

METHOD OF PRODUCING AN ICE BLOCK

Technical Field

This invention relates to the production of a block of ice. More specifically this
5 invention relates to a method of producing the block of ice from a plurality of pieces of ice.

Background Art

Ice may be produced by subjecting water to air at a temperature of 0°C. The
10 efficiency of this process is improved by maximising the contact surface area between the water and air whilst minimising the volume of water to be frozen.

Blocks of ice are generally produced commercially by filling a relatively large container with water, freezing the water to form ice, discharging the ice from the container, and cutting the ice to form the block of ice. The ability of this method to
15 produce blocks of ice efficiently is dictated by the dimensions of the block of ice. It would be advantageous for the ice to be produced independently of producing the block.

Disclosure of the Invention

20 An object of this invention is to provide a more efficient method of producing blocks of ice which is not dictated by the dimensions of the block of ice.

According to the invention there is provided a method of producing a block of ice including:

- producing a plurality of pieces of ice;
- 25 transferring the pieces of ice to a compression apparatus; and
- compressing the pieces of ice in the compression apparatus to form the block of ice.

This method produces the ice independently from the forming of the block of ice. Therefore ice may be produced in a more efficient method than freezing the water for
30 the block of ice as a unit. This permits the contact surface area between the water and air to be maximised and the volume of each piece of water to be frozen to be minimised, making the production of the ice more efficient.

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Preferably the pieces of ice are produced by filling a tubular mold with water, freezing the water to form a tubular piece of ice, dislodging the ice from the mold, and cutting the tubular piece of ice to produce the plurality of pieces of ice. The ice may be consumed by humans and as such it is preferred that the water be filtered.

5 It is preferred that the apparatus producing the plurality of pieces of ice be separate from the apparatus compressing the plurality of pieces of ice and as such the ice will have to be transferred from the producing apparatus to the compressing apparatus. Preferably the pieces of ice are transferred via a screw conveyor and this may cover a distance of approximately 5m and moving at a speed of between 0.25 and
10 0.3 m/s.

It is preferred that the pieces of ice be compressed in a compression chamber to form the block of ice, the block of ice being cylindrical in shape for efficient co-operation and use with ice-shaving machines for making shaved-ice desserts. It is further preferred that a measured volume of pieces of ice be transferred to the
15 compression chamber so as not to overload the compression chamber. Preferably the compression chamber uses a ram to compress the pieces of ice by about 60%.

It is preferred that the ram be used to discharge the block of ice from the compression chamber. It is further preferred that the discharged block of ice be enclosed in a receptacle, preferably a plastic bag, to facilitate transporting the block of
20 ice.

It will be convenient to describe the invention in greater detail by reference to the attached drawings which show one example embodiment of the invention. The particularity of these drawings and the related description is not to be understood as superseding the generality of the claims defining the invention.
25

Description of Drawings

An embodiment of the invention will now be described, by way of non limiting example only, with reference to the accompanying drawings. In the drawings:

Fig 1 shows in diagrammatic form an apparatus for producing a block of ice with
30 a measuring tank in a filling position.

Fig 2 shows the apparatus of Fig 1 with the measuring tank in a dispensing position.

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Fig 3 shows the apparatus of Fig 1 with an upper plate sealing a compression chamber.

Fig 4 shows the apparatus of Fig 1 with a second ram in a part extended position.

Fig 5 shows the apparatus of Fig 1 with the second ram in a full extended position and a discharge member in a retracted position.

Fig 6 shows the apparatus of Fig 1 with the discharge member in an extended position.

Detailed Description of An Embodiment

Referring now generally to the apparatus shown in Figures 1 to 6 there is shown an ice producing apparatus 1 for producing a plurality of pieces of ice (not shown). The specific shape of the pieces of ice produced is not essential to the successful performance of the invention, however, tubular pieces of ice have been found to be suitable. The pieces of ice may be produced by filling a mold with water, freezing the water, discharging the ice from the mold and cutting the ice to produce the plurality of pieces of ice. Depending on the intended use of the block of ice the water may be filtered before filling the mold.

The plurality of pieces of ice produced are transferred, preferably by a screw conveyor 2, to an ice compressing apparatus 3. Generally the screw conveyor 2 is 5m in length and transfers the pieces of ice at a speed of 0.25 to 0.3 m/s.

The pieces of ice enter the compressing apparatus 3 via a funnel section 4. The funnel section 4 includes a sloping face 5 to direct the pieces of ice to a measuring tank 6. The measuring tank 6 is capable of receiving a set volume of pieces of ice. The set volume is selected so as to not overload a compression chamber 7. Preferably the set volume is $5.3 \times 10^6 \text{mm}^3$.

Referring now to Figure 1 the measuring tank 6 is shown in a filling position. When the measuring tank 6 is filled with the set volume of pieces of ice the measuring tank 6 is moved by a first ram 8 to a dispensing position as shown in Figure 2. Once in the dispensing position the measuring tank 6 dispenses the set volume of pieces of ice into the compression chamber 7.

The compression chamber 7 includes a cylindrical wall 9, and a ram plate 10 which forms part of a second ram 11, and is sealed by an upper plate 12 which forms part of a discharging member 13. Referring again to Figure 2 there is shown both the

second ram 11 and the discharging member 13 in retracted positions to receive the set volume of pieces of ice. Once the measuring tank 6 has dispersed the set volume of pieces of ice, the discharging member 13 moves to an extended position so that the upper plate 12 seals the compression chamber 7, as seen in Figure 3.

- 5 Once the compression chamber is sealed with the upper plate 12, the second ram 11 moves to a part extended position as shown in Figure 4. This step compresses the set volume of the pieces of ice, to form a block of ice. It is preferred that the block of ice formed be cylindrical however, other shapes are possible. Preferably the dimensions of the cylindrical block of ice is a diameter of 150mm and height of 140 mm.
- 10 It is further preferred that the second ram be hydraulic and that the hydraulic pressure used to compress the ice be in the range of 2500 - 3000 psi.

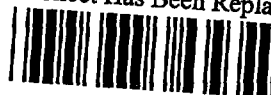
- Once the cylindrical block of ice is produced, the discharge member 13 is retracted to remove the upper plate 12 from sealing the compression chamber 7, as seen in Figure 5. Furthermore the second ram 11 is moved to a full extended position,
- 15 exposing the cylindrical block of ice from the compression chamber.

- Referring now to Figure 6, with the cylindrical block of ice exposed from the compression chamber 7, the discharging member 13 moves to the extended position to discharge the cylindrical block of ice through an exit port 14 in the ice compression apparatus 3. The process from directing the pieces of ice to the measuring tank 6 to
- 20 discharging the cylindrical block of ice should take approximately 10 seconds.

- The discharged cylindrical block of ice is packed into an individual bag and sealed and removed from the ice compressing apparatus 3 via a conveyer belt 15. The individual bags are deposited in a larger bag, approximately 8 individual bags per larger bag, with the larger bag being sealed mechanically by a ring-clamp. Once the large bag
- 25 is sealed the cylindrical blocks of ice are ready for transport.

 The invention described herein is susceptible to variations, modifications and/or additions other than those specifically described and it is to be understood that the invention includes all such variations, modifications and/or additions which fall within the spirit and scope of the appended claims.

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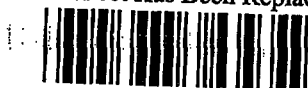


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THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A method of producing a block of ice including:
producing a plurality of pieces of ice;
5 transferring the pieces of ice to a compression apparatus; and
compressing the pieces of ice in the compression apparatus to form the block of
ice.
2. A method according to claim 1 wherein producing the plurality of pieces of ice
10 includes:
filling a mold with water;
freezing the water in the mold to form a piece of ice;
discharging the piece of ice from the mold; and
cutting the piece of ice to produce the plurality of pieces of ice.
- 15 3. A method according to claim 2 including filtering the water filling the mold.
4. A method according to claim 2 or claim 3 wherein the pieces of ice produced by
cutting are tubular.
- 20 5. A method according to any one of the preceding claims including producing the
plurality of pieces of ice remote from the compression apparatus and transferring the
pieces of ice to the compression apparatus via a screw conveyer.
- 25 6. A method according to any one of the preceding claims wherein compressing the
pieces of ice includes separating a measured volume of pieces of ice from the plurality
of pieces of ice, transferring the volume of pieces of ice to a compression chamber in
the compression apparatus, compressing the volume of pieces of ice in the compression
chamber to form the block of ice.

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7. A method according to claim 6 wherein compressing the measured volume of pieces of ice includes a ram in the compression chamber moving from a retracted position to a part extended position to reduce the measured volume of pieces of ice in the compression chamber to form the block of ice.

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8. A method according to claim 7 wherein the measured volume is compressed by about 60%.

9. A method according to claims 7 and 8 wherein the block of ice formed by the
10 compression is cylindrical.

10. A method according to claim 6 including discharging the block of ice from the compression chamber by moving the ram from the part extended position to a full extended position.

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11. A method according to claim 8 including enclosing the discharged block of ice in a receptacle to facilitate transporting the block of ice.

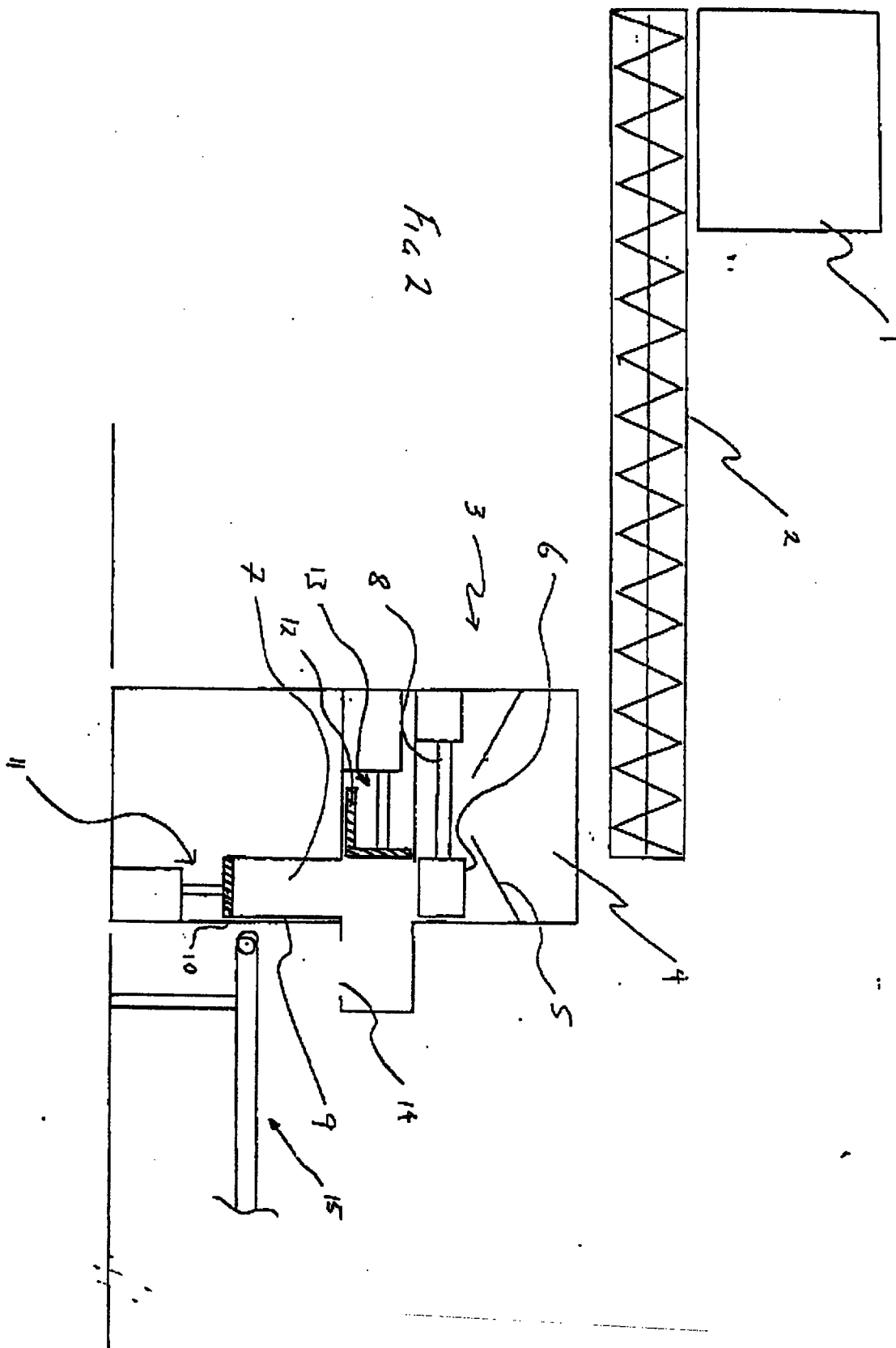
12. A method of producing a block of ice substantially as herein described, with
20 reference to and as illustrated in the accompanying drawings.



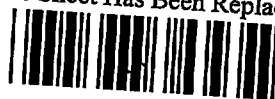
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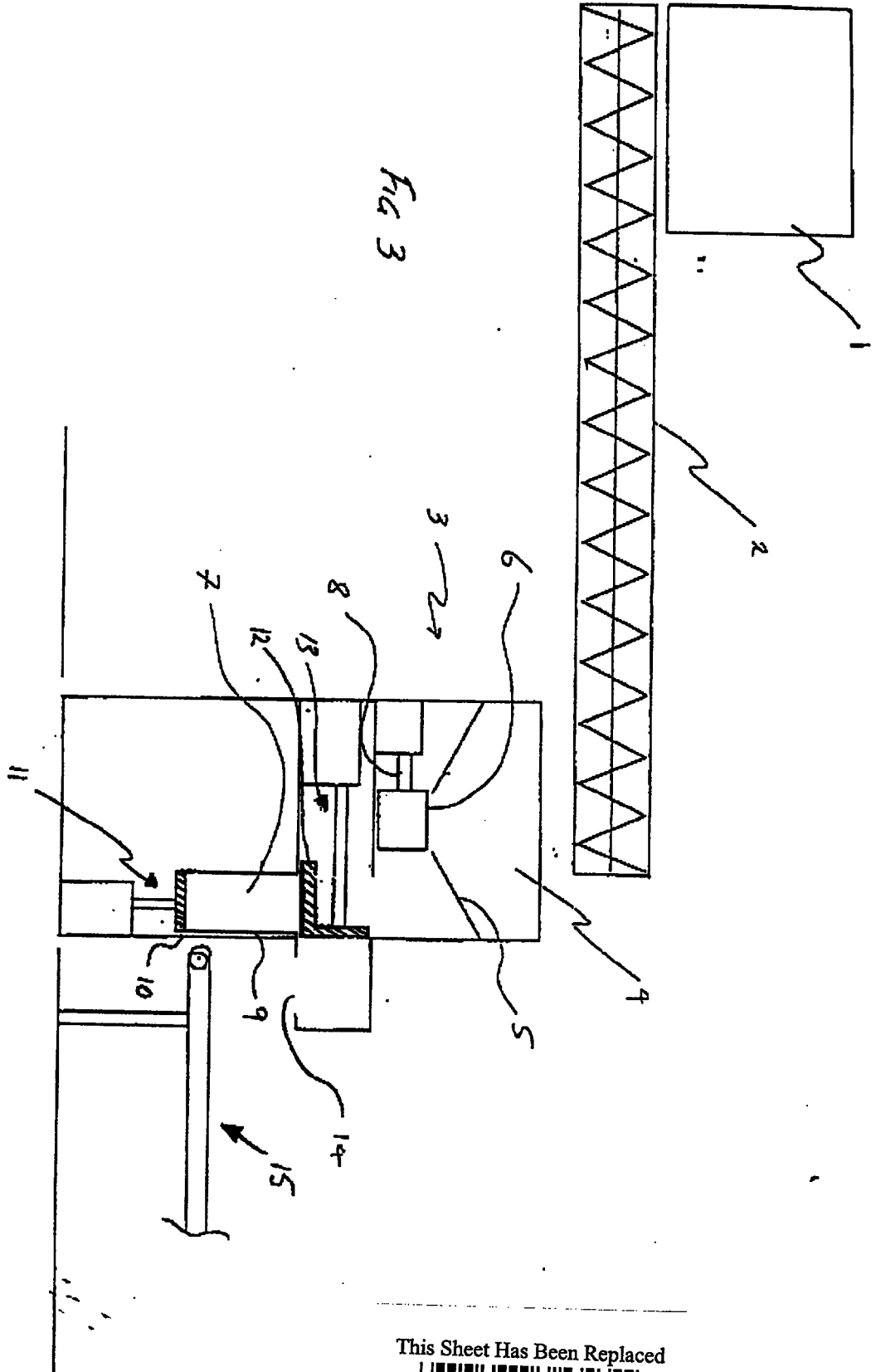
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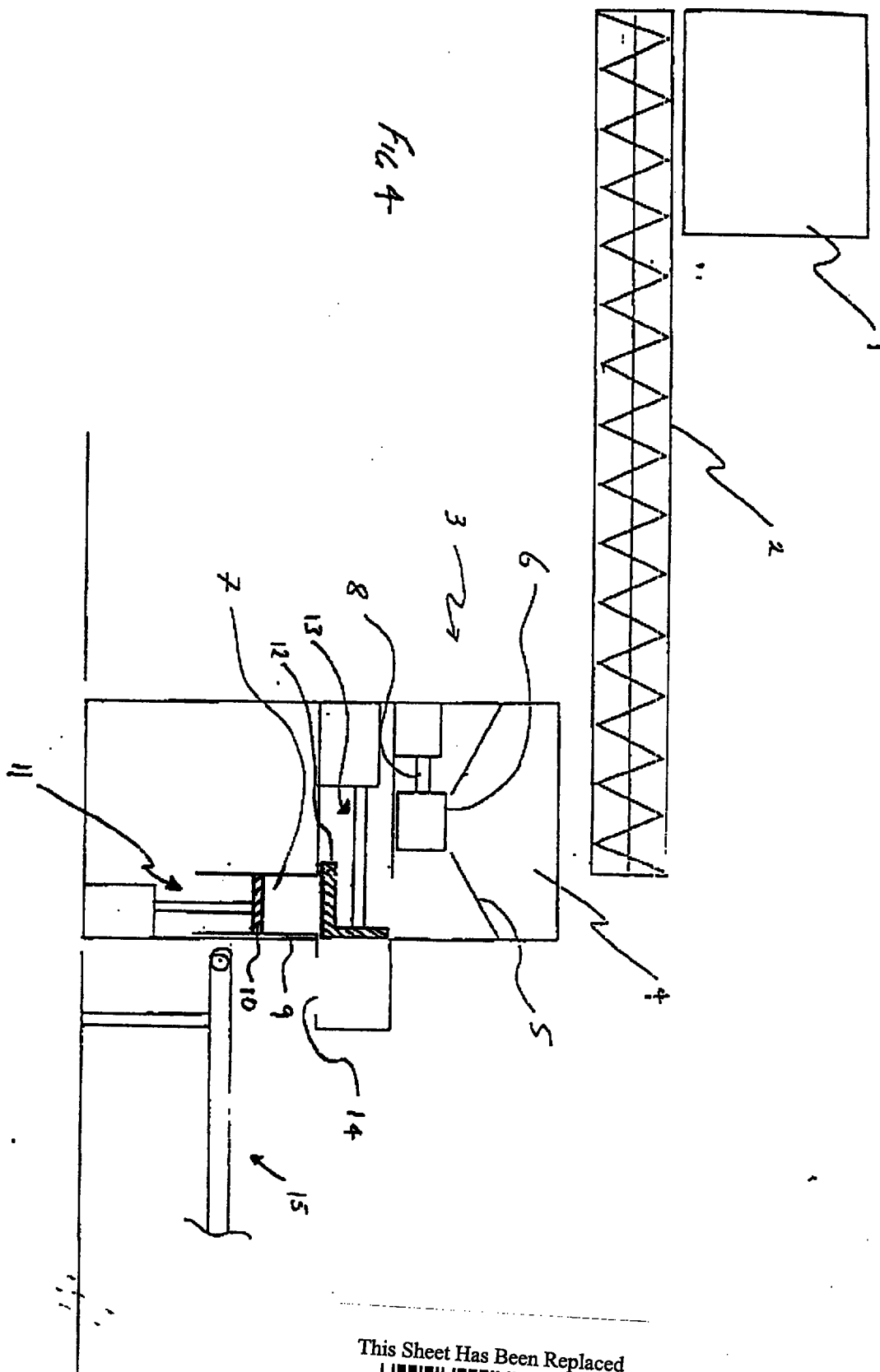
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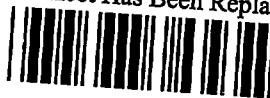
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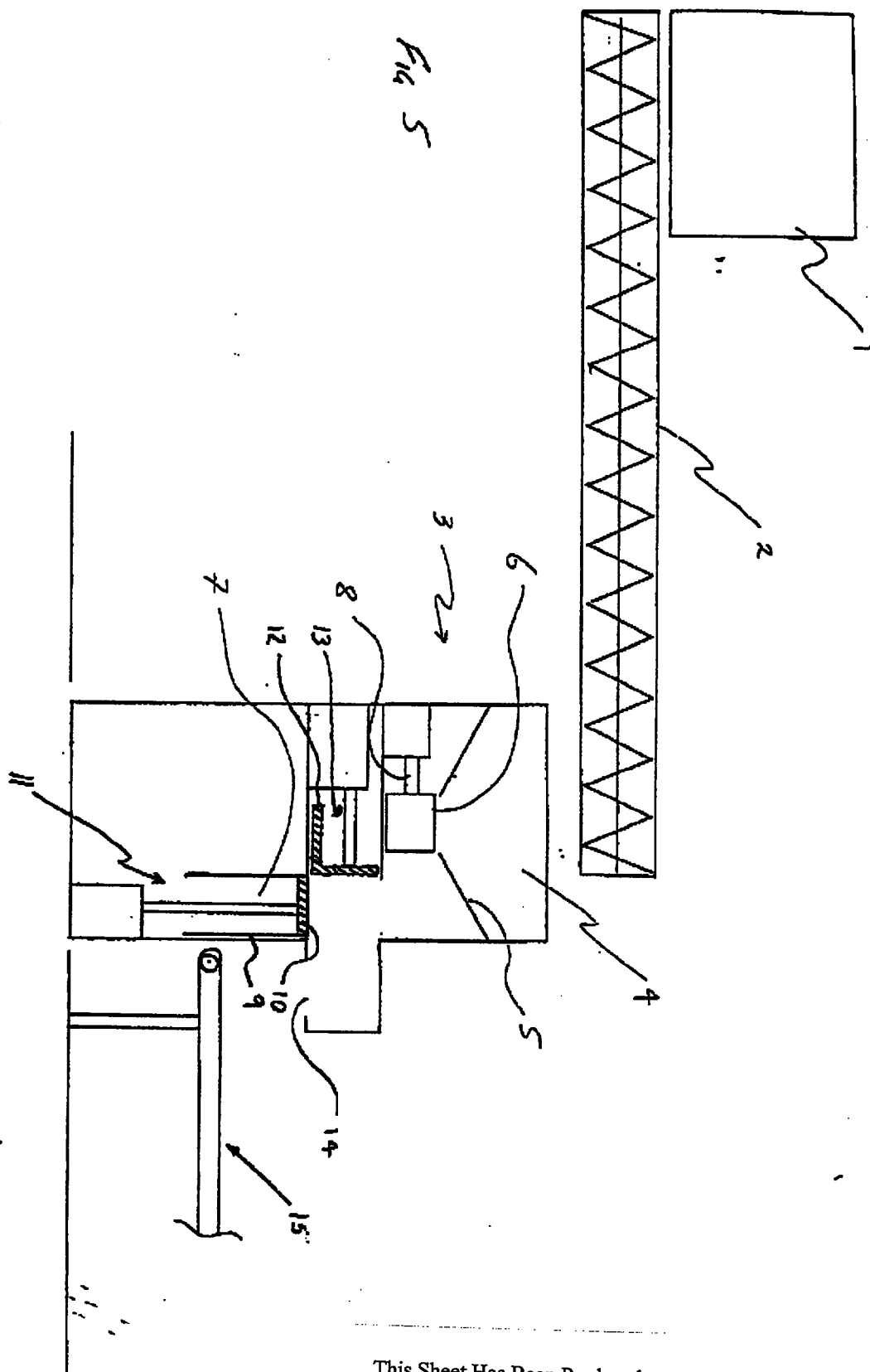
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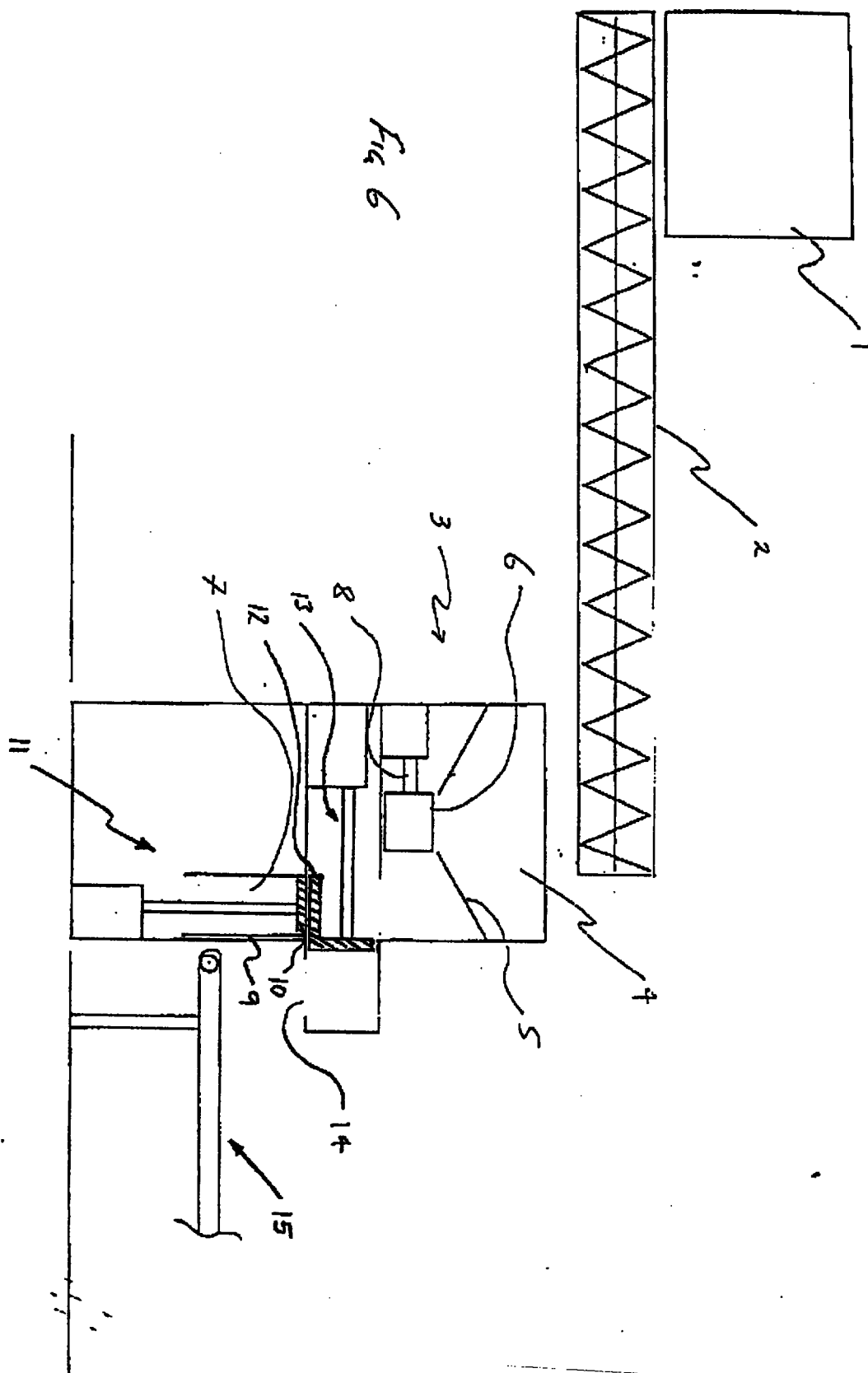
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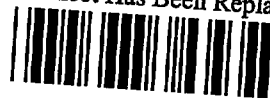
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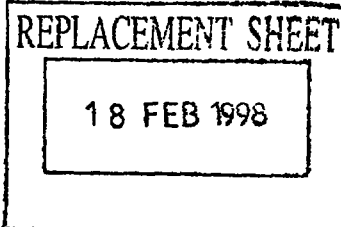
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METHOD OF PRODUCING AN ICE BLOCK

Technical Field

This invention relates to the production of a block of ice. More specifically this invention relates to a method of producing the block of ice from a plurality of pieces of ice.

Background Art

Ice may be produced by subjecting water to air at a temperature of 0°C. The efficiency of this process is improved by maximising the contact surface area between the water and air whilst minimising the volume of water to be frozen.

Blocks of ice are generally produced commercially by filling a relatively large container with water, freezing the water to form ice, discharging the ice from the container, and cutting the ice to form the block of ice. The ability of this method to produce blocks of ice efficiently is dictated by the dimensions of the block of ice. It would be advantageous for the ice to be produced independently of producing the block.

Disclosure of the Invention

An object of this invention is to provide a more efficient method of producing blocks of ice which is not dictated by the dimensions of the block of ice.

According to the invention there is provided a method of producing a block of ice including:

- producing a plurality of pieces of ice;
- transferring the pieces of ice to a compression apparatus; and
- compressing the pieces of ice in the compression apparatus to form the block of ice.

This method produces the ice independently from the forming of the block of ice. Therefore ice may be produced in a more efficient method than freezing the water for the block of ice as a unit. This permits the contact surface area between the water and air to be maximised and the volume of each piece of water to be frozen to be minimised, making the production of the ice more efficient.

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Preferably the pieces of ice are produced by filling a tubular mold with water, freezing the water to form a tubular piece of ice, dislodging the ice from the mold, and cutting the tubular piece of ice to produce the plurality of pieces of ice. The ice may be consumed by humans and as such it is preferred that the water be filtered.

It is preferred that the apparatus producing the plurality of pieces of ice be separate from the apparatus compressing the plurality of pieces of ice and as such the ice will have to be transferred from the producing apparatus to the compressing apparatus. Preferably the pieces of ice are transferred via a screw conveyor and this may cover a distance of approximately 5m and moving at a speed of between 0.25 and 0.3 m/s.

It is preferred that the pieces of ice be compressed in a compression chamber to form the block of ice, the block of ice being cylindrical in shape for efficient co-operation and use with ice-shaving machines for making shaved-ice desserts. It is further preferred that a measured volume of pieces of ice be transferred to the compression chamber so as not to overload the compression chamber. Preferably the compression chamber uses a ram to compress the pieces of ice by about 60%.

It is preferred that the ram be used to discharge the block of ice from the compression chamber. It is further preferred that the discharged block of ice be enclosed in a receptacle, preferably a plastic bag, to facilitate transporting the block of ice.

It will be convenient to describe the invention in greater detail by reference to the attached drawings which show one example embodiment of the invention. The particularity of these drawings and the related description is not to be understood as superseding the generality of the claims defining the invention.

Description of Drawings

An embodiment of the invention will now be described, by way of non limiting example only, with reference to the accompanying drawings. In the drawings:

Fig 1 shows in diagrammatic form an apparatus for producing a block of ice with a measuring tank in a filling position.

Fig 2 shows the apparatus of Fig 1 with the measuring tank in a dispensing position.

Fig 3 shows the apparatus of Fig 1 with an upper plate sealing a compression chamber.

Fig 4 shows the apparatus of Fig 1 with a second ram in a part extended position.

Fig 5 shows the apparatus of Fig 1 with the second ram in a full extended position and a discharge member in a retracted position.

Fig 6 shows the apparatus of Fig 1 with the discharge member in an extended position.

Detailed Description of An Embodiment

Referring now generally to the apparatus shown in Figures 1 to 6 there is shown an ice producing apparatus 1 for producing a plurality of pieces of ice (not shown). The specific shape of the pieces of ice produced is not essential to the successful performance of the invention, however, tubular pieces of ice have been found to be suitable. The pieces of ice may be produced by filling a mold with water, freezing the water, discharging the ice from the mold and cutting the ice to produce the plurality of pieces of ice. Depending on the intended use of the block of ice the water may be filtered before filling the mold.

The plurality of pieces of ice produced are transferred, preferably by a screw conveyor 2, to an ice compressing apparatus 3. Generally the screw conveyor 2 is 5m in length and transfers the pieces of ice at a speed of 0.25 to 0.3 m/s.

The pieces of ice enter the compressing apparatus 3 via a funnel section 4. The funnel section 4 includes a sloping face 5 to direct the pieces of ice to a measuring tank 6. The measuring tank 6 is capable of receiving a set volume of pieces of ice. The set volume is selected so as to not overload a compression chamber 7. Preferably the set volume is $5.3 \times 10^6 \text{ mm}^3$.

Referring now to Figure 1 the measuring tank 6 is shown in a filling position. When the measuring tank 6 is filled with the set volume of pieces of ice the measuring tank 6 is moved by a first ram 8 to a dispensing position as shown in Figure 2. Once in the dispensing position the measuring tank 6 dispenses the set volume of pieces of ice into the compression chamber 7.

The compression chamber 7 includes a cylindrical wall 9, and a ram plate 10 which forms part of a second ram 11, and is sealed by an upper plate 12 which forms part of a discharging member 13. Referring again to Figure 2 there is shown both the

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second ram 11 and the discharging member 13 in retracted positions to receive the set volume of pieces of ice. Once the measuring tank 6 has dispersed the set volume of pieces of ice, the discharging member 13 moves to an extended position so that the upper plate 12 seals the compression chamber 7, as seen in Figure 3.

Once the compression chamber is sealed with the upper plate 12, the second ram 11 moves to a part extended position as shown in Figure 4. This step compresses the set volume of the pieces of ice, to form a block of ice. It is preferred that the block of ice formed be cylindrical however, other shapes are possible. Preferably the dimensions of the cylindrical block of ice is a diameter of 150mm and height of 140 mm. It is further preferred that the second ram be hydraulic and that the hydraulic pressure used to compress the ice be in the range of 2500 - 3000 psi.

Once the cylindrical block of ice is produced, the discharge member 13 is retracted to remove the upper plate 12 from sealing the compression chamber 7, as seen in Figure 5. Furthermore the second ram 11 is moved to a full extended position, exposing the cylindrical block of ice from the compression chamber.

Referring now to Figure 6, with the cylindrical block of ice exposed from the compression chamber 7, the discharging member 13 moves to the extended position to discharge the cylindrical block of ice through an exit port 14 in the ice compression apparatus 3. The process from directing the pieces of ice to the measuring tank 6 to discharging the cylindrical block of ice should take approximately 10 seconds.

The discharged cylindrical block of ice is packed into an individual bag and sealed and removed from the ice compressing apparatus 3 via a conveyer belt 15. The individual bags are deposited in a larger bag, approximately 8 individual bags per larger bag, with the larger bag being sealed mechanically by a ring-clamp. Once the large bag is sealed the cylindrical blocks of ice are ready for transport.

The invention described herein is susceptible to variations, modifications and/or additions other than those specifically described and it is to be understood that the invention includes all such variations, modifications and/or additions which fall within the spirit and scope of the appended claims.

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THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A method of producing a block of ice including:
producing a plurality of pieces of ice;
transferring the pieces of ice to a compression apparatus; and
compressing the pieces of ice in the compression apparatus to form the block of ice.
2. A method according to claim 1 wherein producing the plurality of pieces of ice includes:
filling a mold with water;
freezing the water in the mold to form a piece of ice;
discharging the piece of ice from the mold; and
cutting the piece of ice to produce the plurality of pieces of ice.
3. A method according to claim 2 including filtering the water filling the mold.
4. A method according to claim 2 or claim 3 wherein the pieces of ice produced by cutting are tubular.
5. A method according to any one of the preceding claims including producing the plurality of pieces of ice remote from the compression apparatus and transferring the pieces of ice to the compression apparatus via a screw conveyer.
6. A method according to any one of the preceding claims wherein compressing the pieces of ice includes separating a measured volume of pieces of ice from the plurality of pieces of ice, transferring the volume of pieces of ice to a compression chamber in the compression apparatus, compressing the volume of pieces of ice in the compression chamber to form the block of ice.



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7. A method according to claim 6 wherein compressing the measured volume of pieces of ice includes a ram in the compression chamber moving from a retracted position to a part extended position to reduce the measured volume of pieces of ice in the compression chamber to form the block of ice.
8. A method according to claim 7 wherein the measured volume is compressed by about 60%.
9. A method according to claims 7 and 8 wherein the block of ice formed by the compression is cylindrical.
10. A method according to claim 6 including discharging the block of ice from the compression chamber by moving the ram from the part extended position to a full extended position.
11. A method according to claim 8 including enclosing the discharged block of ice in a receptacle to facilitate transporting the block of ice.
12. A method of producing a block of ice substantially as herein described, with reference to and as illustrated in the accompanying drawings.



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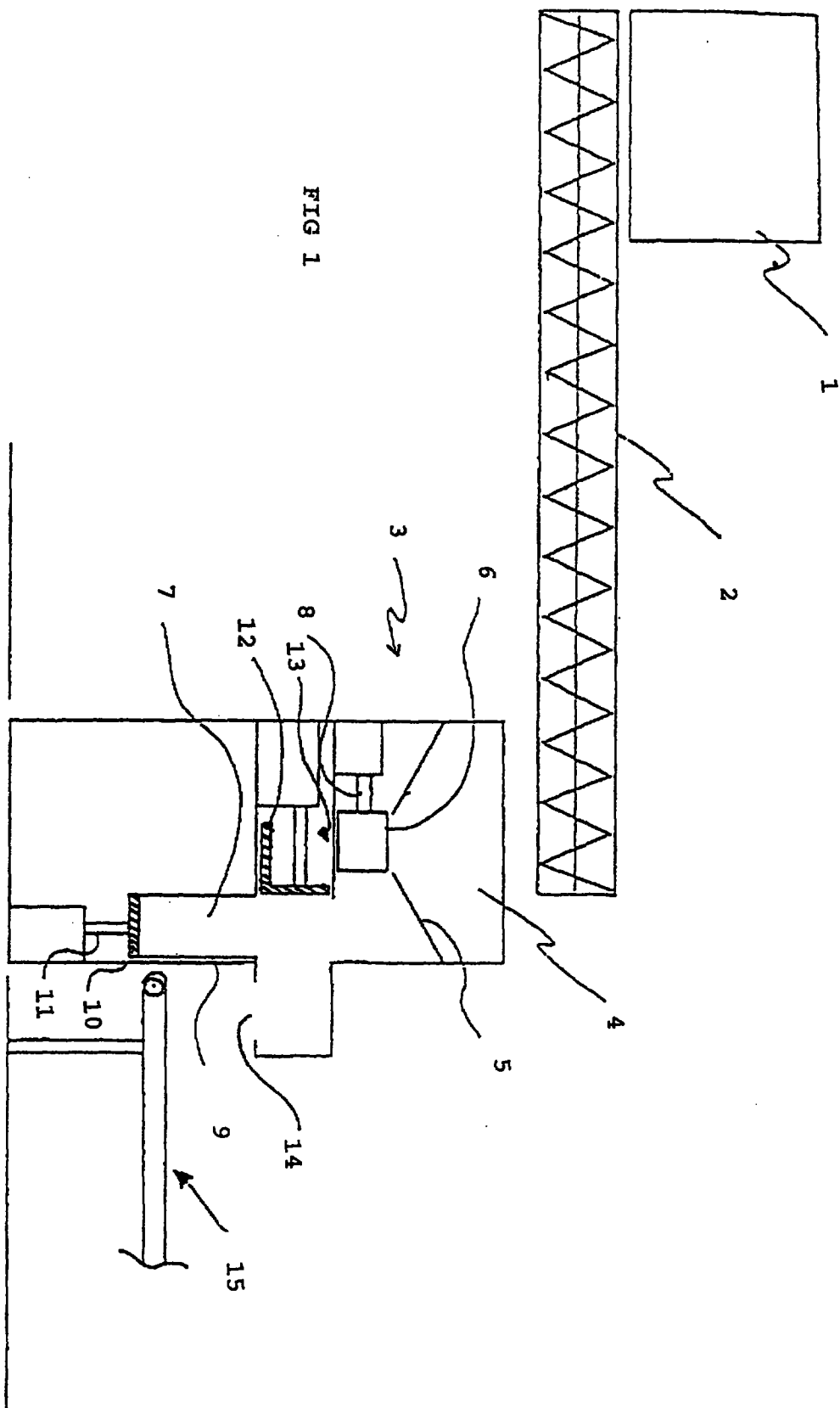
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METHOD OF PRODUCING AN ICE BLOCK

This invention relates to a method of producing a block of ice by producing a plurality of pieces of ice, transferring the pieces of ice to a compression apparatus, and compressing the pieces of ice in the compression apparatus to form the block of ice. This method produces ice independently of forming the block of ice. Accordingly the characteristics of the block of ice will not affect the production of the ice and as such it is possible to produce the ice in the most efficient method available. Furthermore, the operator may have greater control over the characteristics and quality of the ice produced, for example when the block of ice is to be consumed by humans the water may be filtered before it is used to produce the ice. The block of ice produced may have many uses and it has been found particularly suitable for use with ice grinding machines commonly used for making desserts.

Figure 1

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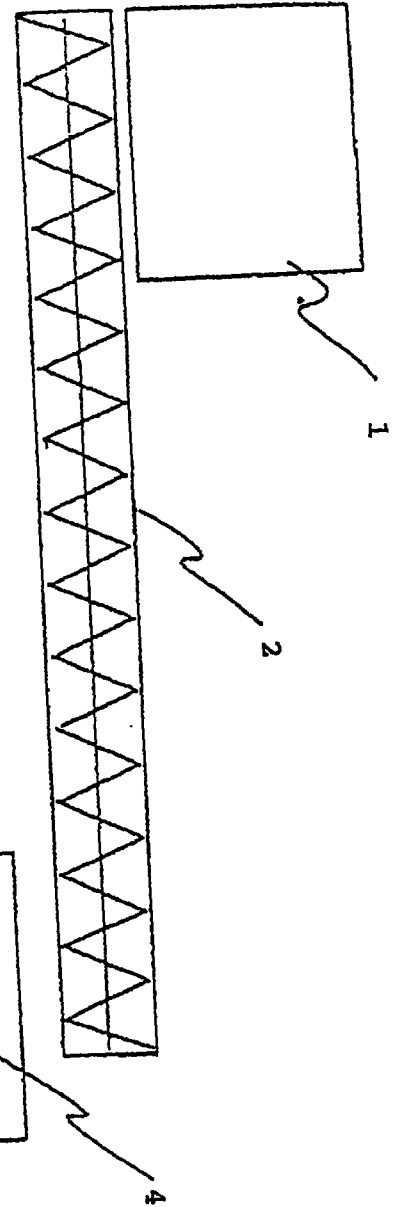
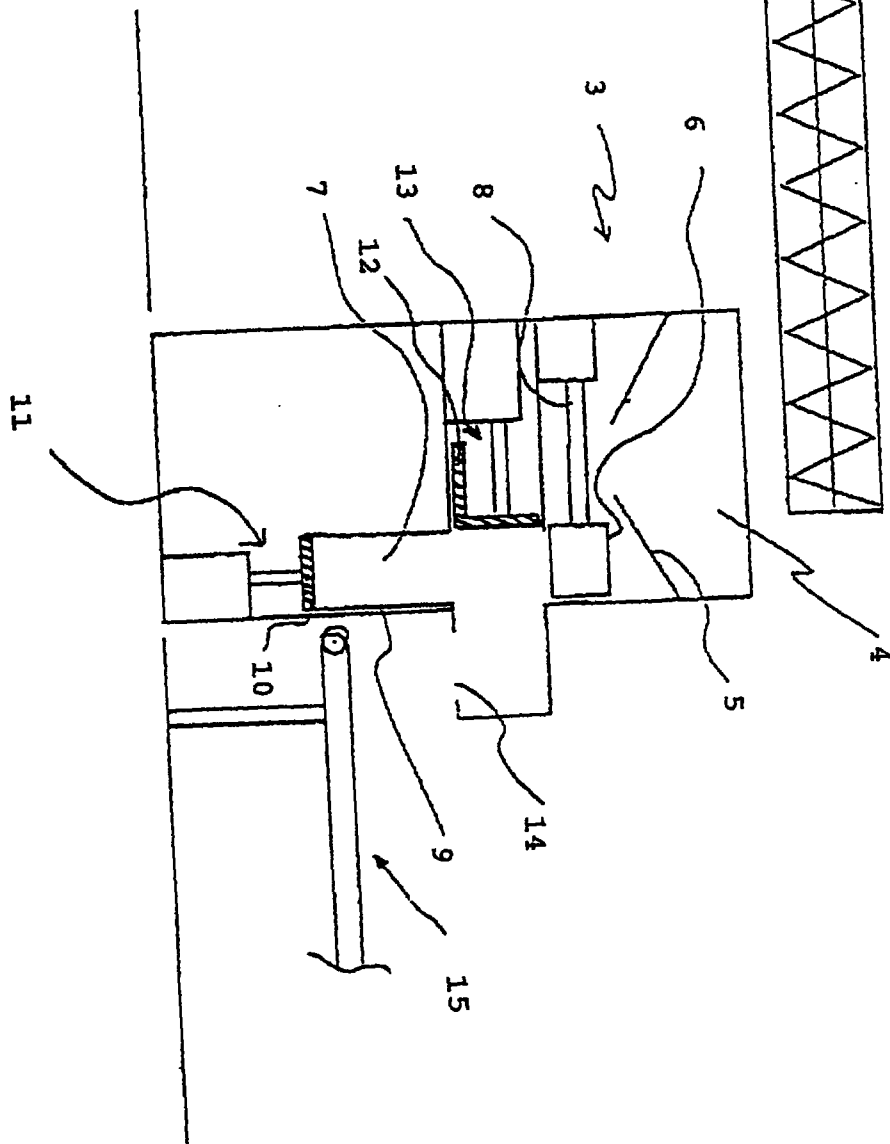


FIG 2



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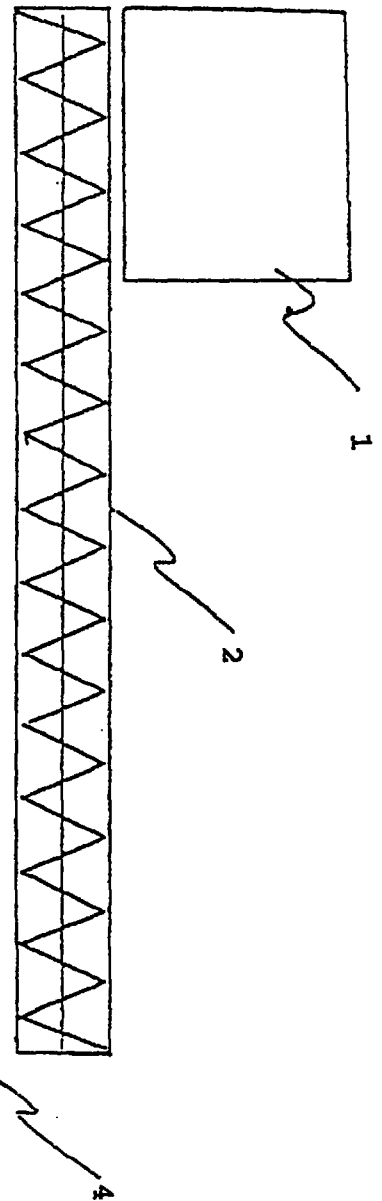
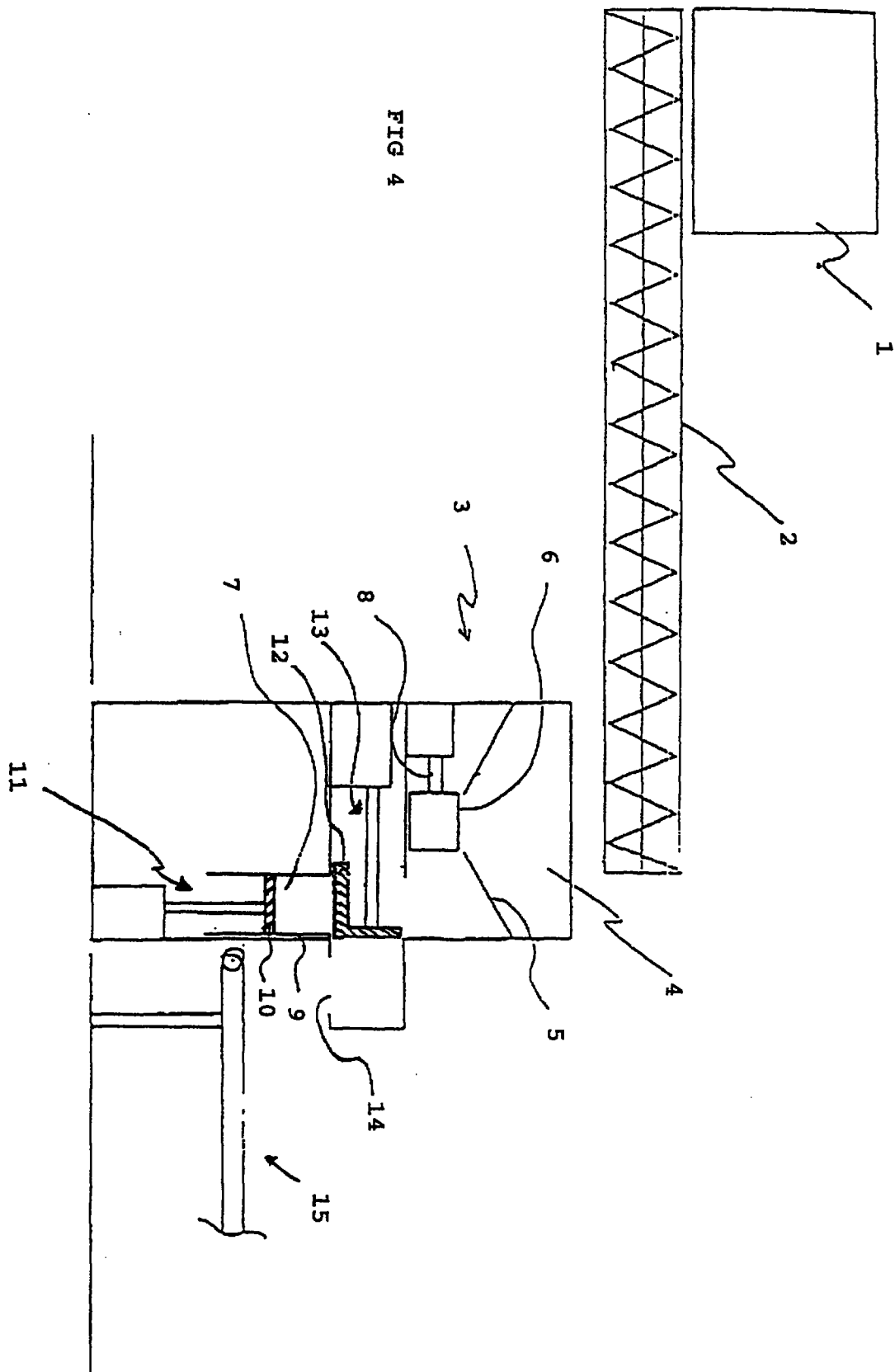


FIG 3

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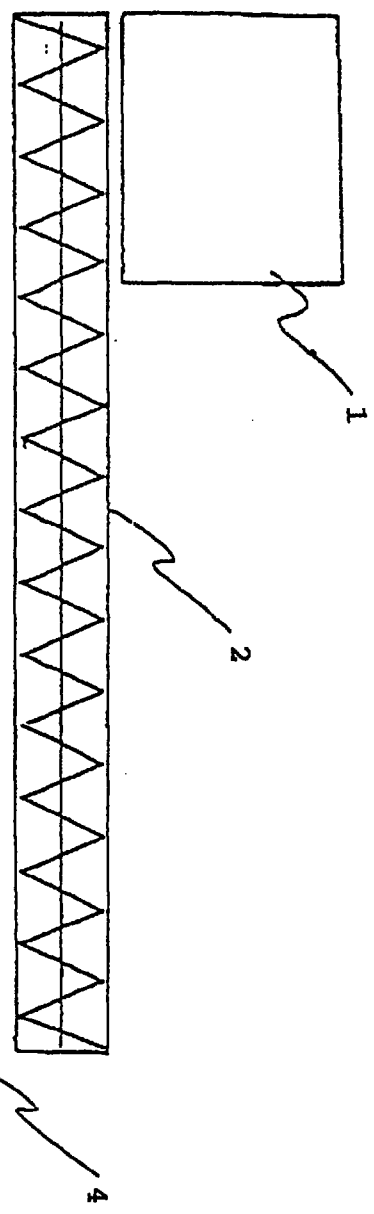
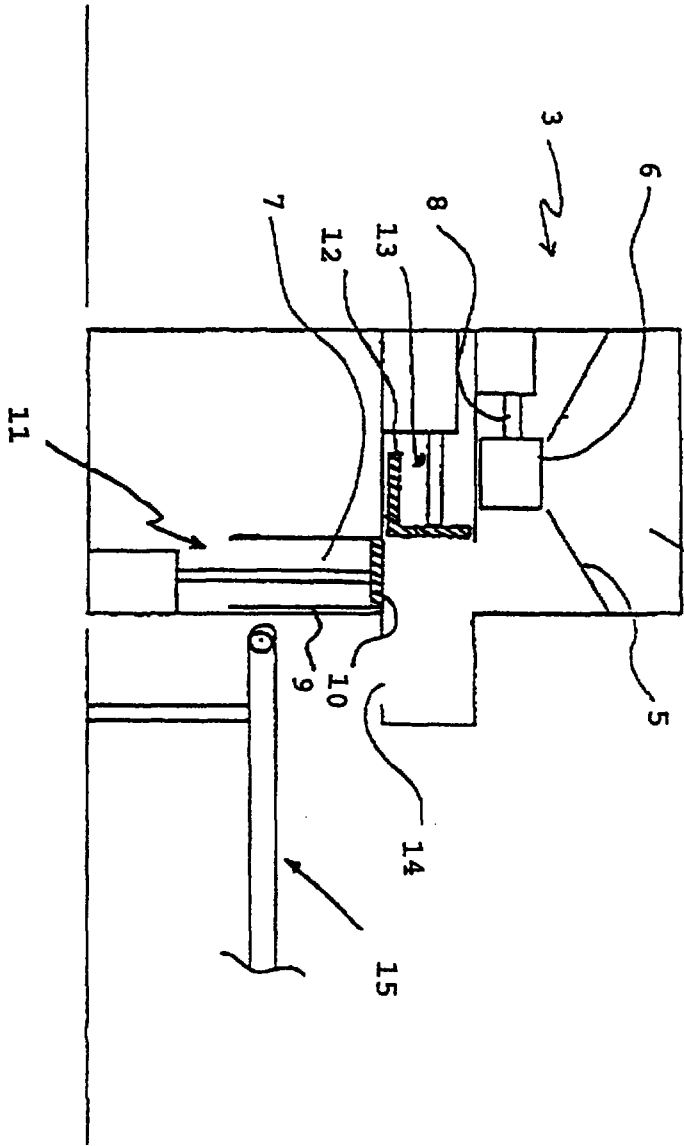
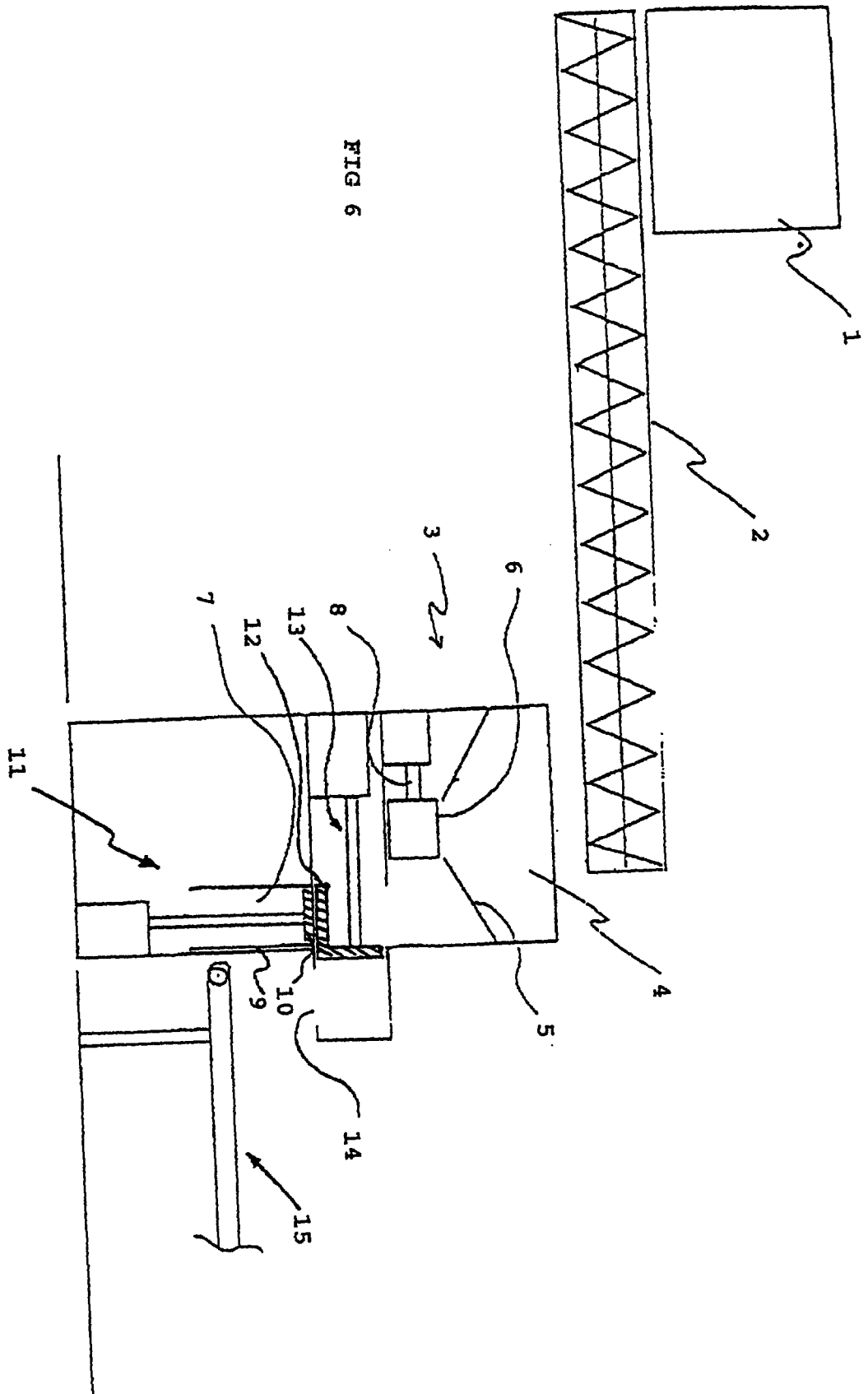


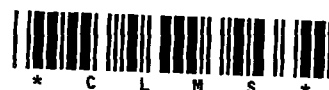
FIG 5





THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A method of producing a block of ice including:
manufacturing a plurality of pieces of ice;
5 transferring the plurality of pieces of ice to a compression apparatus including a
compression chamber;
combining the plurality of pieces of ice in the compression chamber; and
compressing the plurality of pieces of ice in the compression chamber to form the
block of ice.
- 10 2. A method according to claim 1 wherein producing the plurality of pieces of
ice includes:
filling a mold with water;
freezing the water in the mold to form a piece of ice;
15 discharging the piece of ice from the mold; and
cutting the piece of ice to produce the plurality of pieces of ice.
3. A method according to claim 2 including filtering the water filling the mold.
- 20 4. A method according to claim 2 or claim 3 wherein the pieces of ice
produced by cutting are tubular.
5. A method according to any one of the preceding claims including
producing the plurality of pieces of ice remote from the compression apparatus
25 and transferring the pieces of ice to the compression apparatus via a screw
conveyor.
6. A method according to any one of the preceding claims wherein
compressing the pieces of ice includes separating a measured volume of pieces
30 of ice from the plurality of pieces of ice, transferring the volume of pieces of ice to
the compression chamber in the compression apparatus, compressing the
volume of pieces of ice in the compression chamber to form the block of ice.



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7. A method according to claim 6 wherein compressing the measured volume of pieces of ice includes a ram in the compression chamber moving from a retracted position to a part extended position to reduce the measured volume of pieces of ice in the compression chamber to form the block of ice.

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8. A method according to claim 7 wherein the measured volume is compressed by about 60%.

9. A method according to claims 7 and 8 wherein the block of ice formed by the compression is cylindrical.

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10. A method according to claim 7 including discharging the block of ice from the compression chamber by moving the ram from the part extended position to a full extended position.

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11. A method according to claim 8 including enclosing the discharged block of ice in a receptacle to facilitate transporting the block of ice.



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