April 15 , 1924. 1,490,308

E. BEDFORD

ICE SCORING MACHINE

Filed Oct. 23 1922 5 Sheets-Sheet 1

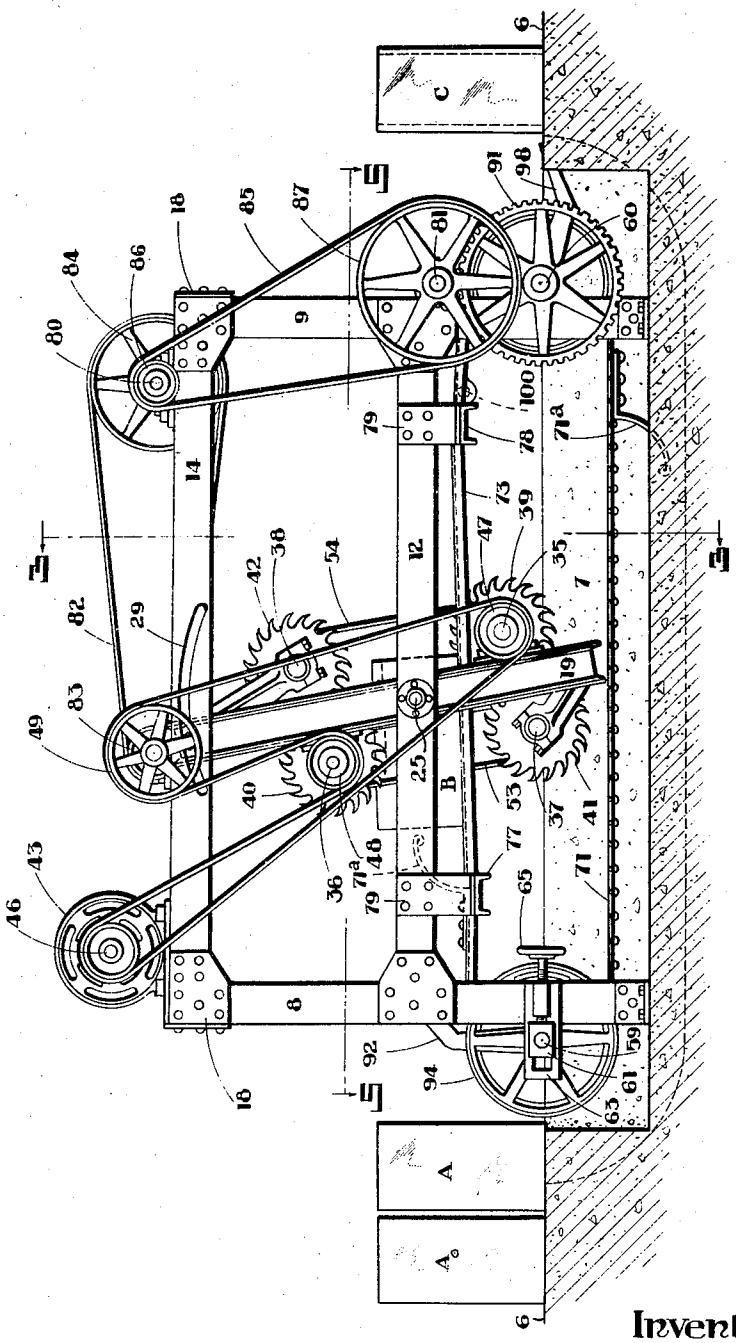


FIG. 1.

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5 Sheets-Sheet 2

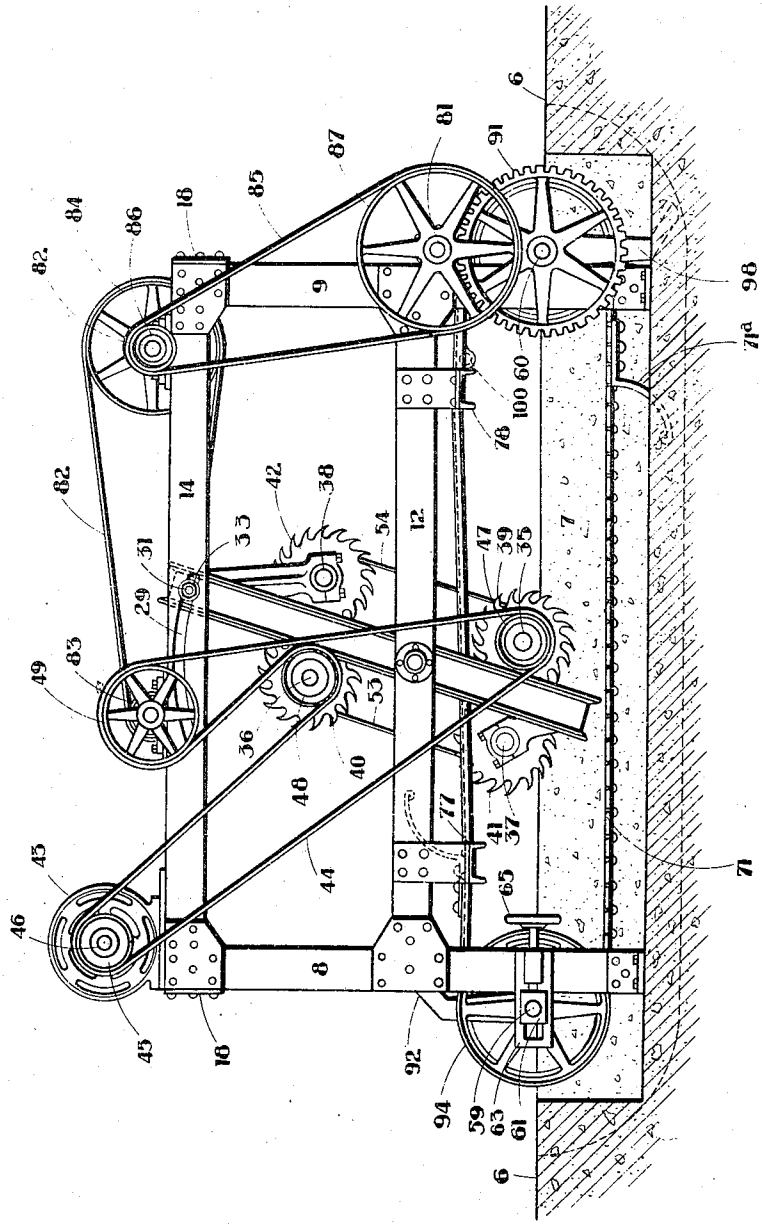


Fig. 2.

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5 Sheets-Sheet 3

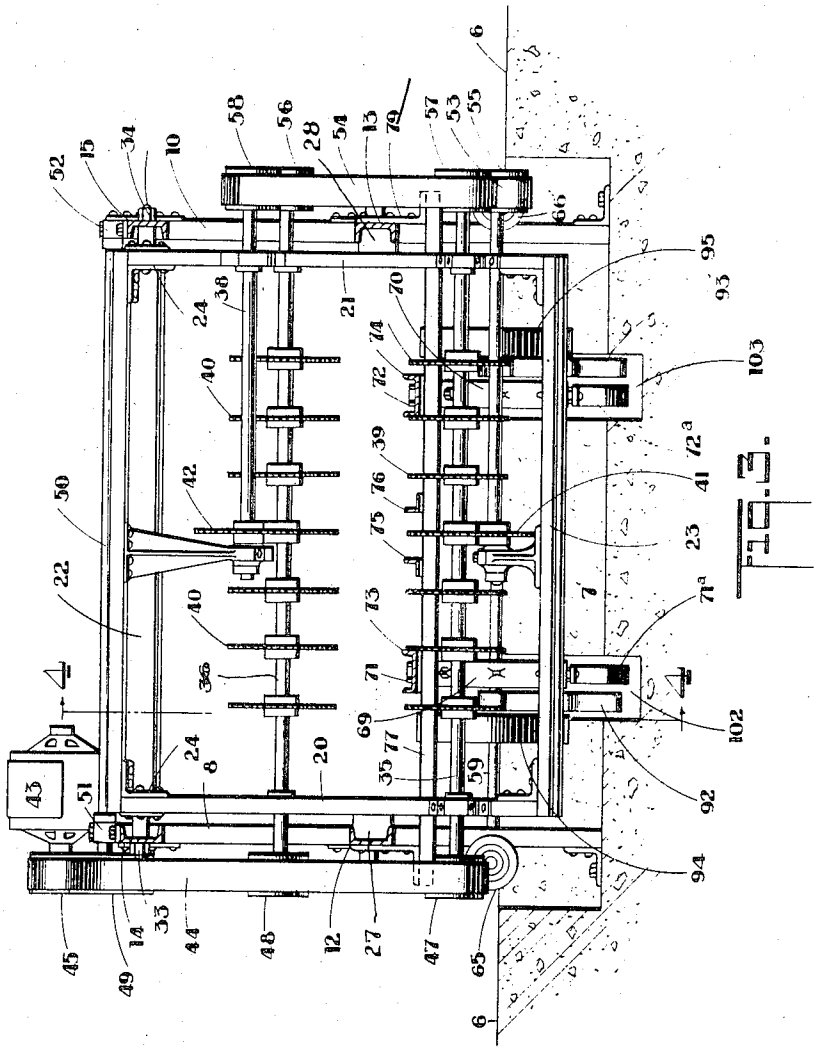


Fig. 3.

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5 Sheets-Sheet 4

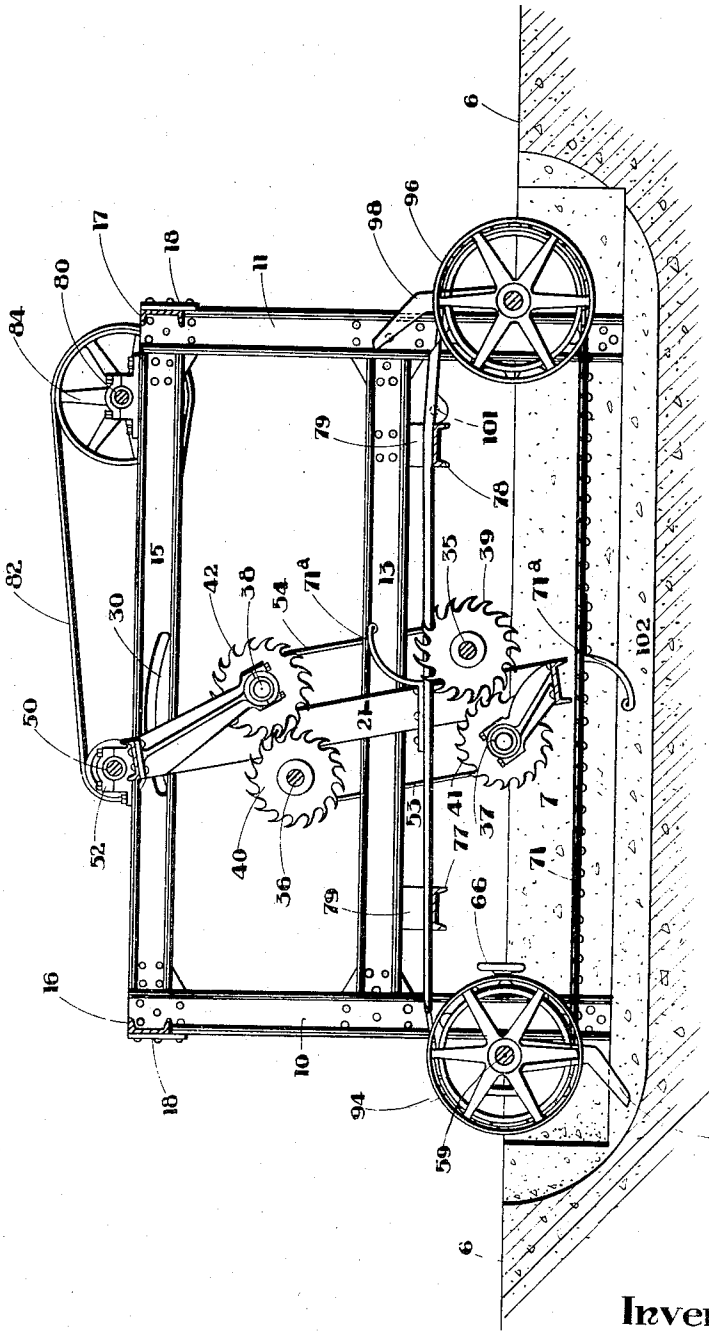


FIG. 4.

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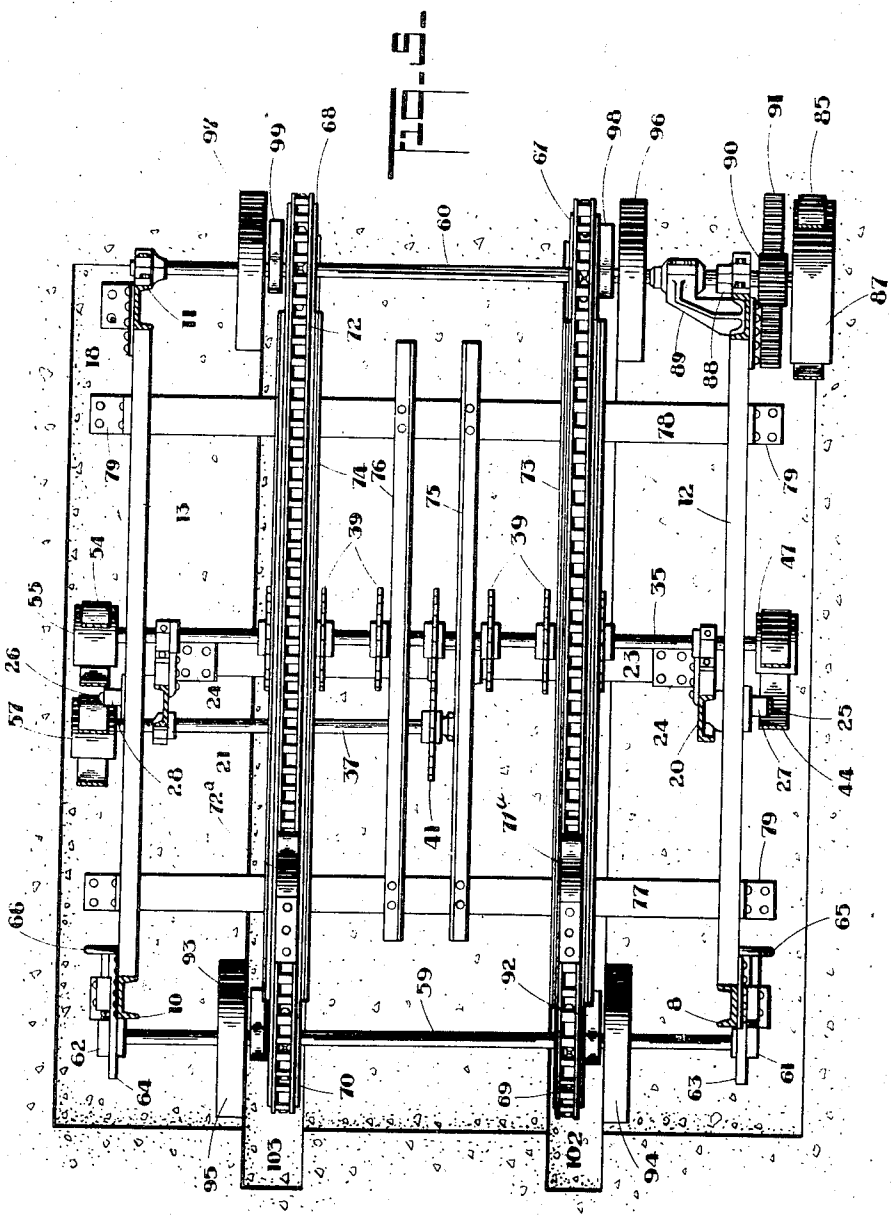
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ICE SCORING MACHINE

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5 Sheets-Sheet 5

Fig. 5.



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UNITED STATES PATENT OFFICE.

EBENEZER BEDFORD, OF TORONTO, ONTARIO, CANADA, ASSIGNOR TO THE LAKE SIMCOE ICE COMPANY, OF TORONTO, CANADA.

ICE-SCORING MACHINE.

Application filed October 23, 1922. Serial No. 596,523.

To all whom it may concern:

Be it known that I, EBENEZER BEDFORD, a subject of the King of Great Britain, and resident of 102 Admiral Road, in the city of Toronto of the Province of Ontario, in the Dominion of Canada, have invented certain new and useful Improvements in Ice-Scoring Machines, of which the following is the specification.

This invention appertains generally to the art of ice scoring machines and apparatus, as described in the present specification and illustrated in the accompanying drawings that form part of the same.

The invention consists essentially of the novel features pointed out broadly and specifically in the claims for novelty following a description containing an explanation in detail of an acceptable form of the invention.

In order that the novelty and utility of my invention may be readily understood, I shall refer briefly to the structure and operation of well-known ice scoring machines. The ordinary method of scoring ice is to feed the same by gravity from overhead intermediate rotary scoring saws, which are gauged to score the ice to the required depth. While this method of scoring ice has proven very satisfactory and may be used in ice-freezing plants of certain design, the same is not generally adapted for universal installation, due particularly to the necessity of the overhead feed.

With the above mentioned undesirable features of structure and operation in view, this invention provides means for automatically intermittently lifting vertically arranged blocks of ice from off a floor or slide as they are delivered from the ice-freezing plant; for canting the same over onto their sides and advancing the same along a feeding slide to intermediate rotary scoring saws; and for automatically delivering the same onto a floor or onto a slide upon completion of the scoring operation. The scoring mechanism, furthermore, is susceptible to adjustment to admit its application to different sized batches of blocks of ice. In addition, readily accessible means are provided for adjusting the relation of the scoring saws with respect to the blocks of ice fed therebetween so that the same may be scored to any required depth to facilitate subsequent division into sections of predetermined size.

Supplementing the advantages afforded by the automatic feeding, scoring and delivering means, are those derived from utilizing readily accessible single score scoring mechanism, whereby the blocks may be scored for single division only.

From the viewpoint of universal adaptation, this invention marks a decided advancement in the art in that it may be installed in practically any design of ice scoring plant, irrespective of the plane on which the ice is delivered to the scoring mechanism. As before premised, special means for this purpose have been devised and, combined with other instrumentalities of this invention, all of which will now be described in detail on reference to the accompanying drawings in which:—

Fig. 1 is a side elevation of an ice scoring machine constructed in accordance with an acceptable embodiment of my invention, the position of the blocks of ice being depicted prior to, during, and after the multiple scoring operation.

Fig. 2 is a similar view illustrating a relative position of the scoring means for single scoring.

Fig. 3 is a transverse section of the machine as it would appear when taken on the plane designated by the line 3—3 on Fig. 1.

Fig. 4 is a longitudinal section as it would appear when taken on the plane designated by the line 4—4 on Fig. 3, and

Fig. 5 is a horizontal section as it would appear when taken on the plane designated by the line 5—5 on Fig. 1.

Like numerals of reference designate corresponding parts throughout the different views.

General construction.

The term "floor" as herein used, is intended to include any flat surface, slide, or the equivalent, upon which blocks of ice may be conveyed or transported to and from the ice scoring machine. A very concise description of the floor upon which the ice scoring machine is mounted will suffice, since the particular type of such is immaterial to the invention which has a wide range of utility irrespective of the specific construc-

tion of the floor or slide upon which the blocks of ice are fed and delivered.

In the drawing is shown, for the purpose of illustration only, what is known as a concrete floor 6 in which the pit 7 is formed and in which the ice scoring machine is mounted, so that the blocks of ice to be scored, will not have to be elevated to any great extent for transition intermediate the scoring saws.

The main frame of the machine may be formed of four vertical standards 8, 9, 10 and 11, intermediate which are arranged longitudinal beams 12, 13, 14 and 15, and the transverse beams 16 and 17 all of which are securely fastened together by the plates 18 which are riveted thereto.

The scoring mechanism is carried upon an articulated frame designated in its entirety by the numeral 19, said frame being formed of vertical sections 20 and 21 and the transverse sections 22 and 23, all of which are secured together to form a rigid structure by the corner brackets 24 which are riveted thereto. This frame is articulated on the trunnions 25 and 26 carried thereby which are supported in bushings 27 and 28 mounted upon the longitudinal beams 12 and 13 of the main frame, so that the same may be swung backward or forward for multiple or single scoring, or for regulating the depth of the scores to be made, as will be hereinafter more clearly set forth.

The extent of adjustment of the frame 19 is determined by the length of the arcual slots 29 and 30, which are cut in the longitudinal beams 14 and 15 and have a radius taken from the centre of the trunnions 25 and 26. Bolts 31 and 32, carried by said frame 19, extend through said arcual slots 29 and 30 and are provided with locking nuts 33 and 34 by which said frame may be securely locked in any required position.

Shafts 35, 36, 37 and 38 are journalled in bearings mounted upon said frame 19. Multiple scoring saws 39 are mounted in spaced relation on said shaft 35 in alignment with corresponding multiple scoring saws 40, mounted upon the shaft 36, while single scoring saws 41 and 42 are mounted upon shafts 37 and 38 respectively.

The said saws are rotated by the electric motor 43 by the belt 44 trained over the pulley 45 mounted upon the motor shaft 46; over the pulleys 47 and 48 mounted upon the ends of the shafts 35 and 36, and over the pulley 49 mounted upon the shaft 50, which is journalled in bearings 51 and 52, mounted upon the longitudinal beams 14 and 15. The shafts 37 and 38 are rotated synchronously with the shafts 35 and 36 by the belts 53 and 54, which are trained over the pulleys 55 and 56 and the pulleys 57 and 58 mounted upon the ends of the said shafts.

The mechanism to pick up, feed and deliver the blocks of ice includes the shafts 59 and 60, the former being journalled in adjustable bearings 61 and 62 mounted in the guides 63 and 64, adjustment thereof being effected by the adjustment hand wheels 65 and 66; the latter shaft 60 being journalled in stationary bearings mounted upon the vertical standards 9 and 10.

Sprockets 67 and 68 are mounted upon the shaft 60 in spaced relation and in longitudinal alignment with the sprockets 69 and 70 mounted upon the shaft 59. Endless chains 71 and 72 are trained over said sprockets, as more clearly depicted in Fig. 2 and are provided with flights 71^a and 72^a, which are used to propel the ice to undergo the scoring operation, during which it is advanced along a slide formed of channel sections 73 and 74, and the angle sections 75 and 76, all of which are mounted upon the transverse beams 77 and 78, which are supported from the longitudinal beams 12 and 13 by the brackets 79.

The picking up, feeding and delivering mechanism briefly referred to, is driven by the motor 43, through the shafts 50, 80, 81 and 60. Shaft 80 is driven by the shaft 50 at a reduced ratio through the medium of the belt 82 trained over the pulley 83 and the pulley wheel 84. The shaft 80 drives the shaft 81 at a correspondingly reduced ratio by the belt 85 trained over the pulley 86 and the pulley wheel 87, which is mounted upon the stub shaft 81, the latter being journalled in the bearings 88 and 89 mounted upon the vertical standard 9. The stub shaft 81 drives the shaft 60 through the medium of the pinion 90, which is keyed to the shaft 60. By this method of gearing, speed is further reduced so that the conveying mechanism will travel at the proper speed for picking up, feeding and delivering the blocks of ice.

The letters "A" designate the blocks of ice to be fed as they are delivered from the freezing plant, the same being picked up, canted over, and deposited upon the ice-feeding slide referred to, by the arms 92 and 93 carried by the shaft 59, the ice during the elevating operation bearing upon the supporting wheels 94 and 95, which are of greater diameter than the sprockets 69 and 70, so that the ice will not come in contact with the same.

After the ice is deposited upon the feeding slide, the same is advanced by the flights 71^a and 72^a to undergo the scoring operation which is effected by the scoring saws referred to, after which the ice is delivered upon the supporting wheels 96 and 97 and is lowered by the arms 98 and 99 carried by the shaft 60 on to the floor, as depicted by the letters "C," the blocks of ice during delivery being canted back to vertical position.

The frictional contact of the chains 71 and 72 with the channel sections 73 and 74, is re-

duced to a considerable extent by the rollers 100 and 101, carried by said channel sections.

The pit 7 is provided with longitudinal recesses 102 and 103 to accommodate for the flights 71ª and 72ª and the arms 92, 93, 98 and 99.

General operation.

For single scoring, the articulated frame is adjusted as illustrated in Fig. 2, that is to say,—the locking nuts 33 and 34 are to the right of the vertical axis of the trunnions 25 and 26. The depth of the scores may be regulated as required, by regulating the inclination of the articulated frame either to the right or to the left for a shallower or deeper score. Presuming that multiple scoring is desired, the articulated frame 19 is located in the approximate position shown in Fig. 1, after which the motor 43 in energized, thus driving the ice scoring mechanism and the picking up, feeding and delivering mechanism.

The blocks of ice to be scored are fed from the left and are, for the purposes of illustration, designated by the letters "A." As they are fed, they are elevated by the arms 92 and 93 from off the floor 6 and are caused to cant over on their sides and bear upon the supporting wheels 94 and 95, due to the contour of said arms 92 and 93, which deposit a block of ice upon each revolution of the shaft 59 upon the feeding slide referred to. Each block of ice is advanced along the feeding slide on its side as shown in Fig. 1, and indicated by the letter "B" by the pairs of flights herein referred to, and upon completion of the scoring operation, is propelled forward and deposited upon the supporting wheels 96 and 97 and is canted over and lowered by the arms 98 and 99 on to the floor 6 at the right of the machine, as depicted by the letter "C."

For single scoring, the articulated frame is adjusted to the position shown in Fig. 2, so that the single scoring saws 41 and 42 mounted upon the shafts 37 and 38, will be brought into the path of the advancing ice and the multiple scoring saws 39 and 40 will assume the positions shown. The blocks of ice are picked up, fed and delivered in the manner previously described, for the single scoring operation.

Adjustment of the articulated frame from the position shown in Fig. 1 to the position shown in Fig. 2, necessitates adjustment of the motor 43, to the left, from substantially the position shown in Fig. 1 to substantially the position shown in Fig. 2, due to the fact that the belt 44 has one run forming the hypotenuse 35—46 of a right angle triangle of which the legs are the horizontal and vertical distances of the axis of 35 from that of 58, and another run forming the hypotenuse 36—48 of a right angle triangle, having as legs the horizontal and vertical distances of 36 and 46. The action of the swinging frame is to approximately increase the horizontal leg of one triangle by the same amount that the other is diminished, but on account of the difference of the vertical leg of one from that of the other, the hypotenuses are slightly varied to secure a constant belt length, consequently it is necessary to adjust the motor to the left, as mentioned.

It will be observed that the vertical ribs of the channels 73 and 74 and the angle guides 75 and 76 will cut into the ice during its transition thereover and maintain the same in alignment. It will also be observed that the channels and angles forming the feeding slide are slightly inclined to the left of the beam 78 so that the ice during the feeding operation must be propelled up the slight incline, thus preventing it from slipping and impinging the scoring saws with velocity after its pick-up. The inclination of the feeding slide at the right of the beam 78 facilitates delivery of the ice in that it will readily slide off the feeding slide onto the supporting wheels 96 and 97 and the arms 98 and 99.

Without further analysis the foregoing will so fully reveal the gist of this invention that others can, by applying current knowledge, readily adapt it to various applications without omitting certain features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention, and therefore such adaptations should and are intended to be comprehended within the meaning and range of equivalency of ensuing claims.

What I claim is:

1. In an ice scoring machine, a main frame and a swinging supplemental frame and saws mounted in said supplemental frame in vis-à-vis single and vis-à-vis gang groups.

2. In an ice scoring machine, a main frame and a rocker supplemental saw frame carrying different saw groups adjustable to various positions for changing saw groups and determining the cut.

3. In an ice scoring machine, a main frame and a rocker frame and an ice path through said frames, and saws in groups adjusted to changing cutting positions by the movement of said rocker frame.

4. In an ice scoring machine, a main frame and a rocker frame and an ice path therethrough, ice propelling means arranged in said path and saws operating in said path above and below and changeable in groups adjusted to their sawing positions by the movement of said rocker frame.

5. In an ice scoring machine, a main frame and an inner swinging frame to-

gether forming an ice path therethrough and saws in varied arrangement carried in said inner frame and operating in said path and holding means adjustable throughout the movement of said inner frame for maintaining the varying positions of said saws to effect different cuts in the ice.

6. In an ice scoring machine, an ice carrier, saws in the path of the ice transported by said carrier said saws being in single set and gang groups in change about arrangement to effect predetermined cuts, a bearing frame for said saws adjustable to effect said change, and means for driving said saws and carrier.

7. In an ice scoring machine, a main frame and an adjustable saw frame having an ice path therethrough, an endless carrier in said ice path, saw shafts journalled in said saw frame, a set of vis-à-vis single saws and a set of vis-à-vis gang saws, mounted on said shafts, means for adjusting said saw frame to bring into action said single set or said gang set, and means for driving the machine including holding means to maintain the several positions of the saw sets.

8. In an ice scoring machine, a main frame and a saw frame pivotally mounted in said main frame and having an ice path therethrough, an endless carrier in said ice path, saw shafts journalled in said saw frame, a set of vis-à-vis single saws and a set of vis-à-vis gang saws mounted on said shafts, means for adjusting said saw frame to bring into action said single set or said gang set, and means for driving the machine including holding means to maintain the several positions of the saw sets.

9. In an ice scoring machine, a swinging saw frame forming a path for the ice and having saw shaft bearings, saw shafts journalled in said bearings, saws in vis-à-vis sets mounted on said shafts, the members of each set being in vis-à-vis diagonal arrangement and adjustable to operating positions by the swinging of said frame and means for driving said saws adjustable to the different positions of the frame.

10. An ice scoring machine comprising a frame having a central horizontal ice passage and means in said passage for transporting the ice from end to end thereof in a direct line, saws journalled to reach the ice in passage and adjustable to a fixed depth of cut, and means for loading and unloading the ice on and off said transporting means and landing it on a delivery way in an end for end position to that in which it reached the transporting means.

11. An ice scoring machine comprising a frame having a longitudinal central ice passage therethrough, a supplementary frame pivoted in said main frame and having saw shaft bearings, a longitudinal and central endless carrier slightly elevated in said passage and adapted to transport the ice blocks through the frames, saws on said shafts suitably driven and adapted to engage the ice blocks in single or multiple cutting, and means for loading and unloading said endless carrier delivering the block in an end for end position to that before loading.

12. An ice scoring machine, comprising a main frame and a supplementary frame pivoted in said main frame and having upper and lower saw shaft bearings to the front and to the rear of its pivotal mounting, shafts journalled in said bearings, a single saw set having one member mounted on the front upper shaft and the other on the lower rear shaft respectively, a gang saw set also having its members mounted on the other front and rear shafts respectively, and means for transporting the ice common to both sets of saws in all adjusted positions of the pivoted frame.

Signed at the city of Toronto, Canada, this 10th day of October, 1922.

EBENEZER BEDFORD.

Witnesses:
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F. BROMLEY.