

March 4, 1941.

W. C. PFEIL

2,234,129

ICE CUTTING DEVICE

Filed Aug. 3, 1940

2 Sheets-Sheet 1

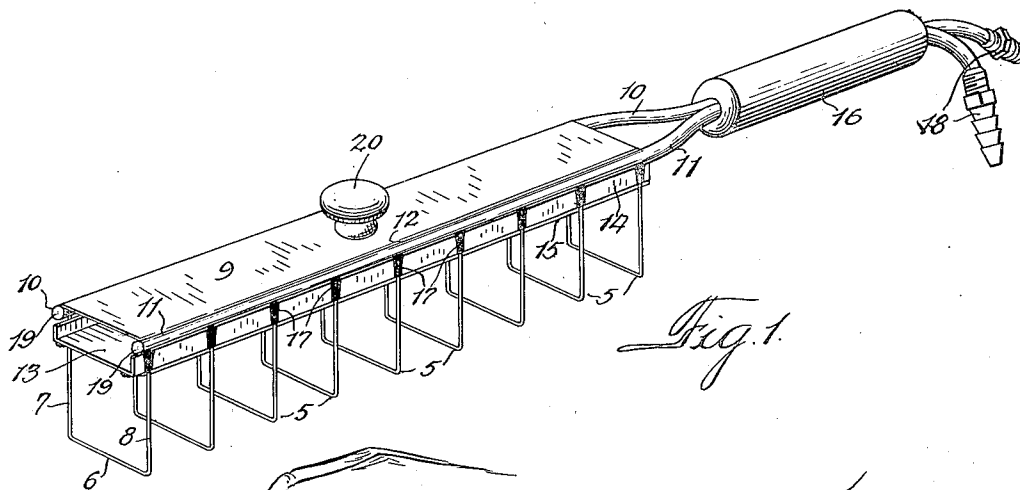


Fig. 1.

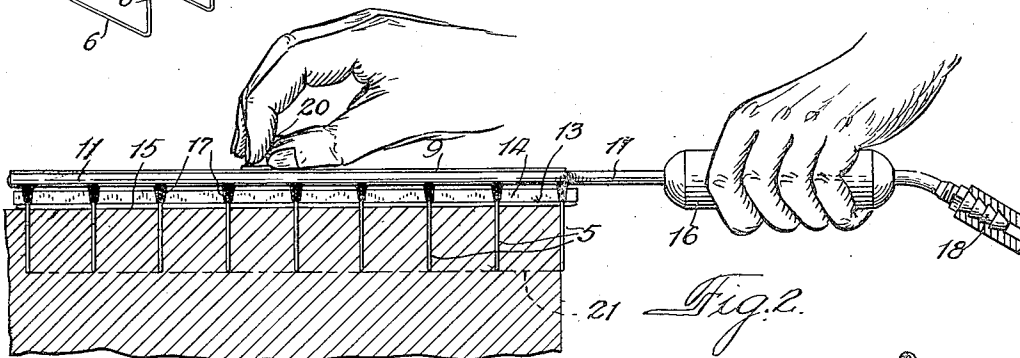


Fig. 2.

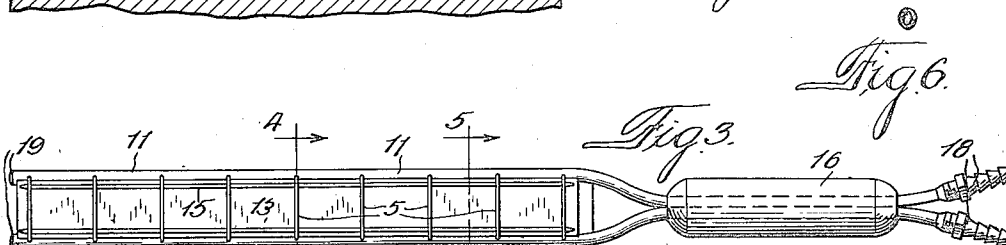


Fig. 6.

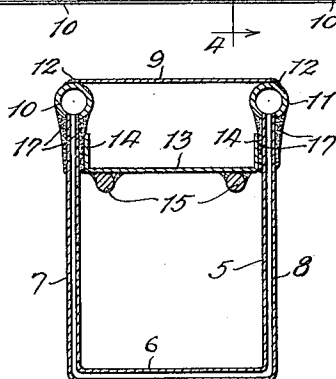


Fig. A.

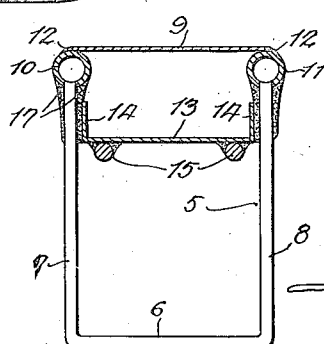


Fig. 5.

Inventor.

William Carl Pfeil:

By: Thiess, Olsen & Mecklenburger.
Attys.

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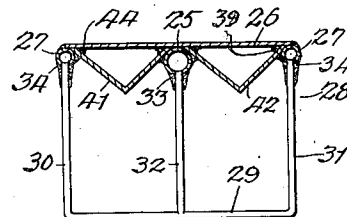
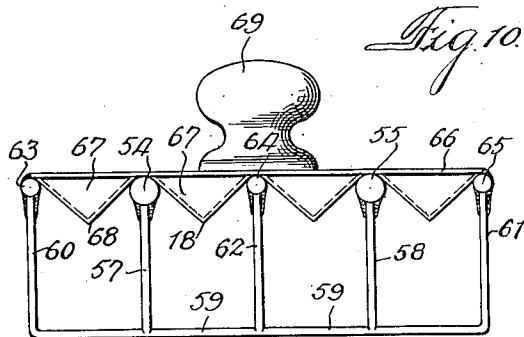
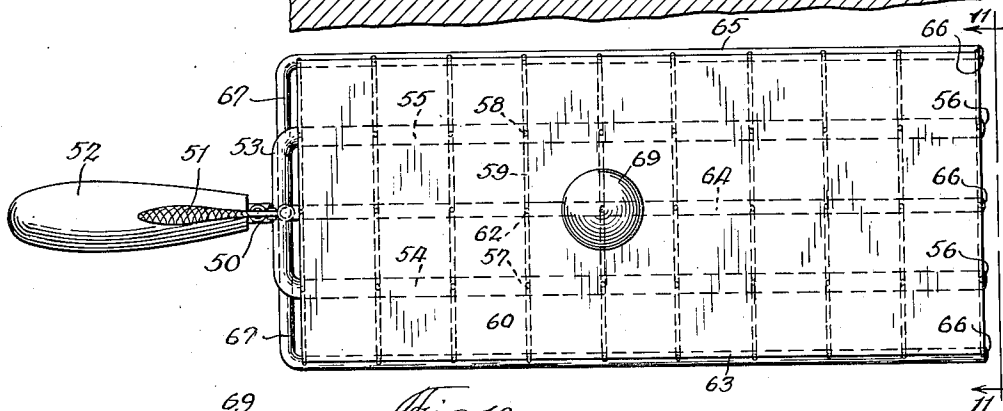
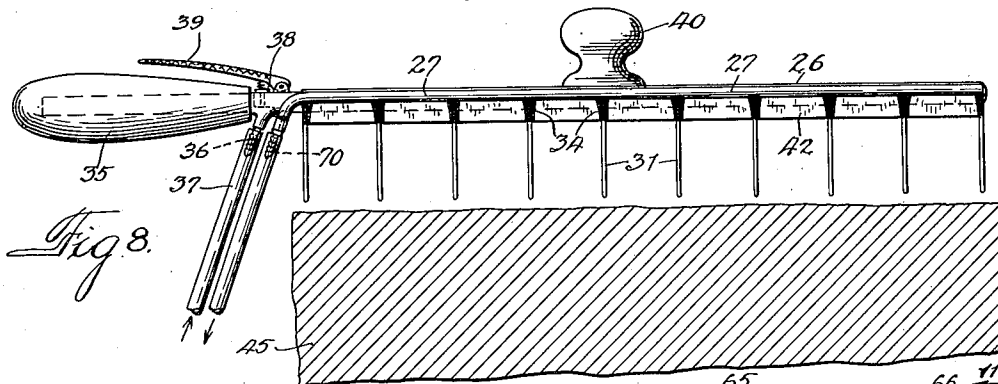
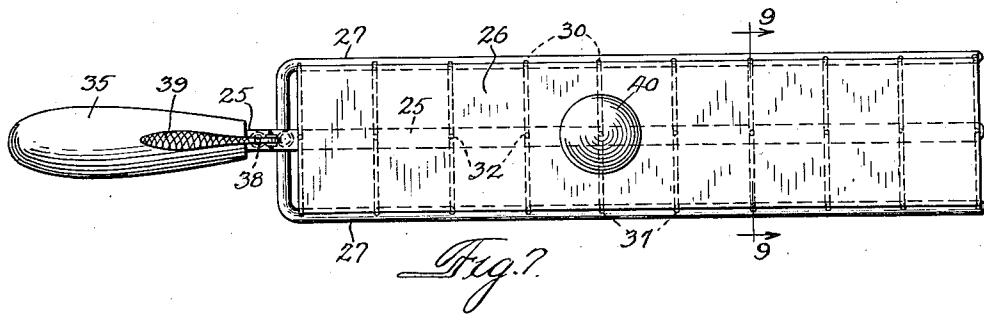
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ICE CUTTING DEVICE

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2 Sheets-Sheet 2



Inventor:
William Carl Pfeil:
By: Thiess, Olson & Mucklenburger.
Attys.

UNITED STATES PATENT OFFICE

2,234,129

ICE CUTTING DEVICE

William Carl Pfeil, Chicago, Ill.

Application August 3, 1940, Serial No. 350,907

17 Claims. (Cl. 62—112)

This invention relates to a new and novel device for cubing ice and more particularly to a device of this type adapted for use as a hand tool capable of conveniently and quickly producing small quantities of ice cubes when desired.

Ice cubing machines are well known but they are large, relatively expensive and produce quantities greatly in excess of the requirements of many users of cubed ice. Although electrically heated machines have been suggested which may be readily used wherever electric current is present, they have been unsuccessful because they are too slow in operation and the wires constantly break at the point where they are cooled by contact with the ice as well as chilled as soon as touched by the ice. This results in periodic heating and chilling and a slowing up of the operation. Where heated fluid has been used, a ready source of supply sufficient to operate the machine has not always been available, and consequently, the expense of securing the source has increased the cost of installation. Where a considerable quantity of cubes are used, the additional cost has not been a problem, because a machine heated by a fluid medium operates more efficiently and rapidly, and provides regularly formed cubes. However, many users of cubed ice cannot afford the cost of either the machine or the additional cost of a source of supply and are forced to purchase their requirements in small quantities already cubed and at a relatively high price.

An object of this invention is to provide an ice cubing device in the form of a hand tool adapted to meet the requirements of users of small quantities of cubed ice, the same being designed for quick attachment to a generally available hot water spigot or equivalent source of heat supply whereby the cutting elements will be quickly and adequately heated to effect a quick cutting operation by melting the ice, the tool being constructed so that it may be easily used and made available for operation at any convenient location for the block of ice.

A further object of this invention is to provide a device of this type that may be provided as a hand tool capable of ready and easy use and assure uniform cutting so that the cubes will be uniform in size and the uniformity of the cake of ice being cut maintained as said cubes are cut therefrom so that the cake will not be de-shaped to cause waste or create difficulty in securing uniform cubes during subsequent operations.

A still further object of the invention is to pro-

vide a device of this type that may produce a cut of uniform depth throughout the area of the cut for each operation so that all the cubes will be of the same size and will not be smaller or larger at opposite ends because the tool could not be forced to cut into the ice with the same pressure throughout the area of the cut.

A further object of the invention is to provide a hand tool of the type described for cubing ice which controls the depth of its cut by the pressure applied thereto during the cutting operation, there being means provided that assures the same pressure being applied to all the cutting elements and the same depth of cut throughout the entire area of the cut.

A still further object of the invention is to provide a device of this type for cutting ice that is simple, efficient and inexpensive to manufacture and operate so that the same may be used and operated generally by those who cannot afford to invest in larger installations and whose daily requirements are not substantial but do require the use of cubed ice.

Other objects and advantages of the invention will be apparent from the following detail description taken in connection with the accompanying drawings which form a part hereof.

In the drawings:

Figure 1 is a perspective view of ice cutting tool embodying the invention;

Fig. 2 is a side view of the same illustrating it in use;

Fig. 3 is a bottom plan view of the device;

Fig. 4 is an enlarged vertical section taken on line 4—4 of Fig. 3;

Fig. 5 is a similar view taken on line 5—5 of Fig. 3;

Fig. 6 illustrates a cross-sectional view of a modified form of cutting element that may be used to facilitate the vertical cutting action;

Fig. 7 is a top plan view of a modified form of ice cutting tool embodying the present invention;

Fig. 8 is a side elevational view of the same;

Fig. 9 is a vertical sectional view taken on line 9—9 of Fig. 7;

Fig. 10 is a further modified form of ice cutting tool embodying the invention; and

Fig. 11 is an end view of the same.

As illustrated in the drawings, the invention comprises a hand tool having a plurality of U-shaped cutting elements adapted to be arranged in a row so that their cross legs are at the bottom and their parallel legs extend upwardly in order to be secured to suitable

mounting means for the parts to form a unitary structure.

The mounting means comprises a plate 9 secured to inlet and outlet connections 10 and 11. In the construction illustrated, inlet connection 10 and outlet connection 11 may be welded, brazed or suitably soldered at 12 to plate 9 along its longitudinal edges. If so desired, a second mounting plate 13 may be positioned below plate 9 and between legs 7 and 8. Plate 13 may be provided with vertical side flanges 14 that are positioned parallel to legs 7 and 8 of cutting members 5. The distance between plate 13 and cross legs 6 of the cutting members may determine the depth of the cut of cutting members 5 when pressed downwardly upon a cake of ice as illustrated in Fig. 2. Plate 13 further serves to carry a pair of guide members 15 that will contact the upper surface of the block of ice and facilitate lateral movement of cutting members 5 when pulled sidewise by a handle 16. Flanges 14 provide means for rigidly securing the upper portion of vertical legs 7 and 8 to plate 13. Any suitable type of connection may be used. I find that a good connection may be made either by welding, brazing or soldering, as indicated at 17.

Although certain features and details of construction of the device herein disclosed lend themselves to a device employing electrical heated cutting elements, the drawings illustrate a construction employing a fluid heating medium which may be hot water or steam (superheated if desired). Consequently, cutting elements 5 are disclosed as U-shaped pipes in communication with inlet and outlet connections 10 and 11. These connections may be short tubular sections carrying handle 16 and having at one end nipples 18 or other equivalent members that admit of easy and rapid connection to a source of heated fluid supply. The other end of inlet and outlet connections 10 and 11 may be closed, as indicated at 19.

Cutting elements 5 are in the form of thin-walled tubes or pipes of small diameter through which the heated fluid readily flows. The thin-walled tubes will allow rapid heat transfer and, hence, an efficient and rapid cutting action. Inlet and outlet connections 10 and 11 are preferably of larger diameter than cutting elements 5. They may be of a diameter permitting of a rapid and uniform flow of heating medium through each cutting element 5. These inlet and outlet connections 10 and 11 are drilled to form small openings into which the upper ends of vertical legs 7 and 8 of cutting elements 5 are inserted. Soldered connections 17 may be extended sufficiently to permit the solder to flow around each leg 7 and 8, as illustrated in Fig. 4, and extend upwardly about tubes 10 and 11 to form a sealed mechanical joint between connections 10 and 11 and the upper ends of vertical legs 7 and 8 of cutting elements 5. It will be noted that the second plate 13 below plate 9 advantageously provides wall surface at the upper ends of vertical legs 7 and 8 that will form a foundation for building up sealed connections 17, so that all of the parts of the tool, herein disclosed, may be assembled in a simple and inexpensive manner into a strong rigid structure.

A knob 20 is secured to plate 9 and in a position with respect to this plate 9 to distribute pressure applied thereto uniformly and aid cutting elements 5 in entering a block of ice. The heat of cutting elements 5 will melt the ice. Consequently, cutting elements 5 will cut into

the ice until guides 15 engage the upper surface of the ice block. The depth of the cut is thereby controlled so that, when handle 16 pulls cutting elements 5 laterally, uniform cubes of ice will be formed. It is only necessary for handle 16 to be pulled laterally a distance equal to the space between cutting elements 5.

One of the features of the present invention resides in the shape of cutting elements 5 whereby a structure may be provided limiting the depth of the cut and thereby assuring that uniform cubes will be produced. By providing knob 20 in addition to handle 16, cutting elements 5 may be uniformly guided in their downward cutting action to assure that the depth of the cut will be the same for all elements. By applying a downward pressure at knob 20, the speed of cutting action is increased and the use of the tool greatly facilitated. Both hands of the operator may be used, as illustrated in Fig. 2. In this figure, line 21 represents the lateral cut effected by cross legs 6 of cutting elements 5 when handle 16 is pulled laterally. When a uniform downward cut is obtained by all cutting elements, as illustrated by line 21, and this handle 16 is pulled laterally, the horizontal cut made leaves the top of the ice block with a smooth and true horizontal upper surface to permit a second layer of uniform cubes to be cut, and so on. Hence, it is impossible to deshape the ice block when cutting one or more layers of cubes therefrom so that uniform cubes will be produced when cutting the next layer from the ice block.

The invention is not limited to cutting elements producing a single row of ice cubes. Figs. 7 to 9, inclusive, illustrate an alternative embodiment of the invention which is adapted to produce two rows of cubes by a single cut. In this embodiment, inlet connection 25 and outlet connection 27 are disposed along the longitudinal sides of a top plate 26 and are secured to the same by brazing, welding, soldering, or the like. Each cutting element 28 is formed out of a U-shaped tube or pipe having a lower horizontal leg 29 and two vertical legs 30 and 31. A pipe 32 lies between these vertical legs 30 and 31 and extends from inlet connection 25 to lower horizontal leg 29. Leg 29 may be drilled to provide a suitable opening to receive the lower end of pipe 32. Likewise, inlet connection 25 may be provided with an opening to receive the upper end of pipe 32. Any suitable form of sealed joint may be provided, as indicated at 33. Also, outlet connections 27 may be provided with openings that receive the upper ends of vertical legs 30 and 31, and a suitable seal may be formed, as indicated at 34.

The heated fluid flows from inlet pipe 25 through intermediate pipe 32 and outwardly in opposite directions through cross leg 29 to vertical pipes 30 and 31. Thus, a relatively uniform flow of heated fluid will be obtained. It is desirable to provide inlet pipe 25 of greater capacity than each outlet connection 27. One end of inlet connection 25 may extend a short distance beyond the first cutting element, as indicated by dotted lines in Fig. 8, to receive a handle 35. A nipple or like connection 36 may be formed at this end of inlet pipe 25 so as to readily receive a pipe 37 leading to a suitable source of heated fluid supply. A valve 38 may be inserted in this end of inlet pipe 25 so that a valve handle 39 may extend rearwardly and adjacent handle 35 to permit convenient control

of the flow of the heating medium through the cutting elements 28 each time they are placed upon a block of ice and pressed thereinto by pressure applied to a knob 40, as indicated in Fig. 8, the block of ice being designated 45. The depth of the cut may be limited by members 41 and 42 that may be conveniently formed as a V with the apex projecting downwardly between the vertical legs 31 and 32, and with their side edges extending upwardly to lie between or adjacent the meeting line of top plate 26 and the inlet and outlet connections 25 and 27, as illustrated in 39. The parts may be joined along this line either by brazing, welding or soldering, as indicated at 44.

By referring to Figs. 10 and 11, it will be observed that the capacity of the device disclosed may be further increased in a simple and effective manner without appreciable increase in cost of manufacture. The principle of construction and operation advantageously permits different capacity devices to be readily built and used and the same advantages and results obtained. In this modified form, flow of the heated fluid medium through inlet connection 50 is likewise controlled by a valve 51 (similar to valve 38) disposed adjacent handle 52, which inlet connection is divided by a cross branch 53 communicating with pipes 54 and 55. The opposite ends of pipes 54 and 55 are closed at 56. At spaced points intermediate their ends, pipes 54 and 55 receive the upper ends of two rows of vertical cutting pipes 57 and 58 (see Fig. 11). The lower ends of vertical cutting pipes 57 and 58 connect to lower cross cutting pipes 59, which at the outer ends are turned upwardly to form two outer rows of vertical cutting pipes 60 and 61. Between rows 57 and 58 is another row of cutting pipes 62. The upper ends of the pipes of rows 60, 61 and 62 are in fluid communication with a series of outlet pipes 63, 64 and 65, which are closed at the far ends as indicated at 66, and are in communication with each other at their opposite ends by a common cross connection 67. Heated fluid, the flow of which is controlled at handle 52 by valve 51, passes through inlet pipes 54 and 55, and then downwardly through pipes of both rows 57 and 58. The fluid turns at right angles in both directions at the bottom of these pipes and flows through pipes 59. The fluid then returns upwardly through pipes 60, 61 and 62, and through cross connection 67 to the outlet end terminating as a nipple 70, or the like. It will be remembered that the various parts described, such as the various vertical and horizontal cutting pipes, may be connected to each other and to the inlet and outlet headers in any suitable way. The only requisites are a fluid seal and a strong mechanical joint at the points of connection. Brazing, welding or soldering are suggested. This is true for any of the forms of invention herein disclosed.

It is true that simplicity of construction and cheapness of manufacture are also factors to be considered, but a substantially rugged mechanical structure is desirable due to the use to which the device will be put.

In the form shown in Figs. 10 and 11, the inlet and outlet headers 54 and 55, and 63 to 65, inclusive, are rigidly connected in a unit in proper spaced relation by a plate 66 or any equivalent member, while the various rows of vertical cutting elements 57, 58, 60, 61 and 62 have V members 67 mounted therebetween with their apices

68 pointed downwardly to limit the depth of the cut when pressure is applied upon a knob 69. Thus, cubes or smaller pieces of ice of uniform dimension are cut, it being kept in mind that the height of the cube cut will be controlled by the distance between apices 68 and horizontal cutting elements 59 and the width and depth will be controlled by the spacing of the vertical cutting elements. Hence, a device may be constructed to cut pieces of predetermined dimensions and even predetermined shapes. I do not intend to limit the final product to pieces that are exactly cubical and do not intend that the term "cubing," as used herein, shall be interpreted to mean only a final product of cubes. I intend that this term shall extend generally to a reducing of a cake of ice into smaller pieces.

From the foregoing description of the variant embodiments of the invention as disclosed herein, it will be obvious that the invention is directed to certain novel features that may be advantageously employed in an ice cubing device designed for use as a hand tool so that cubes may be readily produced that are all of uniform size, thereby not only having the benefits of such uniformity in the cubes cut, but also maintaining thereby a uniformly shaped block of ice as it is being reduced into smaller pieces so as to prevent any resultant irregularity in subsequent cutting operations. I consider it important that each cutting operation will be uniform so that the shape of the ice block will not be gradually destroyed to prevent subsequent uniform cuttings.

I do not desire to be limited to the exact shape of the cutting elements as long as they are formed to permit the depth of their cut being controlled. Nor do I intend being limited to the exact head construction that I have shown for carrying these cutting elements or to the exact method disclosed of connecting the cutting elements, either to the inlet and outlet connections or to the parts forming the head construction.

It will be noted that providing the handle in substantially the same plane as this head construction and above the cutting area of the cutting elements permits the device to be easily gripped and accurately used with little effort by the operator. A uniform cut will always be assured.

The cutting elements may be made of any desirable cross section. They may be circular in cross section, as shown particularly in Figs. 4 and 5, or they may be slightly oval in cross section, as shown in Fig. 6, in order to facilitate the downward cutting action if the major axis is vertical, or to facilitate the lateral cutting action if the major axis is horizontal.

Without further elaboration, the foregoing will so fully explain the gist of my invention that others may, by applying current knowledge, readily adapt the same for use under varying conditions of service, without eliminating certain features, which may properly be said to constitute the essential items of novelty involved, which items are intended to be defined and secured to me by the following claims.

I claim:

1. A hand tool for cutting a block of ice into small pieces comprising a plurality of U-shaped pipes for conducting a heating medium there-through, said U-shaped pipes being arranged in predetermined spaced relation, inlet and outlet connections for said pipes, means for securing said pipes and said connections together to form

a rigid unitary structure, and means for limiting the downward cut of each pipe into a block of ice whereby all said pipes cut into the ice a uniform distance.

2. A tool for cutting a block of ice into small pieces comprising a plurality of U-shaped pipes for conducting a heating medium therethrough, said U-shaped pipes being arranged in predetermined spaced relation, inlet and outlet connections to which said U-shaped pipes are connected, and means for limiting the depth said U-shaped pipes may enter a block of ice when cutting therein whereby to produce therefrom small pieces of predetermined size and shape.

3. A tool for cutting a block of ice into small pieces comprising a plurality of U-shaped pipes for conducting a heating medium therethrough, said U-shaped pipes being arranged in predetermined spaced relation, inlet and outlet connections to which said U-shaped pipes are connected, and means secured to said U-shaped pipes and said inlet and outlet connections for distributing a pressure applied upon the tool uniformly to all of said U-shaped pipes and for limiting the depth of cut of the same in a block of ice.

4. A tool for cutting a block of ice into small pieces comprising a plurality of heated U-shaped cutting elements, means for positioning said U-shaped cutting elements in a predetermined spaced relation, means for applying substantially the same downward pressure upon all said U-shaped cutting elements, and means for limiting the depth of cut of the same in a block of ice.

5. A tool for cutting a block of ice into small pieces comprising a plurality of heated U-shaped cutting elements, means for positioning said U-shaped cutting elements in a predetermined spaced relation, means for applying substantially the same pressure upon all said U-shaped cutting elements to effect a substantially uniform downward cut of the same in a block of ice, and a handle for moving said U-shaped cutting elements laterally through the block.

6. A tool for cutting a block of ice into small pieces comprising a plurality of heated U-shaped cutting elements, means for positioning said U-shaped cutting elements in a predetermined spaced relation, the upper ends of the parallel legs of each U-shaped cutting element being secured to said means whereby all said cutting elements are connected to form a rigid unitary structure, means for limiting the depth of the downward cut of said cutting elements into a block of ice, and a handle positioned above said cutting elements and extending outwardly therefrom for moving said cutting elements laterally through said block.

7. A tool for cutting a block of ice into small pieces comprising a plurality of heated U-shaped pipes arranged in predetermined spaced relation, a head to which the upper ends of said U-shaped pipes are connected, said head including a source of heat supply for said U-shaped pipes, manual gripping means for applying downward pressure upon said head and said U-shaped pipes, said head limiting the downward cut of said U-shaped pipes, and a handle extending outwardly from said head for moving said U-shaped pipes laterally after said downward cutting.

8. A tool for cutting a block of ice into small pieces comprising a plurality of heated U-shaped pipes arranged in predetermined spaced relation, in inlet connection in communication with the

upper ends of the vertical legs along one side of the row of said U-shaped pipes, an outlet connection for the upper ends of the vertical legs along the other side of the row of said U-shaped pipes, means for securing said inlet and outlet connections together, connections for attaching said inlet and outlet connections to a source of heat supply, and means disposed between said vertical legs to define the cutting depth of the lower horizontal cross leg of each U-shaped pipe, said means being secured between said vertical legs a predetermined distance above said lower horizontal cross legs.

9. A tool for cutting a block of ice into small pieces comprising a plurality of cutting elements, each having a plurality of vertical legs and a connecting horizontal lower leg, means for arranging said cutting elements in predetermined spaced relation, and means for limiting the downward cut of said horizontal lower legs into a piece of ice whereby all said horizontal lower legs enter the ice substantially the same distance.

10. A tool for cutting a block of ice into small pieces comprising a plurality of cutting elements, each having a plurality of vertical legs and a connecting horizontal lower leg, means for arranging said cutting elements in predetermined spaced relation, means for applying a downward pressure upon said cutting elements, means for limiting the downward cut of said horizontal lower legs into a block of ice whereby all said horizontal lower legs enter the block substantially the same distance, and means for moving said vertical legs and horizontal legs laterally after said downward cut whereby to sever the portion penetrated by said cutting elements into small pieces of predetermined size.

11. A tool for cutting a block of ice into small pieces comprising a plurality of cutting elements, each having vertical legs and a horizontal leg, means for conducting a heat supply downwardly through certain of said vertical legs of said cutting elements, means for connecting said certain vertical legs to said horizontal legs to cause the heat supply to travel through said horizontal legs, the other vertical legs being connected to said horizontal legs of said cutting elements to cause the heat supply to travel upwardly through the same, means for limiting the downward cut of said horizontal legs when pressed against a cake of ice, and means for moving all said legs laterally in the cake of ice after the downward cutting is completed.

12. A tool for cutting a block of ice into small pieces comprising a pair of horizontal pipes connected in series having a handle at one end, means connecting together said pair of horizontal pipes to secure the same into a rigid unit throughout substantially the greater portion of their length, means for connecting a source of heated fluid supply to one of said pair of horizontal pipes, and a plurality of downwardly projecting U-shaped cutting pipes in fluid communication with said pair of horizontal pipes.

13. A tool for cutting a block of ice into small pieces comprising a pair of horizontal pipes connected in series having a handle at one end, means connecting together said pair of horizontal pipes to secure the same into a rigid unit throughout substantially the greater portion of their length, means for connecting a source of heated fluid supply to one of said pair of horizontal pipes, a plurality of downwardly projecting U-shaped cutting pipes in fluid communication with said pair of horizontal pipes, and a valve

adjacent said handle arranged to be operated to control the flow of the heated fluid through said horizontal pipes and said U-shaped cutting pipes when they move downwardly and then laterally through a block of ice.

14. A tool for cutting a block of ice into small pieces comprising a pair of horizontal pipes having a handle at one end, means connecting together said pair of horizontal pipes to secure the same into a rigid unit throughout substantially the greater portion of their length, means for connecting a source of heated fluid supply to said pair of horizontal pipes, a plurality of downwardly projecting U-shaped cutting pipes in fluid communication with said pair of horizontal pipes, means for applying a downward pressure upon said U-shaped cutting elements, and a valve adjacent said handle arranged to be operated at the time said last means and said handle are gripped whereby to control the flow of said heated fluid supply as said cutting elements are pressed downwardly into a block of ice by said last means and are then moved laterally through the block of ice by said handle.

15. Ice cutting equipment for slicing a layer of cubes from a block of ice comprising a base, a plurality of heated cutting elements supported by said base, means for limiting the depth of the cut of said cutting elements to a distance equal to the thickness of the layer to be cut from said block, said cutting elements and said block being thereafter movable relative to each other in a direction that is transverse to the first cut, said means engaging the outer surface of said block to effect cutting of a uniform layer of cubes from said block by said last movement.

16. Ice cutting equipment for slicing a layer of cubes from a block of ice comprising a base,

a cutting grid including a plurality of pipes through which a heating medium flows, there being means upon said base for mounting said cutting grid thereon so that relative movement between said pipes and the block of ice in two different directions will effect two separate cutting operations, connections for supplying said heating medium to said pipes, and means also carried by said base to engage the outer surface of the block of ice for limiting the extent said pipes enter the block of ice upon the first cutting operation, said last means continuing to engage the outer face of the block during the second cutting operation to limit the layer cut therefrom to a predetermined depth.

17. Ice cutting equipment for slicing a layer of small pieces from a block of ice comprising a frame member, headers secured to said frame member, connections for supplying a heating medium to said headers, a plurality of cutting pipes communicating with said headers and through which said heating medium flows, said cutting pipes being so supported by said frame member that relative movement between said cutting pipes and a block of ice effects a first cutting operation by said pipes, and means for limiting said first cutting operation to a uniform depth, said means extending substantially lengthwise of said grid so that the outer face of the block will engage said means whereby subsequent relative movement between said cutting pipes and the block in a direction transverse to the first movement but along said means will effect a second cutting operation slicing a layer of small pieces from said block of a thickness equal to the depth of the first cutting operation.

WILLIAM CARL PFEIL.