March 19, 1929. R. T. GRAY 1,706,227

APPARATUS FOR SCORING ICE

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Fig 1

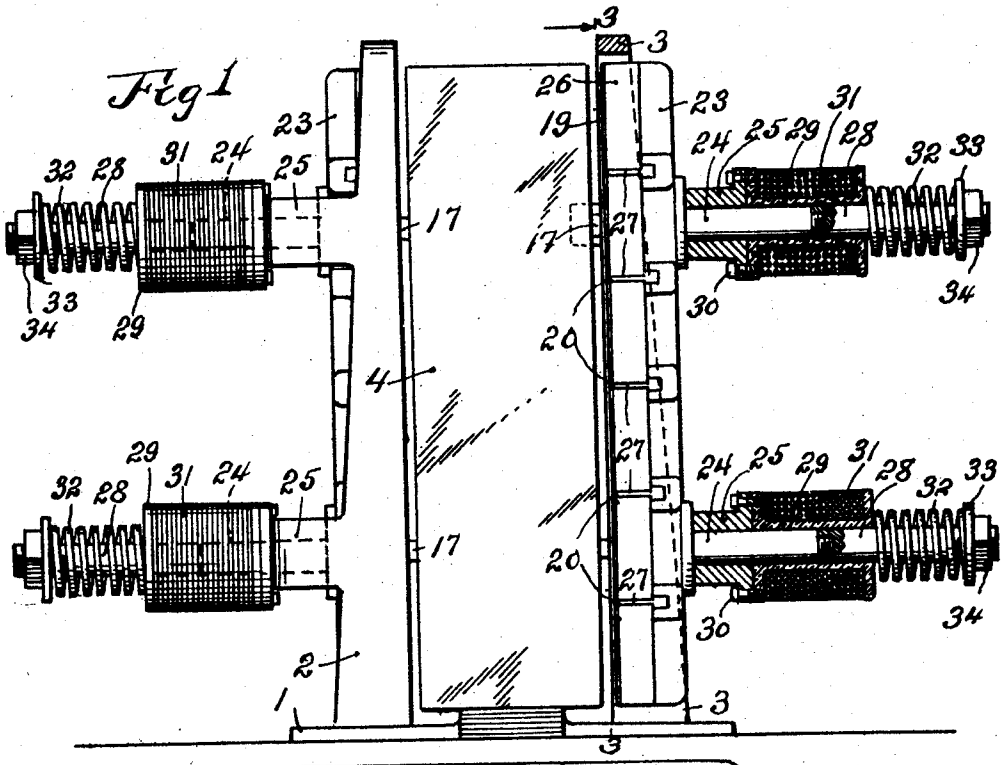
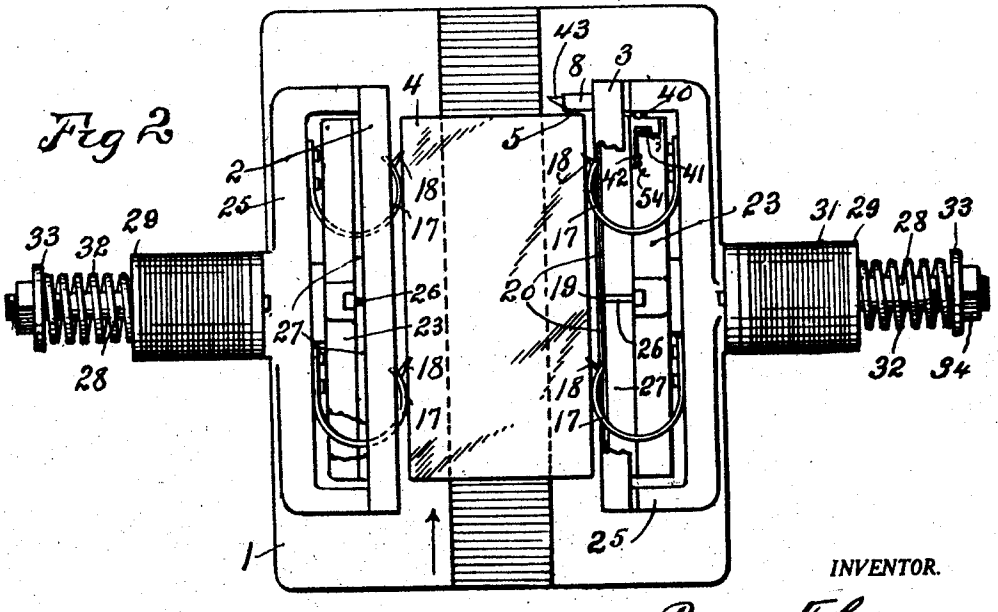


Fig 2



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Witness:

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APPARATUS FOR SCORING ICE

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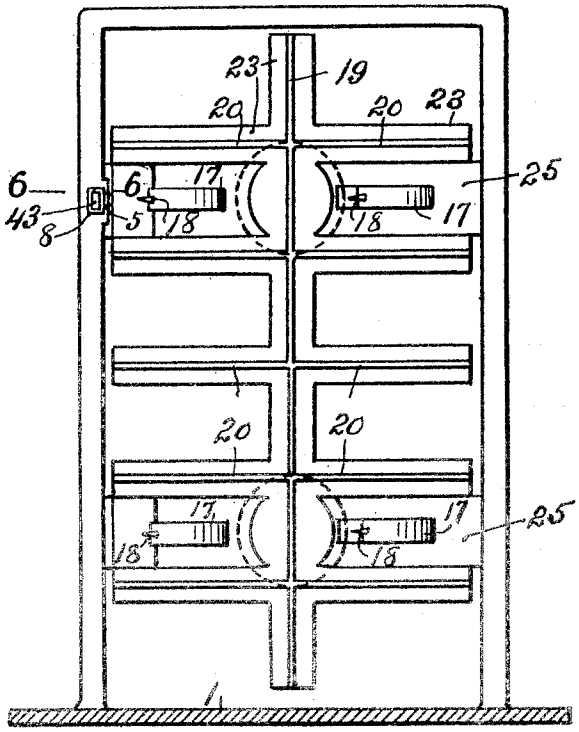


Fig 3

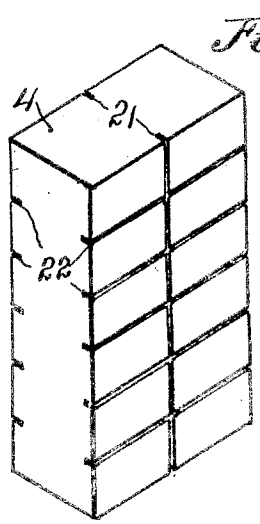


Fig 4

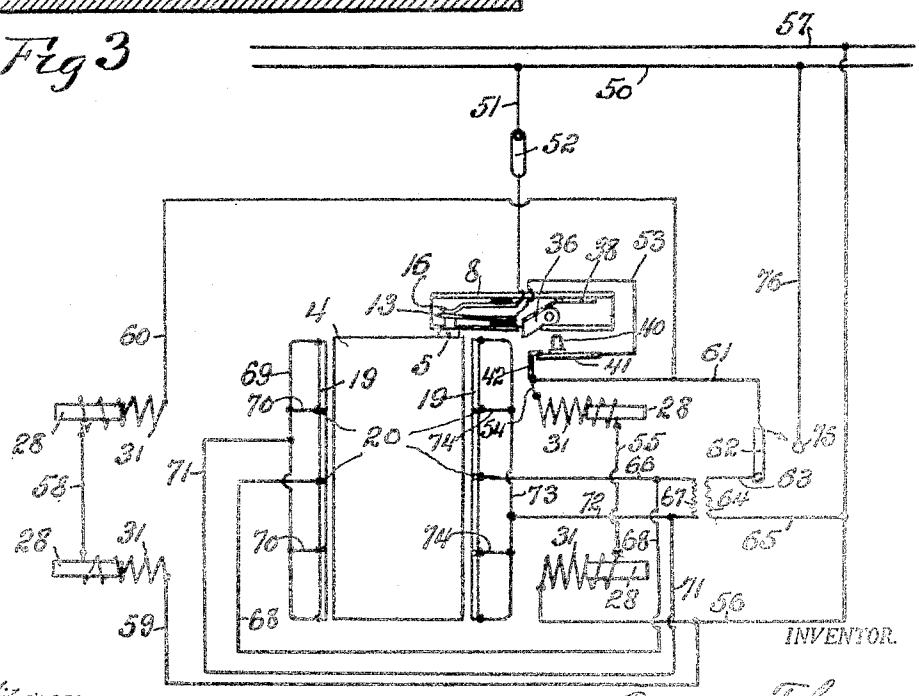


Fig 5

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APPARATUS FOR SCORING ICE

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Fig 6

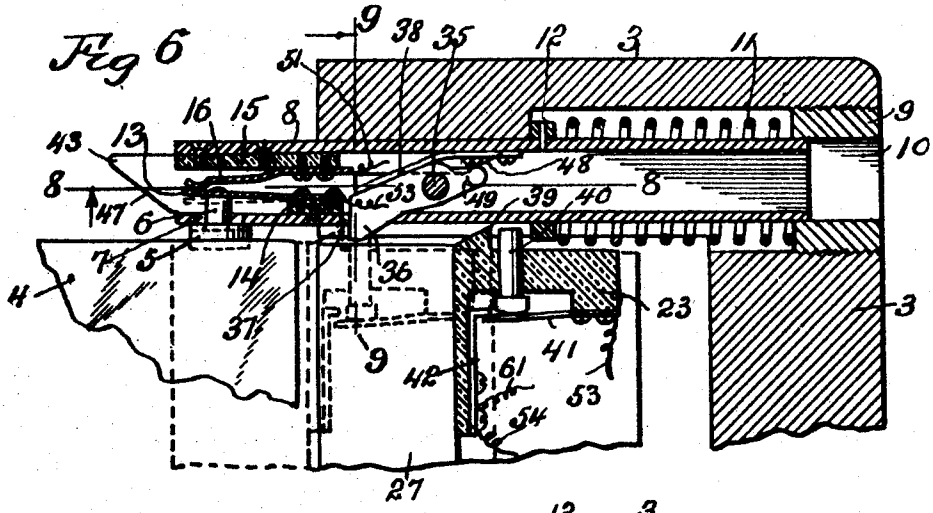


Fig 7

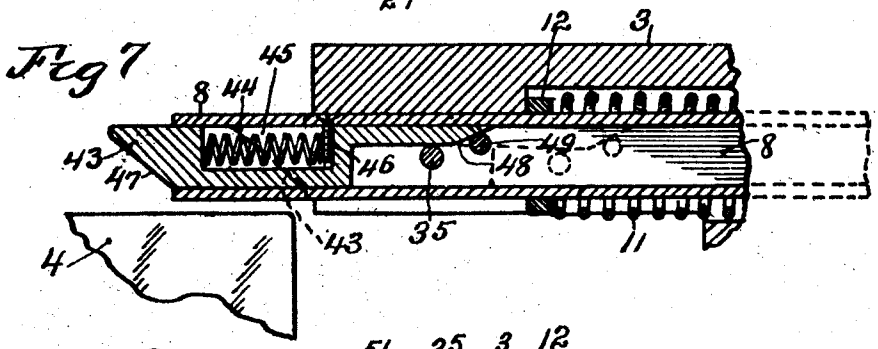


Fig 8

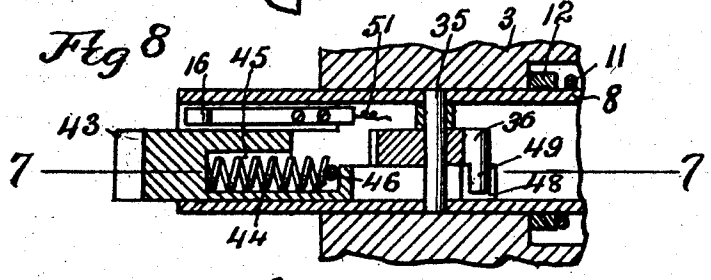
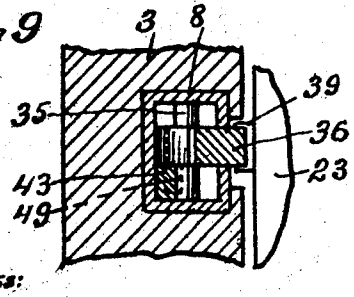


Fig 9



Witness:

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Patented Mar. 19, 1929. 1,706,227

UNITED STATES PATENT OFFICE.

ROSCOE T. GRAY, OF BROOKFIELD, MISSOURI.

APPARATUS FOR SCORING ICE.

Application filed February 21, 1927. Serial No. 169,866.

My invention relates to improvements in apparatus for scoring ice.

One of the objects of my invention is to provide a new apparatus for scoring ice, which utilizes heat for effecting the scoring, which is simple, economically and efficiently operated, and which is rapid in its operation.

Another object of my invention is to provide a novel apparatus for scoring blocks of ice, in a manner such that each block may be accurately subdivided in a smaller block of like size.

Another object of my invention is the provision of a novel apparatus for scoring ice which is simple, relatively cheap, strong, durable, not liable to get out of order, which is automatic in its operation, and in which the scoring mechanism is set into operation by the block of ice which is to be scored.

The novel features of my invention are hereinafter fully described and claimed.

In the accompanying drawings, which illustrate the preferred embodiment of my improved apparatus,

Fig. 1 is a side view, partly in elevation and partly in vertical section of my improved ice scoring apparatus shown operatively engaging a block of ice.

Fig. 2 is a plan view, partly broken away, of the same.

Fig. 3 is a section on the line 3—3 of Fig. 1.

Fig. 4 is a perspective view, reduced, of a block of ice which has been scored with my improved apparatus.

Fig. 5 is a diagrammatic view of the electrical circuits employed.

Fig. 6 is a enlarged fragmental horizontal section on the plane of the line 6—6 of Fig. 3.

Fig. 7 is a section on the line 7—7 of Fig. 8.

Fig. 8 is a section on the line 8—8 of Fig. 6.

Fig. 9 is a section on the line 9—9 of Fig. 6.

Similar reference characters designate similar parts in the different views.

The apparatus is provided with a suitable base 1 from which upwardly extend two standards 2 and 3, which are spaced apart and are adapted to receive between them a block of ice 4, which is to be scored and which rests upon the base 1.

The block of ice 4 is adapted to be slid on the base 1 between the standards 2 and 3 in the direction indicated by the arrow in Fig. 2. When the block 4 has been slid to the scoring position, shown in Figs. 2 and 6, it will contact with the head 5 of a button, the stem 6 of which, Fig. 6, extends through a slot 7 provided in the adjacent side of a horizontally reciprocative tube 8, which is slidably mounted in the standard 3 and in a threaded tube 9 fitted in said standard and having a hole 10 in which said tube 8 is slidable.

A coil spring 11 encircles the tube 8 and bears at one end against a collar 12 fastened on said tube, and at its other end bearing against the threaded tube 9. The tension of the spring 11 normally forces the tube 8 to the projecting position shown in solid lines in Fig. 6, in which position the button 5 is adapted to have contact with the advanced side of the ice block 4, which forces the head 5 of the button against the tube 8, thereby holding the ice block from forward movement.

The stem 6 is fastened to and movable with a flat spring contact plate 13, Figs. 5 and 6, which is fastened at one end, in the tube 8, to an insulation block 14, which is fastened to the adjacent side of the tube 8. To the opposite side of the tube 8 is fastened an insulation block 15, to which is attached one end of a contact spring plate 16, Figs. 5 and 6, against which is adapted to strike the contact plate 13, when the ice block 4 has forced the button 5 to the holding position shown in solid lines in Fig. 6.

When the button is not depressed, the plate 13 will force it to the position shown in dotted lines in Fig. 6, in which position the plate 13 will be out of contact with the contact plate 16, thus breaking the circuit in which the plates 13 and 16 are located. Said plates form a normally open circuit closure.

For holding the ice block 4 from retraction from the scoring position, shown in Fig. 2, four horizontally disposed U-shaped spring plates 17, Figs. 2 and 3, are mounted on each standard 2 and 3 to which they are secured at one set of ends, the other set of ends being respectively provided with inclined spurs 18, which are adapted to permit the ice block 4 to slide in one direction, indicated by the arrow in Fig. 2, but which

engage the block, as shown in Fig. 2, and hold it against the button 5, when the latter is in the path of the ice block.

Each of the standards 2 and 3 has horizontally reciprocative therein, an ice scoring member comprising preferably a conductive element comprising, in the form shown, a vertical portion 19, which centrally intersects and is joined electrically to horizontal arms 20, which are spaced equally distant apart, and the upper and lower ones of which are spaced the same distance from the top and bottom respectively of the ice block 4.

The portions 19 and 20 of each scoring member are each of relatively small cross sectional area, whereby the resistance to the electrical current, which is passed through them, will highly heat them, so that, when applied to a block of ice, they will quickly melt the ice along narrow strips thereof, thus scoring the ice by forming in each side of the block 4, Fig. 4, vertical grooves 21 and horizontal grooves 22 in opposite sides respectively of the ice block. The vertical portions 19 and the horizontal portions 20 of each scoring member are disposed respectively directly opposite to the corresponding portions of the other scoring member. The grooves 22, therefore, in one side of the block will be respectively in the same horizontal planes as the grooves 22 in the opposite side of the block. The groove 21, in each side of the block will be in the same vertical plane as the other groove 21.

By utilizing the grooves 21 and 22, the ice block 4 may be divided into equal parts by means of an ice pick operated in the usual well known manner.

For respectively supporting the two scoring members 19—20, the following described mechanism may be employed. Two vertical supporting members 23, which are horizontally movable toward and from each other in the standards 2 and 3 respectively, and which are each provided with two parallel outwardly extending non-magnetic stems 24, disposed one above the other, and which are respectively longitudinally slidable in two yokes 25 disposed one above the other, with which each standard 2 and 3 is provided.

Mounted respectively on the adjacent sides of the supporting members 23 are thin plates 26, which are vertically disposed, and which are of insulating material, and to the adjacent edges of which are secured the vertical portions 19 of the scoring members.

Similar horizontal insulating plates 27 similarly support the portions 20 of the scoring members, said plates 27 being fastened respectively to the supporting members 23, Figs. 1 and 2.

For forcing the supporting members 23 toward each other, so that the scoring members 19—20 may operatively engage the ice block 4, the non-magnetic stems 24 are respectively fastened at their outer ends, as by threaded connections, Fig. 1, with the inner ends of four magnetic cores 28, which are respectively longitudinally reciprocative in four spools 29, which are respectively fastened at their inner ends, as with bolts 30, to the outer sides of the yokes 25.

Respectively wound on the spools 29 are magnet windings 31, which with the spools 29 form solenoids. When the windings 31 are energized, they will respectively draw inwardly the cores 28, thereby forcing the supporting members 23 toward each other, and forcing the scoring members against the ice block 4, when the latter is in the scoring position shown in Figs. 1 and 2.

For automatically withdrawing the scoring members from the ice block, after the scoring operation has been completed, and the current has been cut-off from the windings 31, I provide four coil springs 32 respectively encircling the cores 28 and bearing at their inner ends respectively against the spools 29 and bearing at their outer ends respectively against washers 33 respectively mounted on the cores 28 and against the outer sides of which bear nuts 34, respectively mounted on the threaded outer ends of the cores 28.

For withdrawing the tube 8 out of the path of the ice block 4 after the block has been scored, and also to break the circuit in which are located the solenoid windings 31, there is pivoted on a vertical bolt 35 in the tube 8 a pawl 36, which at its forward end extends through a slot 37, Fig. 6, in the inner side of the tube 8.

The pawl 36 is normally forced into the slot 37 by a spring 38 fastened to the inner side of the tube 8. The adjacent supporting member 23 is provided adjacent to the tube 8 with an outwardly extending shoulder 39 having an inclined front side which, when the member 23 is forced to the scoring position, shown in dotted lines in Fig. 6, forces the pawl 36 into the tube 8. After the shoulder 39 has passed the pawl 36, the latter drops behind the shoulder 39, and in so doing engages the outer end of a horizontal pin 40, which is longitudinally slidable in the adjacent member 23, and the inner end of which bears against a spring contact plate 41, which is normally in electrical contact with a contact plate 42 mounted on the adjacent member 23. When the pawl 36 strikes the pin 40 the pawl, due to the spring 38 which is stronger than the spring plate 41, forces the pin 40 inwardly, thereby disconnecting the contact plate 41 from the contact plate 42, thus breaking the circuit, at this point, in which are located the solenoid windings 31.

The windings being de-energized, the springs 32 will force the cores 28 outwardly

to the positions shown in Figs. 1 and 2, thereby drawing the supporting members 23 outwardly to the positions shown in Figs. 1 and 2 and in solid lines in Fig. 6, at which time the shoulder 39, being engaged with the pawl 36 forces the latter, and with it the tube 8 rearwardly, until the forward end of the tube 8 is withdrawn to a position in which the button 5 will be disengaged from the ice block 4, and the tube 8 will be withdrawn from the path of the ice block, when the latter is moved from between the standards 2 and 3 in the direction indicated by the arrow in Fig. 2.

For the purpose of disengaging the pawl 36 from the shoulder 39 by the outward withdrawal of the ice block 4, after it has been scored, and to permit the spring 11 to again force the tube 8 to its initial position shown in Fig. 6, there is longitudinally slidable in the tube 8 a bolt 43, Figs. 2, 6, 7 and 8, the forward end of which projects beyond the tube 8, and which is normally held in such projecting position by a coil spring 44, Figs. 7 and 8, which is located in a recess 45 provided in the bolt 43, and which has its forward end bearing against the bolt 43, and its rear end bearing against a screw 46, mounted in the tube 8 and extending into the recess 45, and which serves to limit the outward movement of the bolt 43. The outer end and inner side of the bolt 43 has an inclined surface 47, which, when the tube 8 is withdrawn out of the path of the ice block, is disposed in the path of the ice block, whereby when the ice block is removed in the direction indicated by the arrow in Fig. 2, the block will strike the inclined surface 47 of the bolt 43, thereby forcing the bolt inwardly in the tube 8.

The rear end of the bolt 43 is provided with an inclined surface 48, Figs. 6, 7 and 8, which, when the bolt 43 is in the projecting position engages a downwardly extending pin 49 on the under side and rear end of the pawl 36. When the block of ice forces the bolt 43 rearwardly, the inclined surface 48 by engaging the pin 49, will swing the pawl 36 out of engagement with the shoulder 39, upon which the spring 11 will force the tube 8 to its normal projecting position, shown in Fig. 6, as soon as the ice block has been fully withdrawn from in front of the tube 8.

Referring to Fig. 5, 50 designates a feed wire connected to any source of electric energy, not shown, as a dynamo or storage battery.

51 designates a conductor, which includes a cut-out switch 52, and which connects the feed wire 50 with the spring contact 16. A conductor 53 connects the spring contact 13 with the spring contact 41. A conductor 54 connects the contact 42 with one terminal of one of the solenoid windings 31, the other terminal of which is connected by a conductor 55 with one terminal of another one of the windings 31, the other terminal of which is connected by a conductor 56 with the return conductor 57 which is connected to the electrical supply source above referred to.

The other two solenoid windings 31 are connected at one set of their terminals to a conductor 58, the other set of terminals being connected respectively to conductors 59 and 60. The conductor 59 is connected to the conductor 56. The conductor 60 is connected to a conductor 61 which connects the contact 42 with a switch 62, which is permanently connected to a conductor 63 connected to one terminal of the primary winding 64 on an induction coil, the other terminal of which is connected by a conductor 65 with the conductor 56.

A conductor 66 connects one terminal of a secondary winding 67 of the induction coil to a central portion of one of the scoring members 19—20. A conductor 68 connects the conductor 66 with the central portion of the other scoring member 19—20. A conductor 69 has its ends connected to the ends of the portion 19 of one scoring member and is provided with branches 70 which connect with intermediate portions of said scoring member. A conductor 71 connects the conductor 69 with a conductor 72, which connects the other terminal of the winding 67 with a conductor 73, the ends of which connect with the ends of the portion 19 of the other scoring member. The conductor 73 has branches 74 respectively connecting with intermediate portions of the last named scoring member.

The switch 62 is adapted to be disconnected from the conductor 61 and to be brought into contact with the contact 75, which is connected by a conductor 76 with the feed conductor 50.

In the operation of the invention, the switches 52 and 62 being in the positions shown in Fig. 5, the ice block 4 is moved between the standards 2 and 3 on the base 1 into contact with the button 5, in which position it will be held by the teeth 18 of the U-shaped springs 17. The button 5 will be forced to the position shown in solid lines in Fig. 6, thereby bringing the contact plates 13 and 16 into engagement with each other, upon which current will pass from the feed conductor 50 through the conductor 51, switch 52, contact plates 16 and 13, conductor 53, contact plates 41 and 42, where the current will divide, a portion passing through the conductor 61, switch 62, primary winding 64, and conductors 65 and 56 to the return conductor 57. The other portion of the divided current will pass from the contact 42 through the conductor 54 adjacent winding 31, conductor 55 adjacent

winding 31, thence into conductor 56, wherein the current will again divide a portion passing to the return conductor 57, the other portion passing through the conductor 59, adjacent winding 31, conductor 58, the next adjacent winding 31, and conductor 60 to the conductor 61, after which it will follow the path already described to the return conductor 57.

The passage of the current through the windings 31 will energize these windings, thereby moving the cores 28 inwardly and as before described, bring the scoring members 19—20 against opposite sides respectively of the ice block 4, upon which the highly heated scoring members will melt the ice, thereby forming the grooves 21 and 22.

The scoring members will be heated by the currents induced in the secondary winding 67, which currents will pass through the conductor 66 and conductor 68 to the scoring members 19—20, from which the currents will return by the conductors 69 and 73 and their branches 70 and 74 and the conductors 71 and 72 to the other terminal of the secondary winding 67.

After the scoring members have been moved to a position in which the pawl 36 will drop behind the shoulder 39, Fig 6, the pawl will force inwardly the pin 40, thus separating the contacts 41 and 42 and breaking the circuit at that point whereby the coils 31 and the winding 64 will be de-energized and heating of the scoring members will cease.

The springs 32 will then withdraw the cores 28 to their initial positions, thereby withdrawing the scoring members from engagement with the ice block to their initial positions as has been described. The outward movement of the members 23 will cause the retraction inwardly, as described, of the tube 8, thus permitting the ice block to be removed, and in such removal the bolt 43 will be forced inwardly, thereby releasing the pawl 36 from the shoulder 39, upon which the spring contact 41 will again close the circuit through the contact 42, and the spring 11 will force the tube 8 forwardly to its initial position, and the button 5 being freed from the ice block will permit the spring contact 13 to break contact with the contact 16. The spring 44 will force the bolt 43 to its projecting position, and the parts will be ready for another block of ice to be scored.

From the above description, it will be understood that the operation may be made continuous and automatically with the exception of placing and removing the ice blocks.

If it is desired to keep the scoring members 19—20 continuously heated, this may be effected by swinging the switch 62 into engagement with the contact 75, upon which the current will pass from the feed conductor 50 through the conductor 76, contact 75, switch 62, primary winding 64, conductor 63, and conductors 65 and 56 to the return conductor 57. The currents passing continuously through the winding 64 will constantly supply the scoring members with current by the means already described.

What I claim is:

1. In an ice scoring apparatus, two oppositely alined scoring members, means for heating said members, means for supporting a block of ice between said members, means by which said block controls the operation of said heating means, and means for bringing said members into contact with opposite sides respectively of said block.

2. In an ice scoring apparatus, two electrically conducted oppositely alined scoring members, means for electrically heating said members, means for supporting a block of ice between said members, means by which said block controls the operation of said heating means, and means for moving said members into and out of contact with opposite sides respectively of said block.

3. In an ice scoring apparatus, an electrically conductive scoring member, means for electrically heating said member, an electrically actuated means for moving said member in one direction with respect to its scoring position and including circuit controlling means for said heating means, for rendering said actuating means active or inactive and adapted to be operated by a block of ice which is being scored, means by which said block controls the operation of said controlling means, and means for moving said member in the opposite direction.

4. In an ice scoring apparatus, an electrically conductive scoring member, means for electrically heating said member, electrically actuated means for moving said member to the scoring position, and including a circuit closer controlling said heating means for rendering said actuated means active and inactive and adapted to be operated by the block of ice that is to be scored to close said circuit, and means for moving said member from the scoring position, after said member has effected the scoring operation.

5. In an ice scoring apparatus, an electrically conductive scoring member, means for electrically heating said member, electrically actuated means for moving said member to the scoring position including a normally open circuit closer controlling said heating means and a normally closed circuit closer, the normally open circuit closer being adapted to be closed by a block of ice which is to be scored, means by which said block controls the operation of said normally open circuit closer, means for opening the normally closed circuit closer when said mem-

ber has fully effected the scoring operation, means for moving said member from the scoring position when the normally closed circuit breaker has been opened, and means by which the latter is permitted to again close when the scoring member is fully retracted from the scoring position.

6. In an ice scoring apparatus, an electrically conductive scoring member, a secondary winding of an induction coil in circuit with said scoring member, a circuit including a normally open circuit closer, a normally closed circuit closer and the primary winding of said induction coil, electro-magnetic means in shunt with said primary winding and said normally closed circuit closer for forcing said member to its operative position, means for automatically retracting said member from said position, means by which a block of ice closes said normally open circuit closer when in position to be operated upon by said scoring member, movable means by which the last named means is normally forced to its operative position, means actuated by said forcing means upon its retraction for retracting said movable means from the operative position and for opening said normally closed circuit closer, and means actuated by said block when moved in the proper direction for releasing said movable means from said forcing means.

In testimony whereof I have signed my name to this specification.

ROSCOE T. GRAY.