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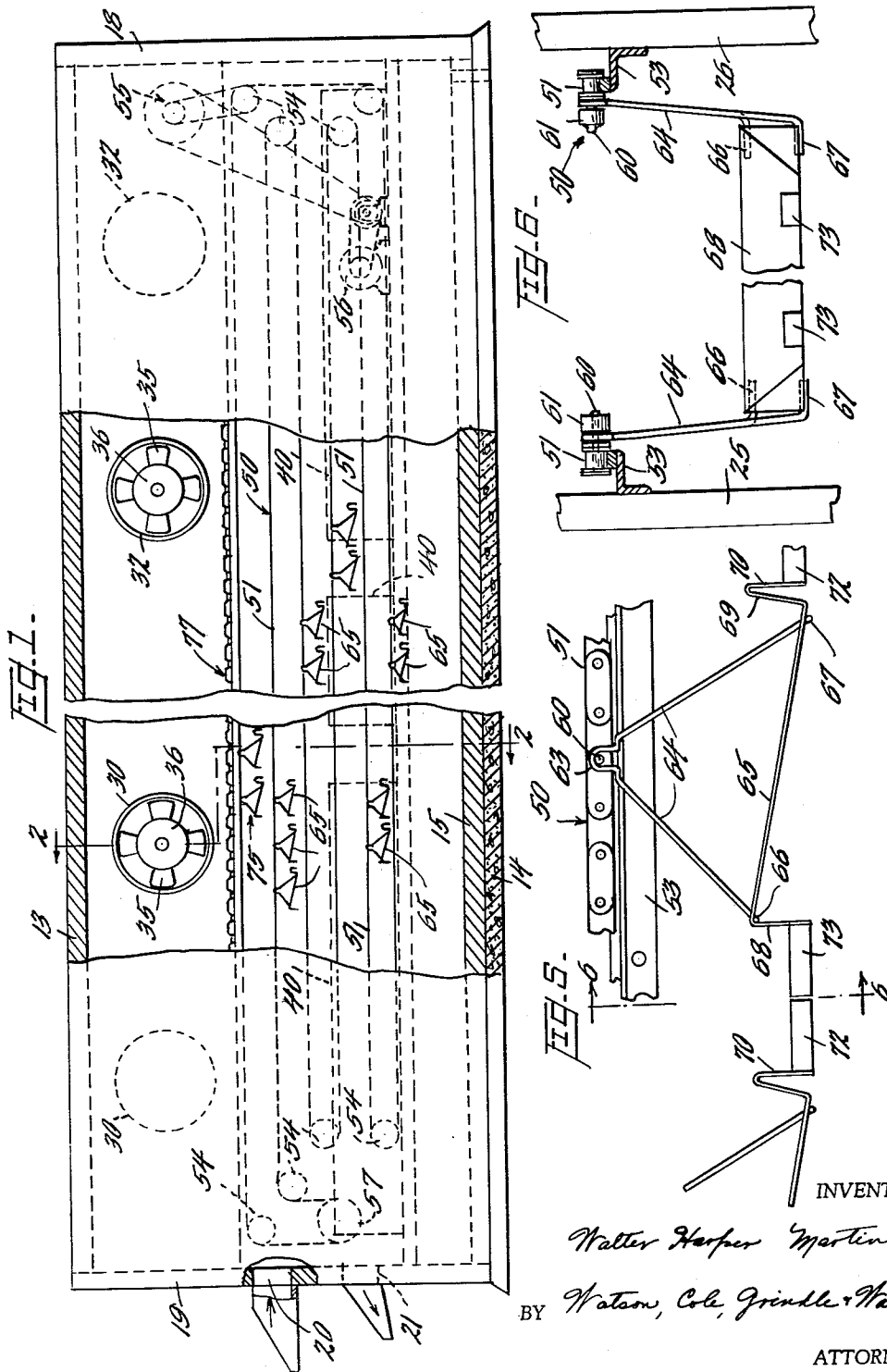
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3,173,276

ENDLESS CONVEYOR TYPE FREEZER

Filed June 26, 1962

2 Sheets-Sheet 1



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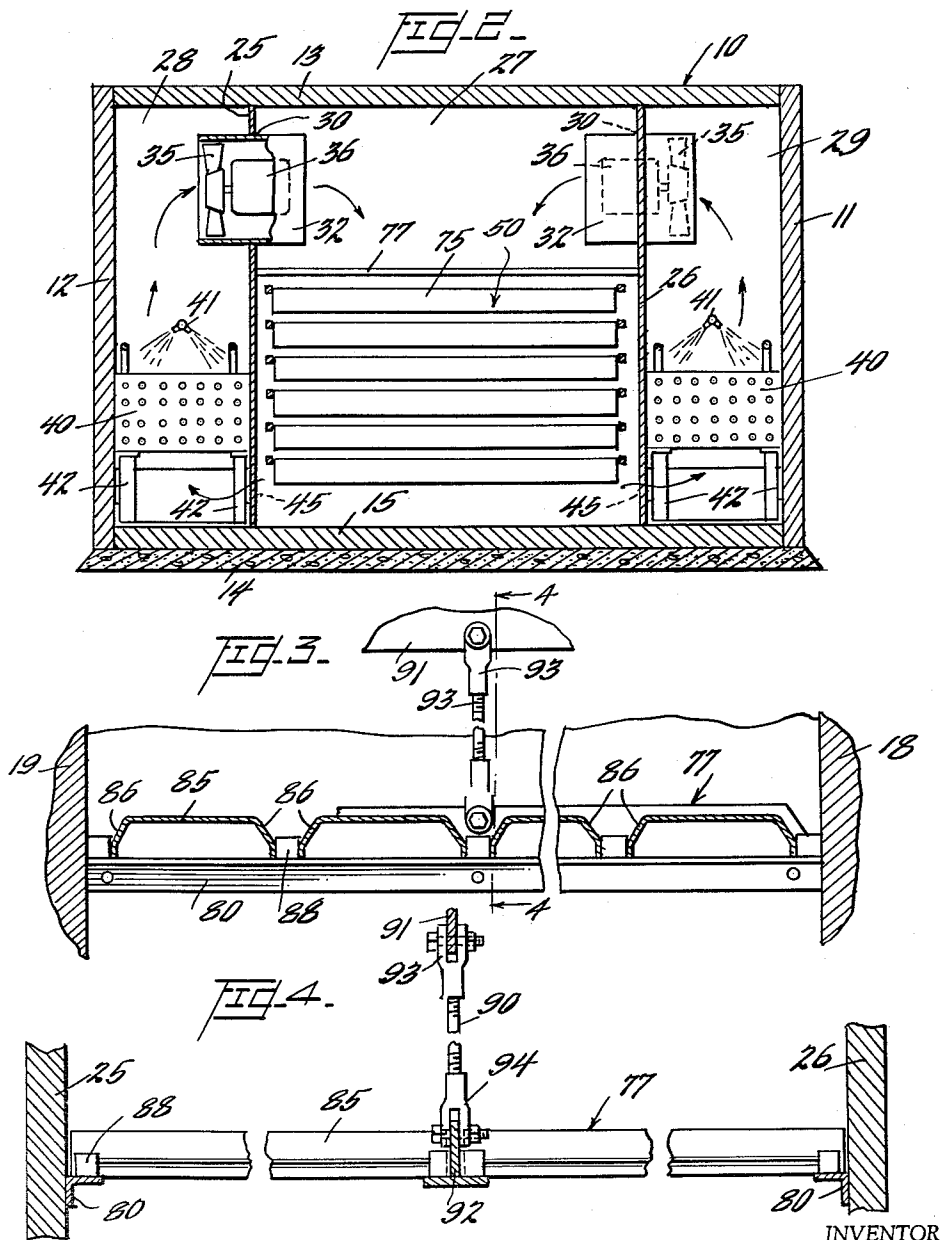
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ENDLESS CONVEYOR TYPE FREEZER

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2 Claims. (Cl. 62—380)

This invention relates to refrigeration and more particularly to blast freezers designed to rapidly reduce the temperature of articles or commodities.

The general object of the invention is to provide an improved blast freezer which is highly efficient in operation and which is characterized by novel means for jetting the cold air toward the articles or commodities passing progressively through the freezer and a novel carrier system including trays for said commodities which are not only readily and quickly detachable from the conveyor which transports them through the freezer, but are so configured as to assist the jetting of the cooling air maintaining the high velocity and turbulence thereof through the convolutions of the carrier system.

Other objects and features of novelty will be apparent from the following specification when read in connection with the accompanying drawings in which one embodiment of the invention is illustrated by way of example.

In the drawings:

FIGURE 1 is a somewhat diagrammatic view in side elevation of a quick-freeze installation embodying the principles of the invention; a central portion of the device being broken away to reveal the internal construction;

FIGURE 2 is a transverse vertical sectional view taken on line 2—2 of FIGURE 1;

FIGURE 3 is a fragmentary or detail view in vertical longitudinal section through the jet deck showing the suspension means therefor;

FIGURE 4 is a fragmented view in transverse vertical section taken substantially on line 4—4 of FIGURE 3;

FIGURE 5 is a fragmentary detail view in vertical longitudinal section showing one of the goods-supporting trays and a portion of the chain conveyor; and

FIGURE 6 is a transverse vertical sectional view taken on line 6—6 of FIGURE 5.

Referring in general to FIGURES 1 and 2 of the drawings, the installation is broadly designated by the numeral 10 and comprises a housing having side walls 11 and 12, a roof structure 13, a concrete slab base 14, and a layer of insulation 15 preferably formed of polyfoam plastic material. The structure also has a rear end wall 18 and a front end wall 19, the latter being provided with a loading opening 20 and an unloading or discharge opening 21.

The housing is preferably somewhat longer than it is wide and it is traversed by vertical longitudinal partitions 25 and 26 which serve to separate the central main chamber 27 from the laterally disposed refrigeration chambers 28 and 29.

The upper portions of the partitions 25 and 26 are respectively provided with staggered preferably circular openings 30 which receive short ducts 32 in which are installed high velocity fans 35 powered by electric motors 36. The fans or blowers 35 are arranged to draw refrigerated air from the laterally disposed refrigeration chambers 28 and 29 and discharge the air at high velocity into the upper portion of the central chamber 27, which portion becomes a plenum chamber for distribution of the air downwardly toward the materials or articles to be refrigerated.

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The actual refrigeration apparatus may be of any suitable effective type and is diagrammatically illustrated at 40 in the drawings. The arrangement may comprise the cooling coils suggested schematically in the drawings and the spray nozzles indicated at 41 above the coils, the device being suitably supported as by means of the posts 42.

A suitable number of openings 45 are made in the lower portions of the partitions 25 and 26 for the return of spent refrigerated air from the central chamber 27 back to the refrigeration machines 40.

Diagrammatically illustrated at 50 is a conveyor installation whereby the comestibles are carried through the installation from the loading station 20 to the discharge point 21. The conveyor system comprises a pair of endless chains 51 which are disposed along the inner sides of the partitions 25 and 26 and supported for movement along the walls thereof by means of the brackets 53 as clearly shown in FIGURES 5 and 6 of the drawings.

The several runs of the chains are carried around the sprocket wheels 54, one of the rearmost sprocket wheels being driven from a belt and gearing system 55 which is powered by the motor 56, all indicated schematically at the right-hand end of FIGURE 1 of the drawings.

The sprocket wheels 57 throw bights in the respective chains at the forward end of the device and guide them past the discharge opening 21 and then upwardly past the loading opening 20.

At intervals along the chains 51, certain of the pintles 60 of the chains by which the links are connected are extended inwardly of the central chamber as at 60 and upon the ends of these projected pins 60 are secured, as by welding, the knobs or blocks 61. This leaves a fairly narrow space at an intermediate portion of each of the pins 60 to accommodate the loop 63 formed in the bight portion of the bails 64 which serve to support the trays 65 upon which the comestibles may be disposed.

The lower ends of the bails 64 are inwardly directed as at 66 and 67 and welded or otherwise secured to the undersides of the sloping trays 65. Each tray is provided with a rearward or trailing vertical flange or skirt 68 and a forward looped flange 69, the downwardly bent portion 70 of which carries one or more rubber members 72 which cooperate with the rearwardly projecting rubber bumpers 73 secured to the rear flange or skirt 68 of the trays.

Thus, the series of trays are swingingly supported from the chains so as to negotiate the turns at the end of the various runs, and they are provided with parallel walls 68 and 70 which define between them an air passageway for circulation of refrigerated air between the trays upon the various runs.

In order to give the refrigerated air from the upper portion of the central chamber 27 high velocity for impingement upon the uppermost run of trays indicated at 75, there is installed a jet deck designated by the general reference numeral 77. The nature of this deck is clearly shown in FIGURES 3 and 4 of the drawings.

Angle strips 80 extend along the partitions 25 and 26 above the uppermost run 75 of the conveyor system and extending across the chamber 27 from the partition 25 to the partition 26 are the series of flanged panels 85. These panels are dished on their undersides and downwardly converging edge walls 86 provide streamlined narrowing slots through which the air from the upper plenum portion of the chamber 27 may be injected downwardly onto the first run of the conveyor. Spacing blocks such as suggested at 88 may be provided and at intervals along the installation, links 90 serve to support the intermediate portions of the jet deck from the ceiling 13 of the structure. A plate 91 may be secured to the ceiling

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and a T-connection 92 arranged beneath the jet deck and the extensible link 90 secured to these parts as by means of the clevises 93 and 94.

In operating the installation, the freezing air is given a high velocity of some 3500 feet per minute and the jetting of the air through the openings in the jet deck together with the passage of the series of trays with their jet-like interstices through the installation in both directions, insures a wide distribution of air jets and a resulting turbulence which has been found to be quite effective in freezing articles, especially packages of comestibles, rapidly and efficiently. As mentioned above, it is preferable to subject the newly loaded articles or packages to the coldest and most effective jets first and then the articles pass through the various descending runs of the conveyor system until they arrive at the discharge point.

Various changes and modifications may be made in the embodiment illustrated and described herein without departing from the scope of the invention as defined by the following claims.

Having thus described the invention, what is claimed as new and desired to be obtained by Letters Patent is:

1. In a continuous quick-freeze installation for comestibles and the like, a horizontal elongated chamber having loading and discharge openings at an end thereof, a multi-traverse chain conveyor with runs extending horizontally and longitudinally of said chamber, means for supporting articles to be frozen at intervals along the chains of said conveyor, means for introducing a high velocity stream of refrigerated air into the upper portion of said chamber, and a jet deck extending horizontally across the upper portion of said chamber above the uppermost run of said conveyor and comprising a series of spaced narrow panels, the spaces between said panels being of converging configuration to increase the velocity of the air flowing therethrough, the means for supporting the articles upon the conveyor comprising a series of trays spaced apart along the runs of the conveyor, narrow spaces between the successive adjacent trays being bounded fore and aft by vertical panels forming parts of the trays, said panels defining further air jetting openings for maintaining the velocity of the flow of air downwardly through the conveyor runs, a laterally disposed refrigerating chamber upon each side of said first-named chamber, air refrigerating means in said refrigerating chambers through which air may ascend, a lower opening between said first-

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named chamber and said refrigerating chamber for flow of air from said first-named chamber to said refrigerating chamber, upper openings between said first-named chamber and said refrigerating chamber, and blowers in said last-named openings for forcing refrigerated air at high velocity from said refrigerating chamber into the upper portion of said first-named chamber above said jet deck.

2. In a continuous quick-freeze installation for comestibles and the like, a horizontal elongated chamber having loading and discharge openings at an end thereof, a multi-traverse chain conveyor with runs extending horizontally and longitudinally of said chamber, means for supporting articles to be frozen at intervals along the chains of said conveyor, means for introducing a high velocity stream of refrigerated air into the upper portion of said chamber, and a jet deck extending horizontally across the upper portion of said chamber above the uppermost run of said conveyor and comprising a series of spaced narrow panels, the spaces between said panels being of converging configuration to increase the velocity of the air flowing therethrough, said article supporting means comprising a series of trays spaced apart along the runs of the conveyor, narrow spaces between the successive adjacent trays being bounded fore and aft by vertical panels forming parts of the trays, the spacing between the upper portions of the panels being at least as great as the spacing of the lower portions of said panels, said panels defining further air jetting openings for maintaining the velocity of the flow of air downwardly through the conveyor runs, means for suspending said trays from the conveyor chains, and resilient bumpers on the fore and aft edges of said trays for maintaining them in spaced relationship.

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