

March 12, 1968

G. M. GUARD

3,372,558

AUGER TYPE ICEMAKERS

Filed May 24, 1967

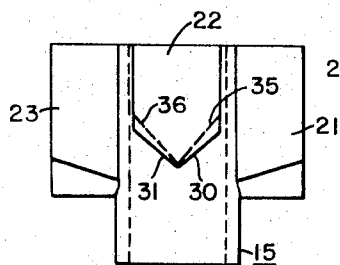
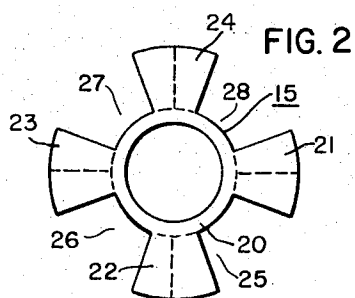


FIG. 3

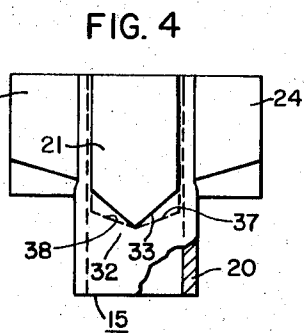
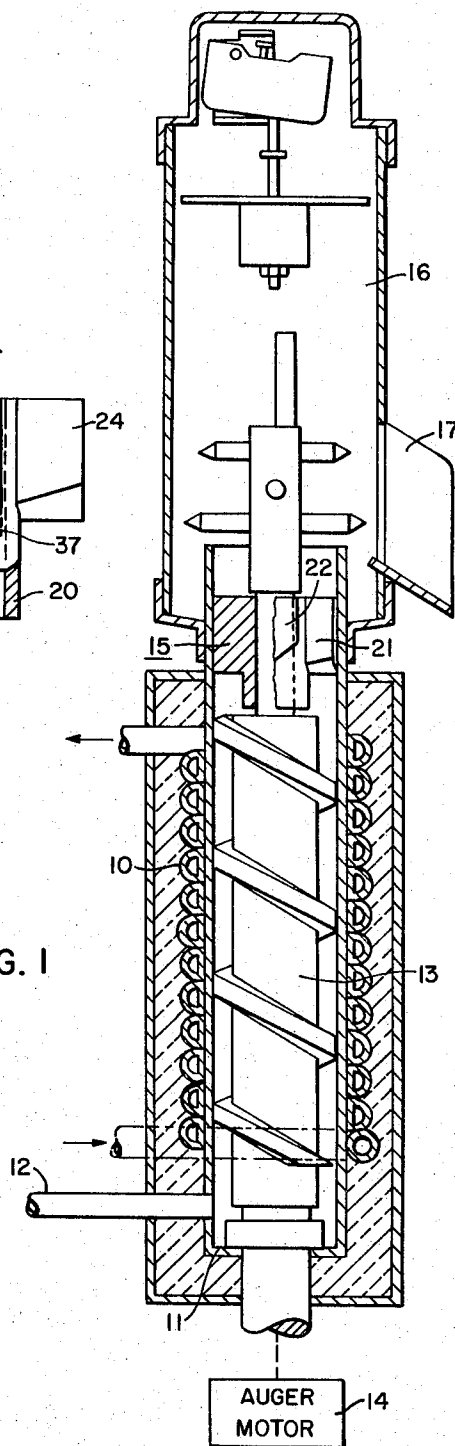


FIG. 4

FIG. 1



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AUGER TYPE ICEMAKERS

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Filed May 24, 1967, Ser. No. 641,010
3 Claims. (Cl. 62—320)

ABSTRACT OF THE DISCLOSURE

The present invention relates to auger type icemakers. To make random different size chunks of ice, an auger icemaker is provided with an extrusion head having extrusion openings formed by radially spaced apart bosses with alternate adjacent bosses of different length extending axially toward the discharge end of the auger and with wedge shaped compressing and shearing surfaces on the ends of the bosses facing the auger discharge end.

Applicant's copending patent application Ser. No. 620,406, filed Mar. 3, 1967, discloses an electrical control circuit which may be used with auger type icemakers similar to the present invention.

Background of the invention

Auger type icemakers are well known and are used to rapidly manufacture ice to be dispensed into the cup of a cold drink that is to be vended by a cup type cold drink vending machine. For such purposes it is desirable that the ice particles to be dispensed, be both of so-called chunk size and shape, and relatively hard and dry, so that too rapid melting in the drink with consequent dilution does not take place. However, rapid cooling of the drink is also desirable, and therefore it is an extremely difficult problem to accomplish both of the above objectives which seem to be contradictory. A solution to this problem is afforded by the present invention in that the auger icemaker embodying the teachings of this invention will manufacture ice chunks of random different sizes and/or densities so as to provide a maximum amount of cooling area for rapid cooling of the drink with a minimum amount of melting and dilution of the drink over a given period of time.

Auger type icemakers without the random size chunk icemaking features of the present invention are disclosed by the following listed United States patents which are classified in class 62 Refrigeration, subclasses 320 and 71, respectively: 3,043,311, Nelson, May 15, 1962; 3,196,624, Reynolds, July 27, 1965.

Summary

A refrigerated cylinder with a closed lower end is provided with means to feed water to the interior of the cylinder for forming slush ice therein. A rotatable auger is contained in the cylinder and means for rotating the auger in a direction to feed slush ice upwardly to the top of the cylinder is also provided. An extrusion head having a number of radially spaced axially extending openings is inserted to close the upper end of the cylinder so that the slush ice that is forced through its axial openings upon rotation of the auger will be compressed and formed into chunk ice particles. According to the invention, random size chunks of ice are formed by providing wedge surfaces spaced at different distances from the discharge end of the auger. Also, according to this invention, random different densities of ice chunks may be formed when respective different ones of the wedge surfaces have different included angles. In the preferred embodiment of the invention, the axial openings and the wedge surfaces of the extrusion head are formed

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by a central hub portion with radially spaced apart bosses and alternate adjacent bosses being of different lengths extending axially of the hub toward the discharge end of the auger. The lower surfaces of the bosses that are adjacent the discharge end of the auger are formed with wedge surfaces for compressing and shearing the slush ice being advanced thereto by the auger.

Further objects and advantages of the invention will be apparent with reference to the following specification and drawings, in which:

Description of the drawings

FIGURE 1 is a sectional elevational view of the auger type icemaker of the invention;

FIG. 2 is a top plan view of the extrusion head;

FIG. 3 is a side elevational view of the extrusion head of FIG. 2; and

FIG. 4 is a view similar to FIG. 3 but taken at a position angularly displaced by 90° from that of FIG. 3.

Description of the preferred embodiment

Referring to FIG. 1 of the drawings the auger type icemaker is shown to include the refrigerated cylinder 10 closed at the bottom as shown by 11 and having a water inlet 12 through which water is supplied to the interior of the cylinder 10 for the formation of slush ice therein. A rotatable auger 13 is arranged to be driven by the auger motor 14 to rotate within the cylinder 10 and force slush ice upwardly towards the extrusion head 15. Slush ice passing through the axial openings of the extrusion head 15 is compressed and sheared into random size chunk particles to be collected in the ice particle storage hopper 16 from which the ice particles may be discharged through the discharge opening 17 which may also include a discharge door (not shown).

The novel arrangement of the extrusion head 15 of the invention which results in the formation of the random size chunk ice particles is more clearly shown by FIGS. 2-4 of the drawings. It will be seen that the extrusion head 15 is comprised of the central hub portion 20 which also functions as an upper bearing for the shaft of the rotatable auger 13. A number of radially spaced apart bosses 21-24 extend from the hub portion 20 to form axially extending openings indicated generally at 25-28 therebetween through which the chunk ice particles being formed are passed into the ice hopper 16. It will be noted that the bosses 21 and 23 are longer than the bosses 22 and 24 in the axial direction towards the discharge end of the auger 13. In other words, alternate adjacent ones of the bosses 21-24 are of different lengths. The lower ends of each of the bosses 21-24, that is the end surfaces adjacent to the discharge end of the auger 13, are comprised of wedge shaped surfaces including as shown the essentially flat surfaces 30, 31 for the boss 22, and 32, 33 for the boss 21. The bosses 23 and 24 are provided with similar wedge shaped surfaces facing the discharge end of the auger 13. These wedge shaped surfaces, as described, are effective to compress and shear the slush ice into chunk ice particles of ice to be moved through the axial openings of the extrusion head 15 into the ice hopper 16 and since the bosses 21 and 23 are of different lengths with respect to the bosses 22 and 24, thus positioning their respective wedge surfaces at different distances from the discharge end of the auger, random different size chunks of ice will be formed.

If it is also desired to form different densities of chunk ice, the included angle of the wedge surfaces for different bosses may be different. For example, as shown by the dotted lines 35 and 36 the boss 22 may be provided with a more sharply pointed wedge surface having a smaller included angle than the included angle between the wedge surfaces 30 and 31. Alternatively, another boss of the

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extrusion head such as the boss 21 may be provided with the wedge surfaces shown by the dotted lines 37 and 38 to have an included angle greater than the included angle formed by the wedge surfaces 32 and 33. Thus with different included angles for the various wedge surfaces of the extrusion head the different densities of ice particles will be formed.

Various modifications will occur to those skilled in the art.

I claim as my invention:

1. An auger icemaker for making chunk ice of random different chunk size comprising, a refrigerated slush ice forming cylinder with a closed bottom, means to supply water into said cylinder to be cooled to form slush ice therein, a rotatable auger in said cylinder to move slush ice upwardly in said cylinder as said auger is rotated, means to rotate said auger, and a chunk ice forming extrusion head closing the top of said cylinder adjacent the discharge end of said auger and having radially positioned axial openings through which the slush ice is moved to be compressed to form chunk ice particles, the openings of said extrusion head being formed by a central hub portion and radially spaced apart bosses, alternate adjacent ones of said bosses being of different lengths extending towards

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the discharge end of the auger axially of the hub portion, and each of said bosses having wedge shaped surfaces facing the discharge end of said auger for compressing and shearing the slush ice into random size chunks as the slush ice is advanced into and through the extrusion head upon rotation of said auger, said wedge shaped surfaces being formed of two essentially flat surfaces with an included angle forming a relatively sharp shearing edge.

2. The invention of claim 1 in which the included angles for the wedge surfaces of different bosses are different.

3. The invention of claim 1 in which the included angles for alternate adjacent bosses are different.

References Cited

UNITED STATES PATENTS

3,126,719	3/1964	Swatsick	62—320
3,196,624	7/1965	Reynolds	62—71
3,196,628	7/1965	Reynolds	62—354 X

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