28. The method of claim 26, said plate being made of aluminum, said member being a drill bit, said step of forming the apertures through the plate including pressing the drill bit through the plate to form sharp raised edges on opposite ends of the holes.

29. The method of claim 26, wherein the member is tapered and non-circular, and said step of pushing the member into the hole including pushing the non-circular tapered member with only opposed opposite sides tapered into the apertures.

30. The method of claim 26, wherein the sharp raised edge extends out less than .020 inches.

31. The method of claim 30, wherein the sharp raised edge extends out approximately .010 inches.

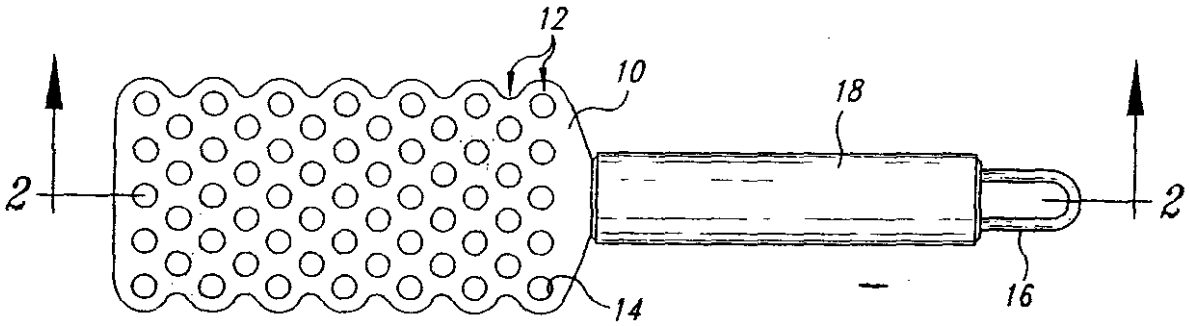

Fig. 1

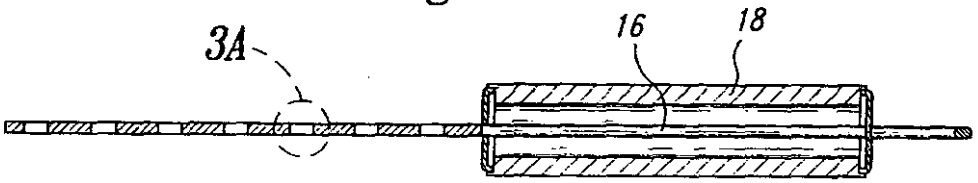

Fig. 2

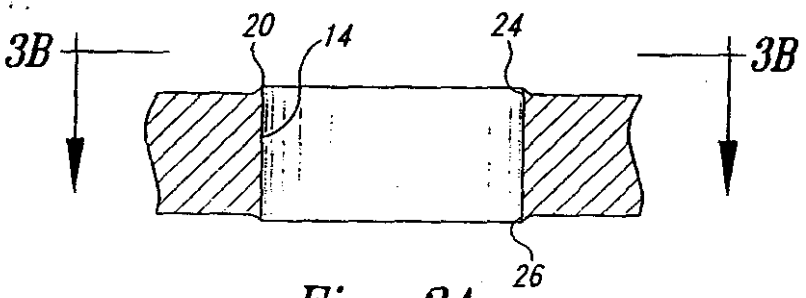

Fig. 3A

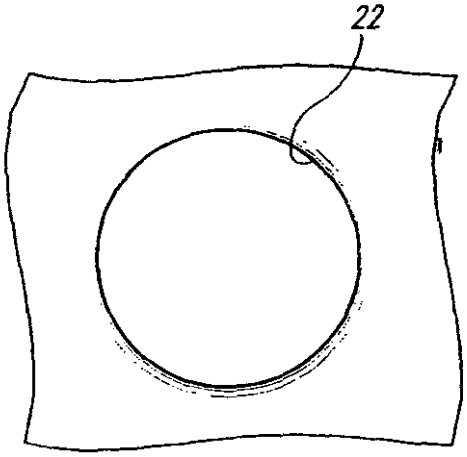

Fig. 3B

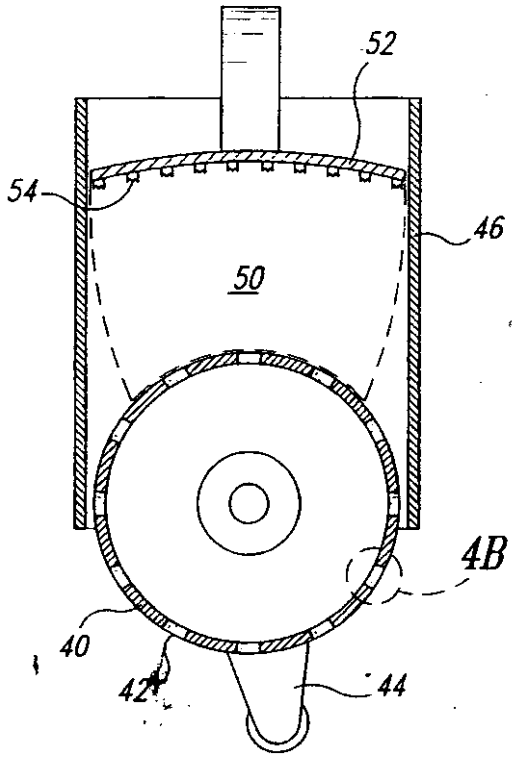

Fig. 4A

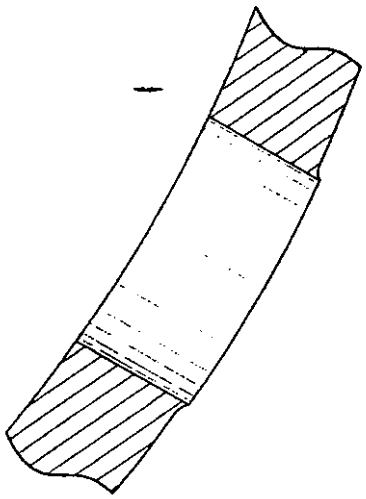

Fig. 4B

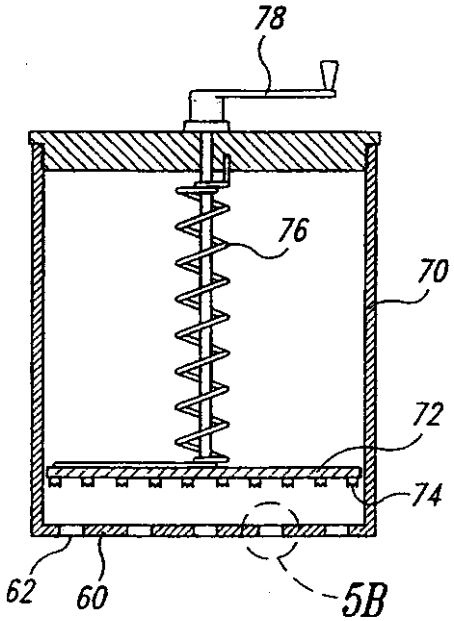

Fig. 5A

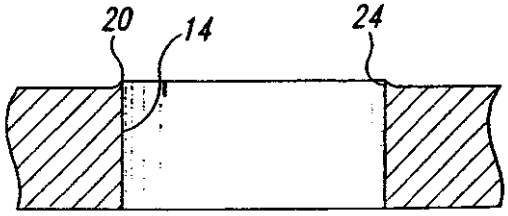

Fig. 5B

Fig. 6

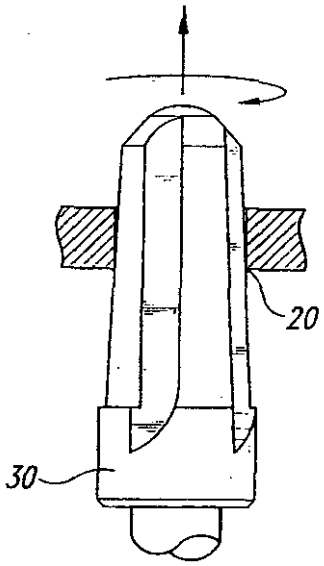

Fig. 7

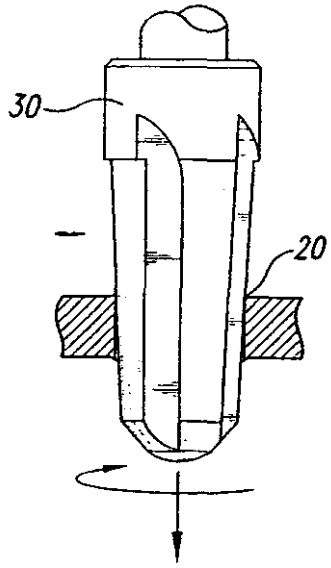

Fig. 8

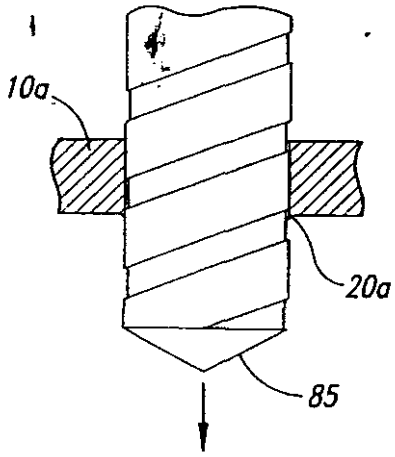

Fig. 9

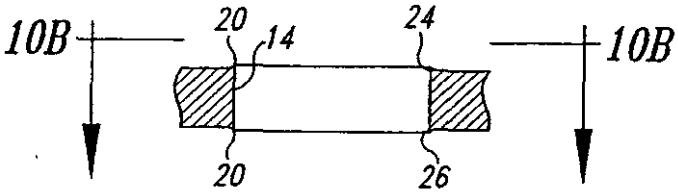

Fig. 10A

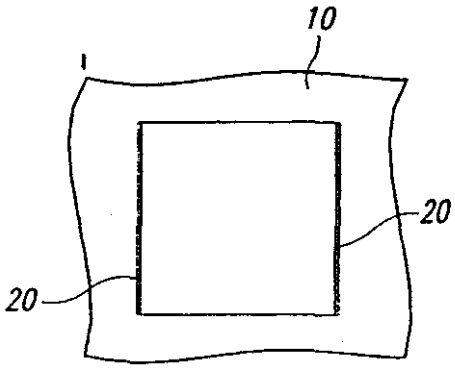

Fig. 10B

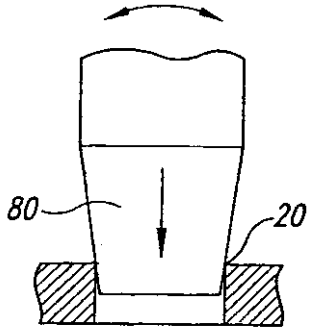

Fig. 10C

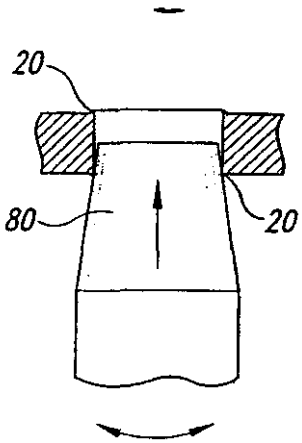

Fig. 10D

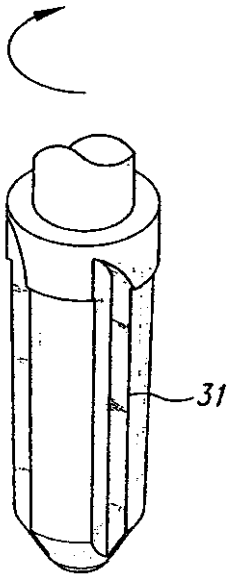

Fig. 11

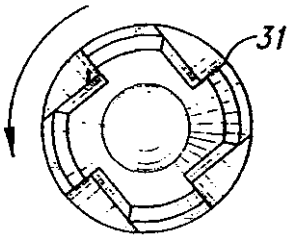

Fig. 12

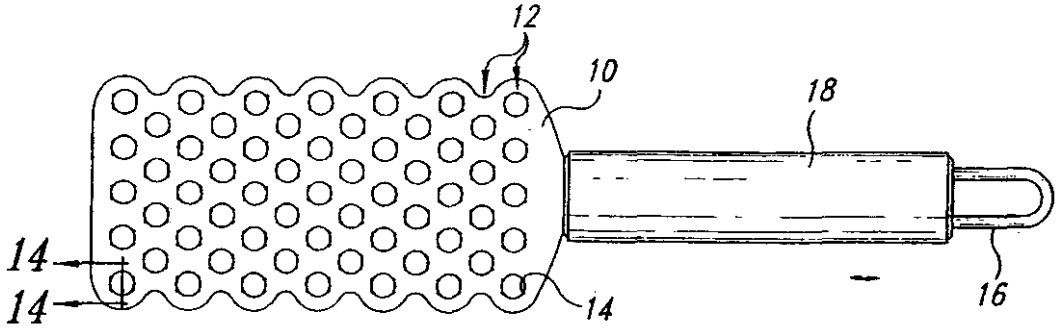

Fig. 13

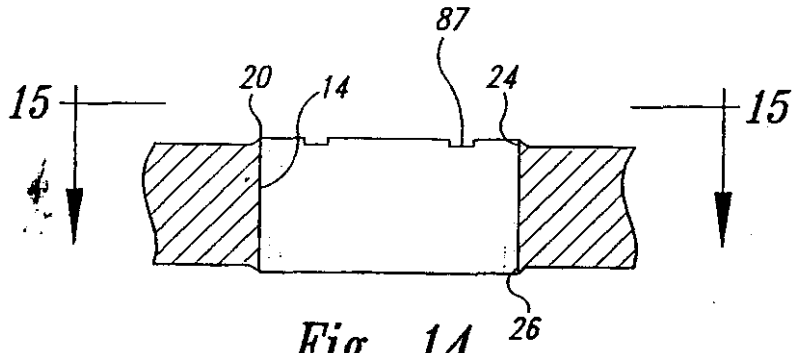

Fig. 14

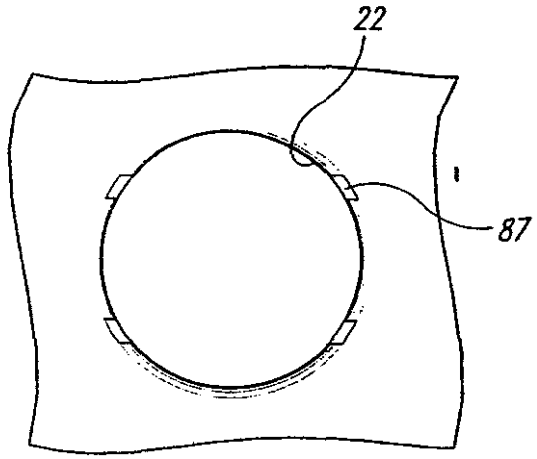

Fig. 15

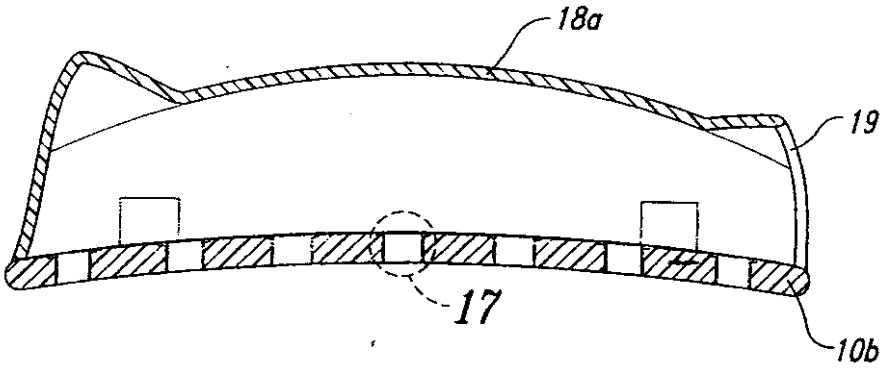

Fig. 16

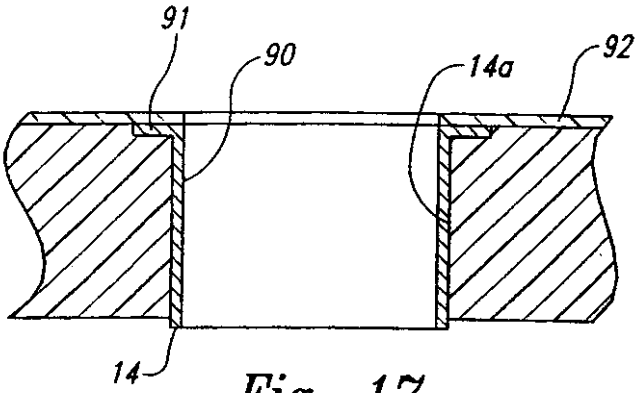

Fig. 17

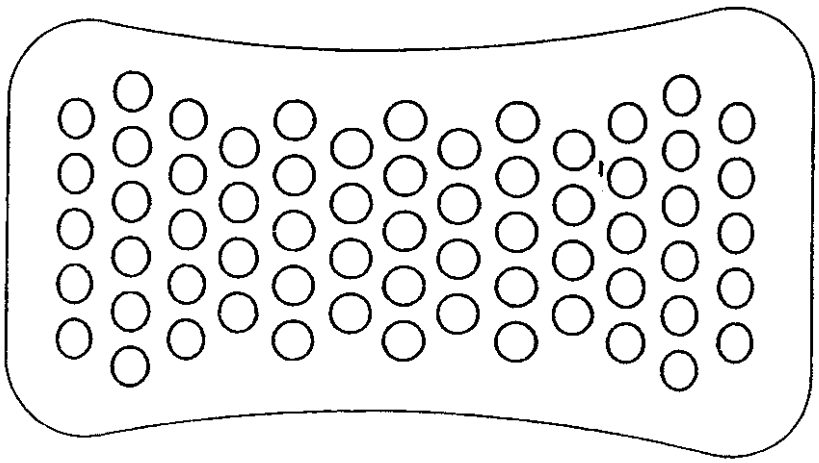

Fig. 18

INTERNATIONAL SEARCH REPORT

Inter nal Application No
PCT/US 00/07100

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A47J43/25 B23D73/12

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A47J B23D B24D B23P B21D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
—

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	DE 596 405 C (H.J. VON KLINKOWSTRÖM) page 1, line 28 - line 57; figures 1-3	13,16,26 1,3,9, 16,28
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A	GB 488 925 A (F. RAUCHFUSS) page 1, line 13 - line 41; figures 1-3	1-3,7, 10,15, 22,23, 27,29
A	GB 1 463 031 A (BUCKBEE-MEARS COMPANY) 2 February 1977 (1977-02-02) claim 6; figure 1	1,8,12, 16,17, 30,31

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
9 August 2000	18/08/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Schmitt, J

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Inte onal Application No
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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INTERNATIONAL SEARCH REPORT

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Inter nal Application No
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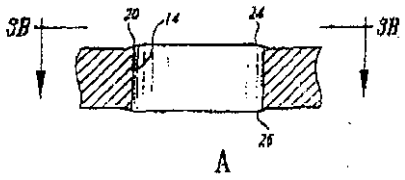
[54]发明名称　一种改进的擦碎器及制造擦碎装置的方法

[57]摘要

一种具有多个交错设置的孔(14)列的奶酪酪擦碎板(10),每个孔 通过把一镶嵌件(90)装配到一个孔中形成,或通过把一加工件(30, 80)推入孔中而形成。孔具有锋利的凸沿,凸沿基本上环绕每个孔的至少 一端的一部分。在一个实施例中,锋利凸沿由一推入孔中的加工件(80) 形成。锋利凸沿的高度伸出不超过千分之二十英寸,最好只千分之十英寸。在一个实施例中,形成所述锋利凸沿的加工件(30)是锥形的圆柱,四周 间隔布置有刃(31)。在其他实施例中,所述加工件是一个钻头(85),或是在所述孔中摇摆的锥形件(80)。在另外的实施例中,镶嵌件(90) 被压入孔中并从板中伸出,从而形成所述凸沿。



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