



CUTTER KNIFE FOR THERMOPLASTIC RESIN PELLETIZER AND
PRODUCTION METHOD OF THE SAID CUTTER KNIFE

[0001]

FIELD OF INVENTION:

This invention relates to a cutter knife to be mounted on a thermoplastic resin pelletizer for pelletizing thermoplastic resin. The invention also relates to a production method of said cutter knife.

[0002]

PRIOR ART:

For the sake of convenience of transportation, reducing costs of later processing and other reasons, thermoplastic resin is normally produced and distributed in the form of pellets, which are small, approximately rice-grain sized particles. These pellets are industrially produced by means of a kneading-pelletizing (extrusion) machine incorporated in a chemical apparatus. Examples of types of a pelletizing device used in such a pelletizer include a hot cut type and a underwater cut type. There are also various blades used for this purpose; a typical example of fixed blades is a die plate, while there is a cutter knife 1 shown in Fig. 8 as an example of movable blades. Nowadays, because of their superior abrasion resistance and resin cutting capability, ceramic alloys are most widely used as a material of cutter knife 1.

[0003]

PROBLEMS TO BE SOLVED BY THE INVENTION:

However, ceramic alloys used as a material of such a



cutter knife present various problems; not only are they expensive and hard to acquire but also prone to being chipped or broken because they have lower resistance to a transverse load, in other words are more fragile, compared with steel which is the most typical blade material. Although ceramic alloys require a thorough countermeasure to solve the above problems, it cannot be said that a sufficiently effective countermeasure exists at present. Furthermore, a ceramic alloy is difficult to process by using machine, which means that processing a ceramic alloy is costly. Therefore, using a ceramic alloy, which is itself an expensive material, to produce cutter knives substantially increases their costs.

[0004]

MEANS TO SOLVE PROBLEMS:

In order to solve the above problems presented by conventional cutter knives, an object of the invention is to provided a cutter knife for a thermoplastic resin pelletizer and its production method by using a ceramic alloy as a material for said cutter knife, wherein said cutter knife can easily be produced with reduced costs and without the danger of breakage in spite of using a ceramic alloy as a material. A feature of the invention is a cutter knife to be mounted on a thermoplastic resin pelletizer for pelletizing thermoplastic resin, wherein the main body and the knife edge of the cutter knife are integrally formed, the main body formed out of steel and the knife edge formed out of ceramic alloy. According to the second feature of the invention, a groove is formed in a

corner of a rectangular steel body in such a manner as to extend in the longitudinal direction of the steel body which has an appropriate thickness, a ceramic alloy plate is inserted into the groove and bonded thereto by means of diffusion bonding, and the material is then cut into a specified shape. According to the third feature of the invention, a steel block is so shaped as to have a step when viewed from the side and, after having a ceramic alloy plate bonded to the upper surface of the lower step thereof by means of diffusion bonding, is diagonally cut at specified intervals, and then, each cut piece is cut into a specified shape.

[0005]

DESCRIPTION OF PREFERRED EMBODIMENTS:

Next, embodiments of the present invention are explained in detail hereunder referring to the drawings.

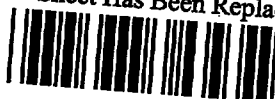
Numerals 11 denotes a cutter knife used as a movable blade of a thermoplastic resin pelletizer 20. Cutter knife 11 comprises a main body 12 made of steel and a knife edge 13 which is formed out of a ceramic alloy as an integral body with main body 12.

Although the ceramic alloy used for the present embodiment is a titanium carbide (TiC)-type alloy, it is to be understood that ceramic alloys applicable for the present invention are not limited to a TiC alloy.

[0006]

Embodiments:

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[Embodiment 1]

A groove 14 is formed in a corner of main body 12 in such a manner as to extend in the longitudinal direction of main body 12 and intruding towards the middle of main body 12, which is formed out of steel into a rectangular shape having an appropriate thickness, and a ceramic alloy plate that constitutes knife edge 13 is inserted into groove 14 and bonded thereto by means of diffusion bonding (see Fig. 2). Then, by cutting the material into a specified shape by a method known to those skilled in the art, cutter knife 11 is formed (see Fig. 1).

[0007]

[Embodiment 2]

A steel block serving as the material of main body 12 is so shaped as to have a step when viewed from the side, and then, after bonding a ceramic alloy plate that constitutes knife edge 13 to the upper surface of the lower step by means of diffusion bonding, is diagonally cut at specified intervals (see Figs. 3 and 4). Then, by cutting the material into a specified shape by a method known to those skilled in the art, cutter knife 11 is formed, in the same manner as Embodiment 1 (see Fig. 5).

[0008]

EFFECT OF INVENTION:

As described above, the present invention substantially improves breakage resistance of a cutter knife to be mounted on a thermoplastic resin pelletizer for pelletizing

thermoplastic resin by integrally forming the main body and the knife edge of the cutter knife out of steel and ceramic alloy respectively. Further, the invention is capable of reducing costs of material by forming the main body out of steel, as well as considerably reducing production costs of cutter knives by simplifying their production method.

BRIEF DESCRIPTION OF DRAWINGS:

Fig. 1 is a perspective view of a cutter knife according to the invention.

Fig. 2 is a perspective view of same before the cutting processing.

Fig. 3 is a perspective view to explain another method of processing a cutter knife according to the invention, illustrating the state where a ceramic alloy plate is bonded by means of diffusion bonding.

Fig. 4 is a perspective view of same illustrating a cut piece.

Fig. 5 is a perspective view of same after the cutting processing.

Fig. 6 is a schematic side view illustrating the relationship between a thermoplastic resin pelletizer and its cutter knives.

Fig. 7 is a front view of same.

Fig. 8 is a perspective view of a conventional cutter knife.

Numeral Codes:

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- 11 cutter knife
- 12 main body
- 13 knife edge
- 14 groove
- 20 thermoplastic resin pelletizer

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CLAIMS

NAME OF INVENTION:

Cutter Knife for Thermoplastic Resin Pelletizer and
Production Method of Said Cutter Knife

WHAT IS CLAIMED IS:

1. A cutter knife to be mounted on a thermoplastic resin pelletizer for pelletizing thermoplastic resin, wherein the main body of said cutter knife is formed out of steel, the knife edge of said cutter knife being formed out of a ceramic alloy as an integral body with said main body.
2. A method of producing a cutter knife for a thermoplastic resin pelletizer, said method calling for forming a groove in a corner of a rectangular-shaped steel body in such a manner as to extend in the longitudinal direction of said steel body which has an appropriate thickness; inserting a ceramic alloy plate into said groove and bonding said ceramic alloy thereto by means of diffusion bonding; and cutting the material into a specified shape.
3. A method of producing a cutter knife for a thermoplastic resin pelletizer, said method calling for forming a steel block into such a shape as to have a step when viewed from the side; bonding a ceramic alloy plate to the upper surface of the lower step of said steel block by means of diffusion bonding; diagonally cutting said block at specified intervals; and cutting each cut piece into a specified shape.

CUTTER KNIFE FOR THERMOPLASTIC RESIN PELLETIZER AND
PRODUCTION METHOD OF SAID CUTTER KNIFE

ABSTRACT OF THE DISCLOSURE

SUMMARY

Objective:

To provide a way to use a ceramic alloy as a material for producing a cutter knife to be mounted on a thermoplastic resin pelletizer easily, with reduced costs, and also eliminating the possibility of breakage.

Means to Solve the Problems:

Form the main body of a cutter knife out of steel and form the knife edge out of a ceramic alloy, wherein the knife edge is formed as an integral body with the main body by means of diffusion bonding.

Selected Drawing:

Fig. 1

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FIG. 1

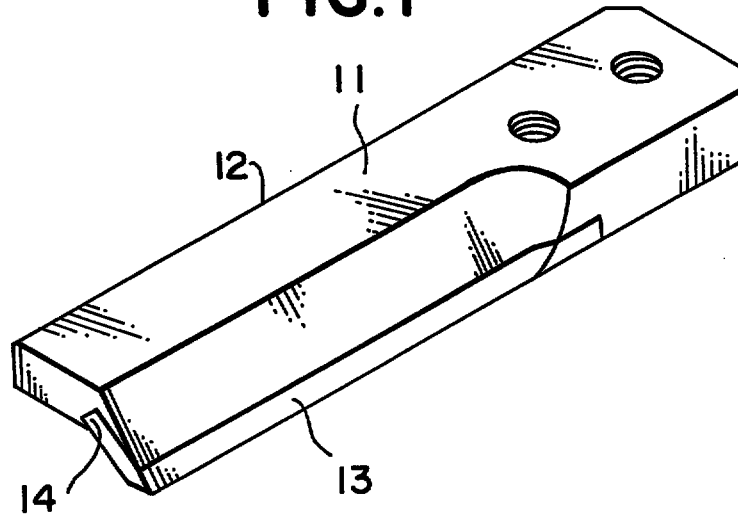
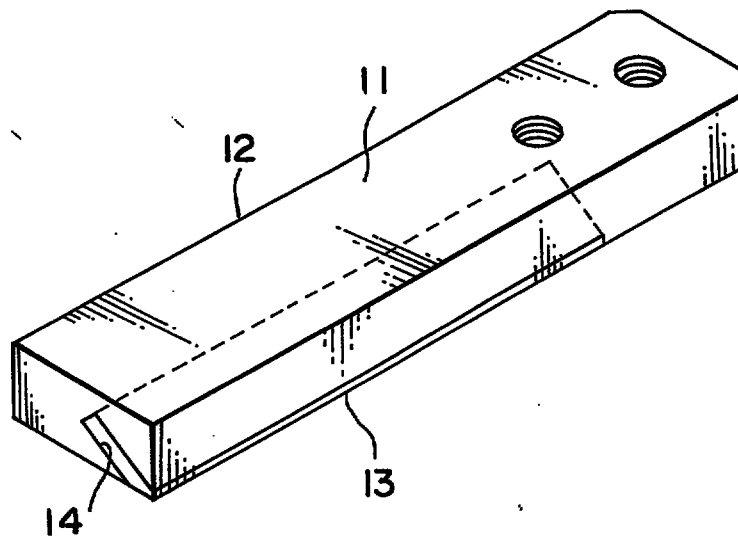


FIG. 2



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FIG. 3

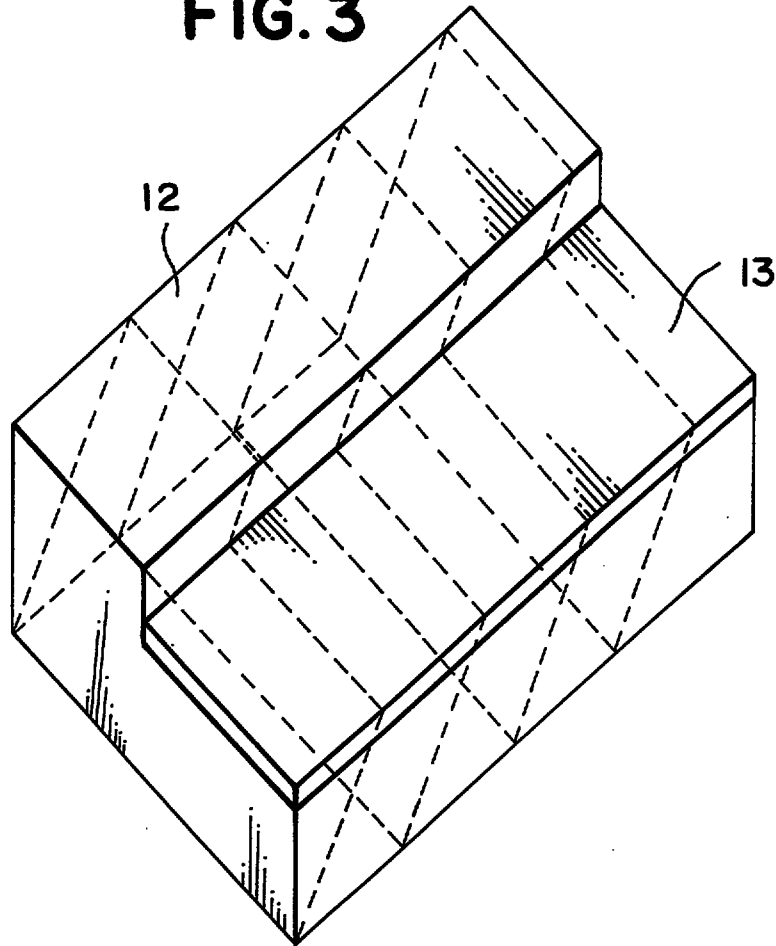
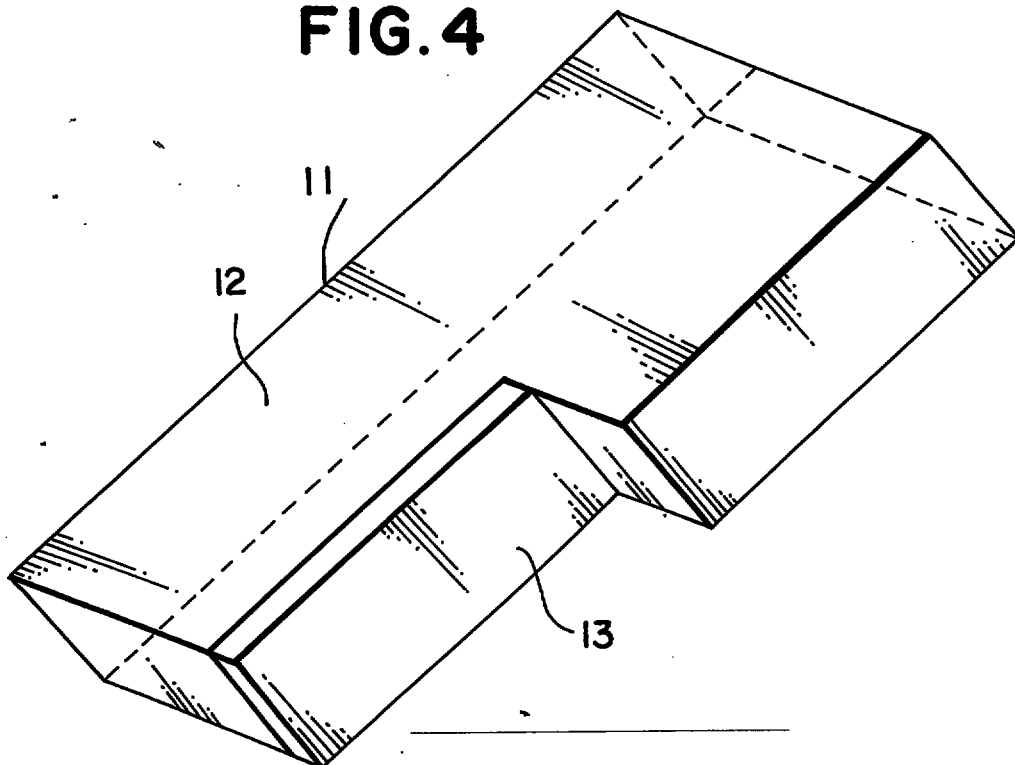


FIG. 4



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FIG. 5

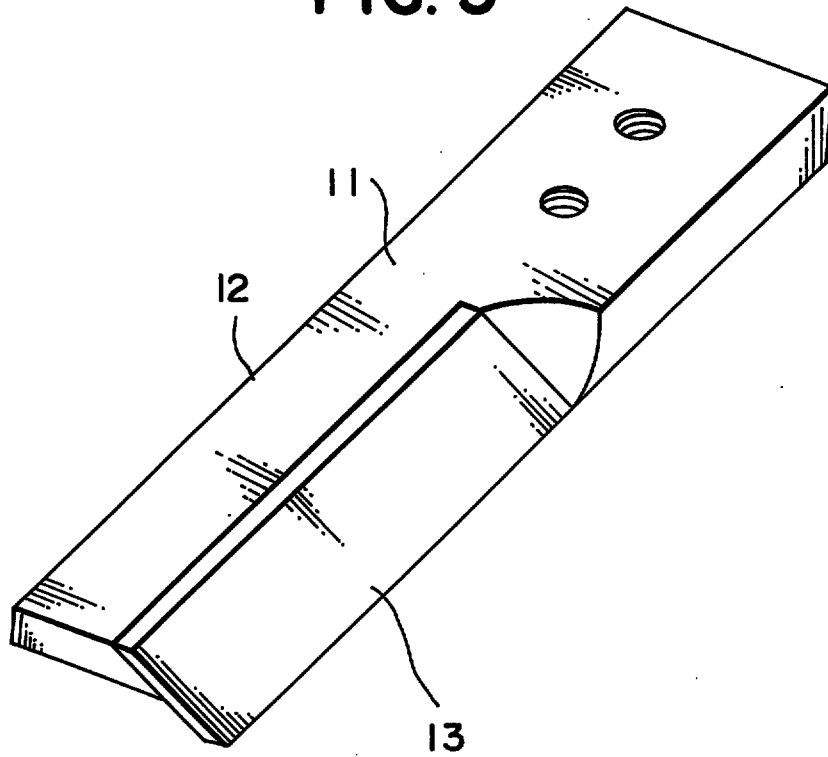
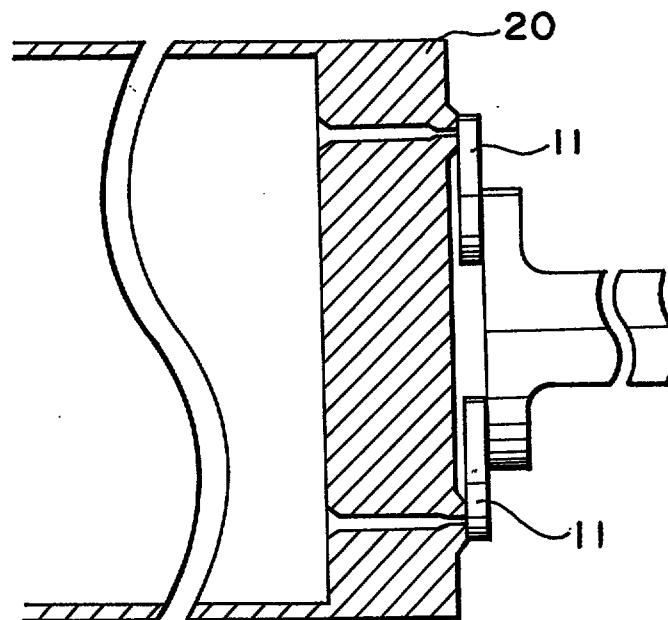


FIG. 6



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FIG.7

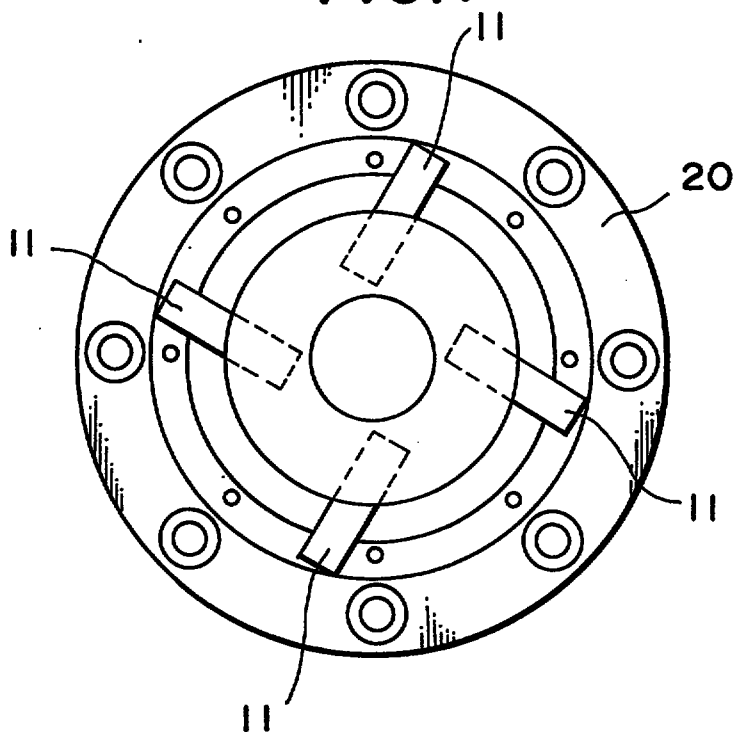
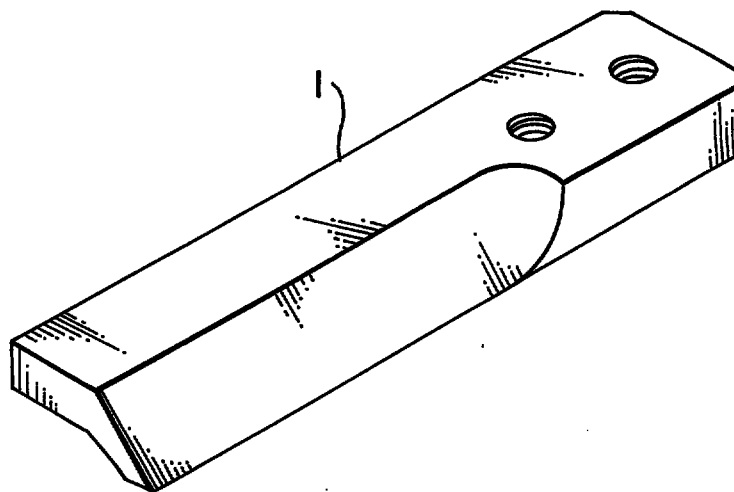


FIG.8



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CUTTER KNIFE FOR THERMOPLASTIC RESIN PELLETIZER AND
PRODUCTION METHOD OF ~~THE~~ SAID CUTTER KNIFE

[0001]

FIELD OF INVENTION:

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[0003]

PROBLEMS TO BE SOLVED BY THE INVENTION:

However, ceramic alloys used as a material of such a

14 AUG 1997

cutter knife present various problems; not only are they expensive and hard to acquire but also prone to being chipped or broken because they have lower resistance to a transverse load, in other words are more fragile, compared with steel which is the most typical blade material. Although ceramic alloys require a thorough countermeasure to solve the above problems, it cannot be said that a sufficiently effective countermeasure exists at present. Furthermore, a ceramic alloy is difficult to process by using machine, which means that processing a ceramic alloy is costly. Therefore, using a ceramic alloy, which is itself an expensive material, to produce cutter knives substantially increases their costs.

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corner of a rectangular steel body in such a manner as to extend in the longitudinal direction of the steel body which has an appropriate thickness, a ceramic alloy plate is inserted into the groove and bonded thereto by means of diffusion bonding, and the material is then cut into a specified shape. According to the third feature of the invention, a steel block is so shaped as to have a step when viewed from the side and, after having a ceramic alloy plate bonded to the upper surface of the lower step thereof by means of diffusion bonding, is diagonally cut at specified intervals, and then, each cut piece is cut into a specified shape.

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Although the ceramic alloy used for the present embodiment is a titanium carbide (TiC)-type alloy, it is to be understood that ceramic alloys applicable for the present invention are not limited to a TiC alloy.

[0006]

Embodiments:

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14 AUG 1997

[Embodiment 1]

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[0007]

[Embodiment 2]

A steel block serving as the material of main body 12 is so shaped as to have a step when viewed from the side, and then, after bonding a ceramic alloy plate that constitutes knife edge 13 to the upper surface of the lower step by means of diffusion bonding, is diagonally cut at specified intervals (see Figs. 3 and 4). Then, by cutting the material into a specified shape by a method known to those skilled in the art, cutter knife 11 is formed, in the same manner as Embodiment 1 (see Fig. 5).

[0008]

EFFECT OF INVENTION:

As described above, the present invention substantially improves breakage resistance of a cutter knife to be mounted on a thermoplastic resin pelletizer for pelletizing

thermoplastic resin by integrally forming the main body and the knife edge of the cutter knife out of steel and ceramic alloy respectively. Further, the invention is capable of reducing costs of material by forming the main body out of steel, as well as considerably reducing production costs of cutter knives by simplifying their production method.

BRIEF DESCRIPTION OF DRAWINGS:

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Fig. 2 is a perspective view of same before the cutting processing.

Fig. 3 is a perspective view to explain another method of processing a cutter knife according to the invention, illustrating the state where a ceramic alloy plate is bonded by means of diffusion bonding.

Fig. 4 is a perspective view of same illustrating a cut piece.

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Fig. 6 is a schematic side view illustrating the relationship between a thermoplastic resin pelletizer and its cutter knives.

Fig. 7 is a front view of same.

Fig. 8 is a perspective view of a conventional cutter knife.

Numerical Codes:

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REPLACEMENT SHEET

14 AUG 1997

- 11 cutter knife
- 12 main body
- 13 knife edge
- 14 groove
- 20 thermoplastic resin pelletizer



- 7 -

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14 AUG 1997

CLAIMS

NAME OF INVENTION:

Cutter Knife for Thermoplastic Resin Pelletizer and
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WHAT IS CLAIMED IS:

1. A cutter knife to be mounted on a thermoplastic resin pelletizer for pelletizing thermoplastic resin, wherein the main body of said cutter knife is formed out of steel, the knife edge of said cutter knife being formed out of a ceramic alloy as an integral body with said main body.
2. A method of producing a cutter knife for a thermoplastic resin pelletizer, said method calling for forming a groove in a corner of a rectangular-shaped steel body in such a manner as to extend in the longitudinal direction of said steel body which has an appropriate thickness; inserting a ceramic alloy plate into said groove and bonding said ceramic alloy thereto by means of diffusion bonding; and cutting the material into a specified shape.
3. A method of producing a cutter knife for a thermoplastic resin pelletizer, said method calling for forming a steel block into such a shape as to have a step when viewed from the side; bonding a ceramic alloy plate to the upper surface of the lower step of said steel block by means of diffusion bonding; diagonally cutting said block at specified intervals; and cutting each cut piece into a specified shape.

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CUTTER KNIFE FOR THERMOPLASTIC RESIN PELLETIZER AND
PRODUCTION METHOD OF SAID CUTTER KNIFE.

ABSTRACT OF THE DISCLOSURE

SUMMARY

Objective:

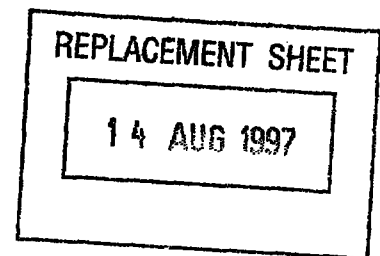
To provide a way to use a ceramic alloy as a material for producing a cutter knife to be mounted on a thermoplastic resin pelletizer easily, with reduced costs, and also eliminating the possibility of breakage.

Means to Solve the Problems:

Form the main body of a cutter knife out of steel and form the knife edge out of a ceramic alloy, wherein the knife edge is formed as an integral body with the main body by means of diffusion bonding.

Selected Drawing:

Fig. 1



14 AUG 1997

- 1/4 -

FIG. 1

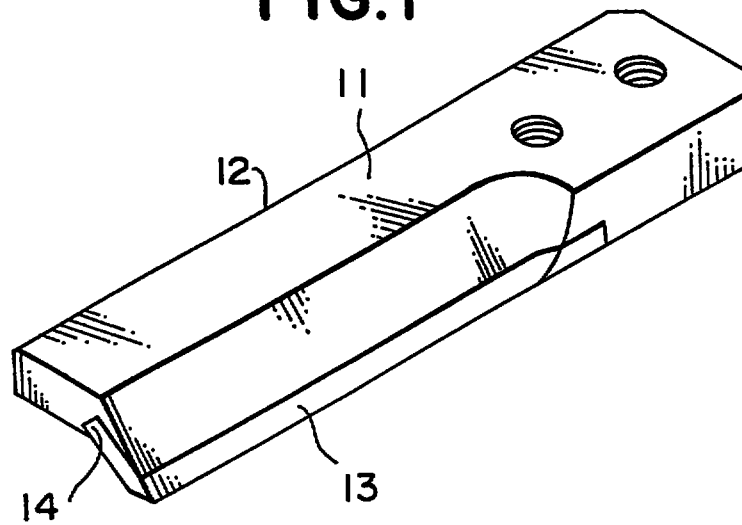
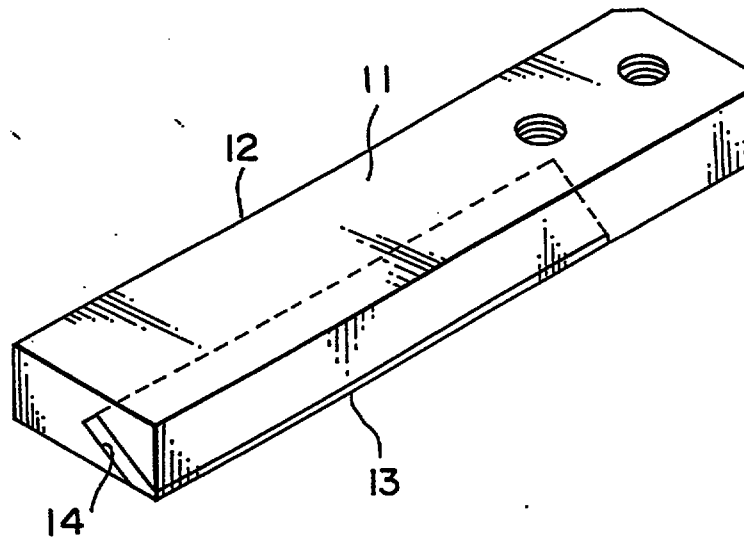


FIG. 2



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FIG. 3

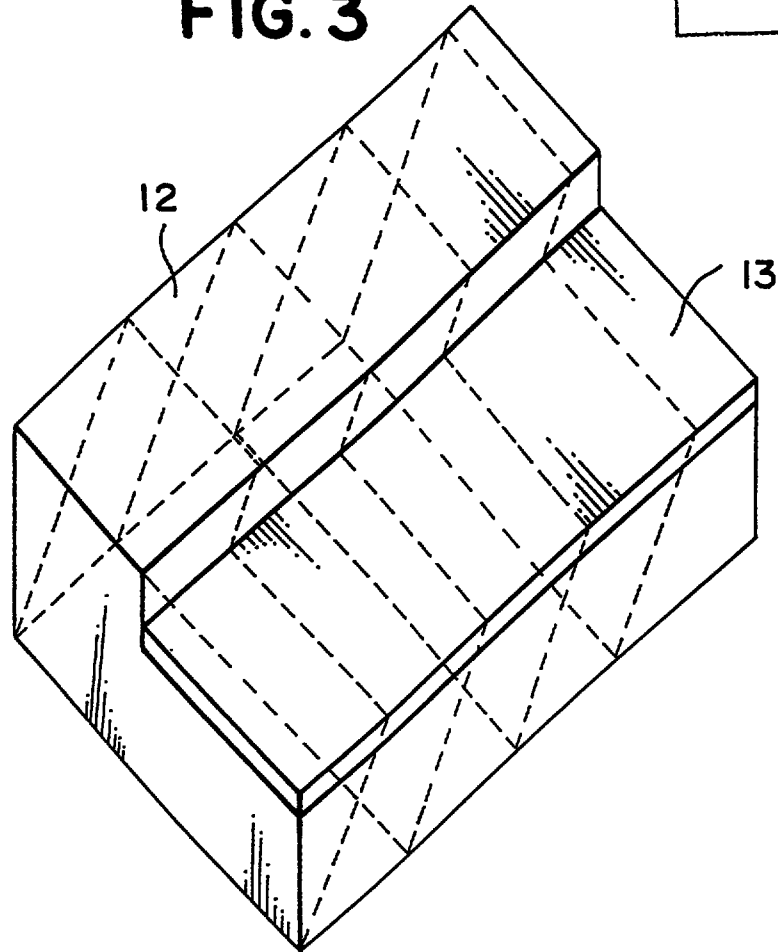
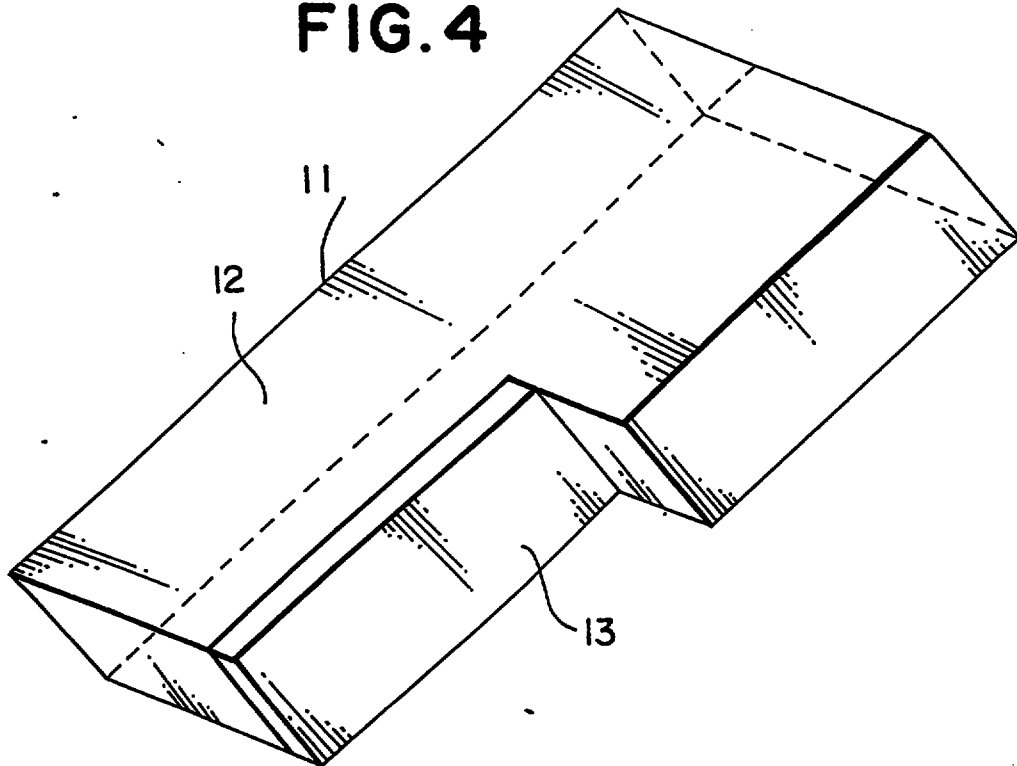


FIG. 4



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FIG. 5

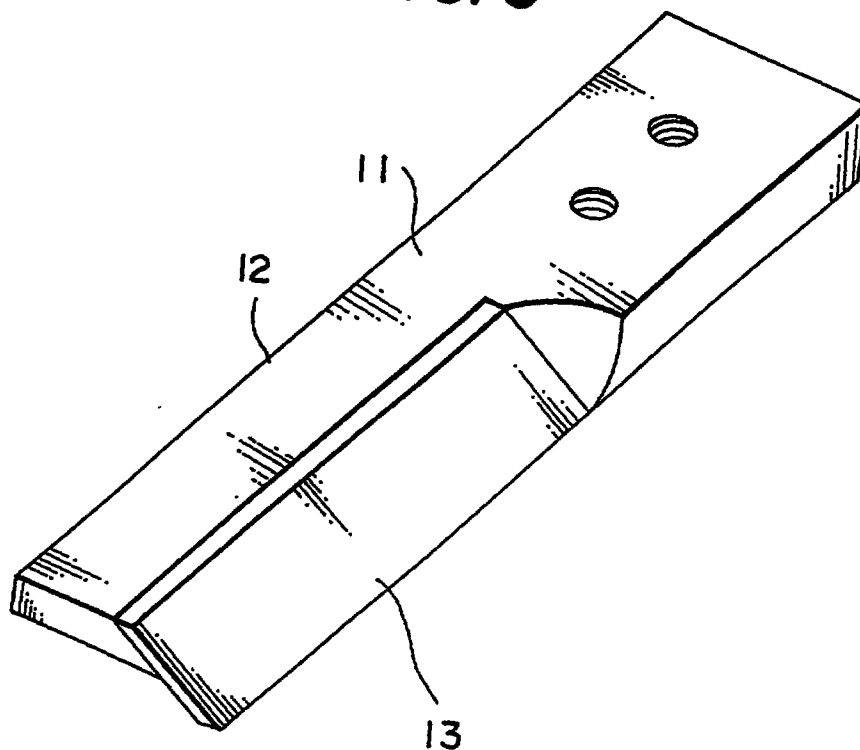
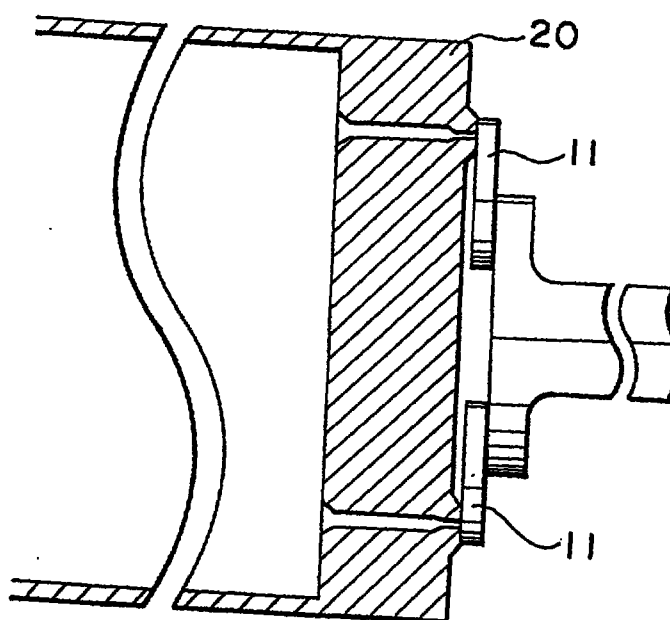


FIG. 6



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FIG. 7

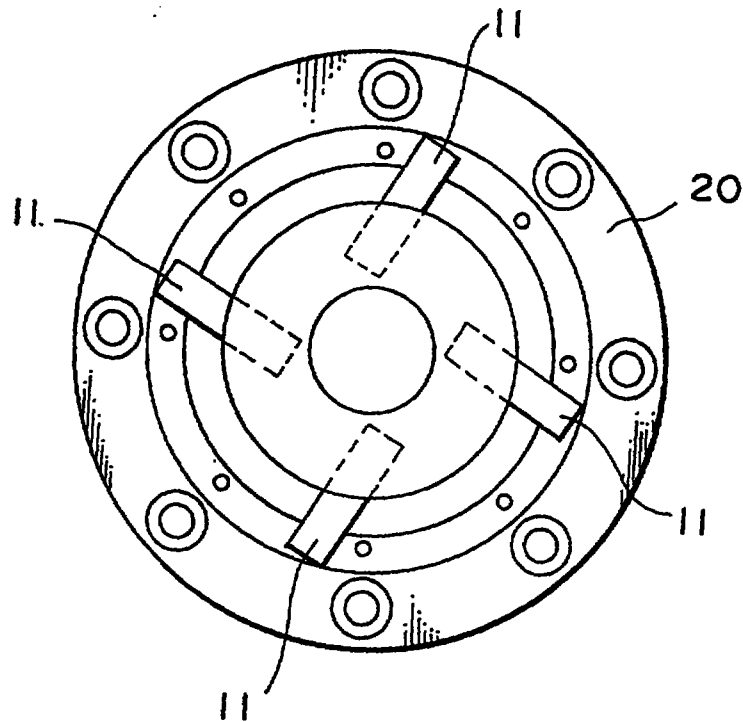
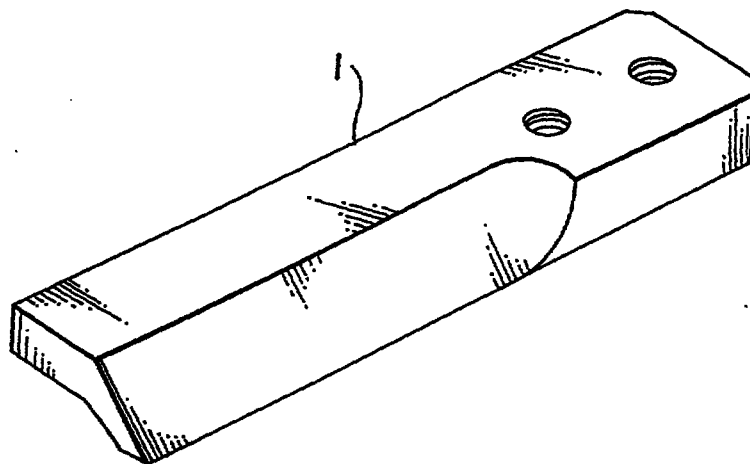


FIG. 8





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AMENDED CLAIMS

NAME OF INVENTION:

Cutter Knife for Thermoplastic Resin Pelletizer and
Production Method of Said Cutter Knife

WHAT IS CLAIMED IS:

- ~~1. A cutter knife to be mounted on a thermoplastic resin pelletizer for pelletizing thermoplastic resin, wherein the main body of said cutter knife is formed out of steel, the knife edge of said cutter knife being formed out of a ceramic alloy as an integral body with said main body.~~
- ~~2. A method of producing a cutter knife for a thermoplastic resin pelletizer, said method calling for forming a groove in a corner of a rectangular-shaped steel body in such a manner as to extend in the longitudinal direction of said steel body which has an appropriate thickness; inserting a ceramic alloy plate into said groove and bonding said ceramic alloy thereto by means of diffusion bonding; and cutting the material into a specified shape.~~
- 1.3. A method of producing a cutter knife for a thermoplastic resin pelletizer, said method calling for forming a steel block into such a shape as to have a step when viewed from the side; bonding a ceramic alloy plate to the upper surface of the lower step of said steel block by means of diffusion bonding; diagonally cutting said block at specified intervals; and cutting each cut piece into a specified shape.

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