

May 30, 1961

W. R. A. HAPPER

2,986,019

ARTICLE DISPLAY APPARATUS

Filed Dec. 9, 1958

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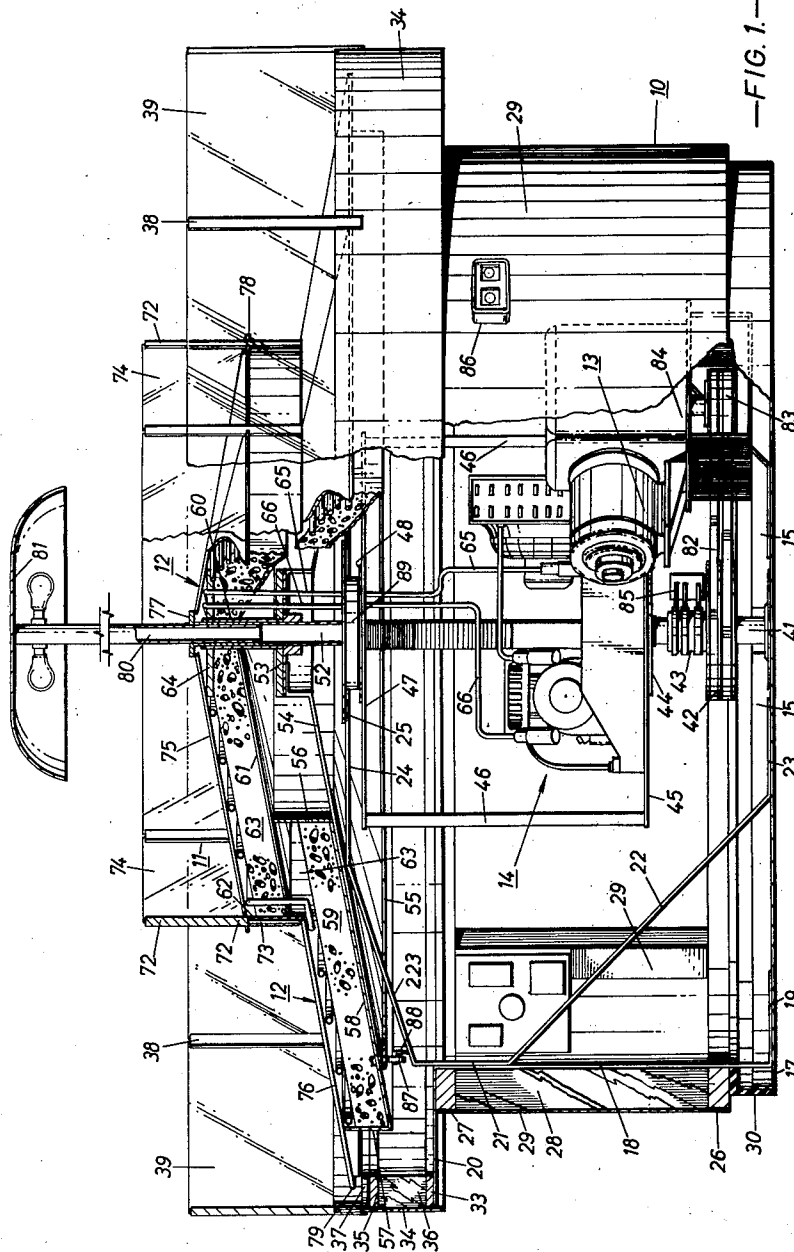


FIG. 1.

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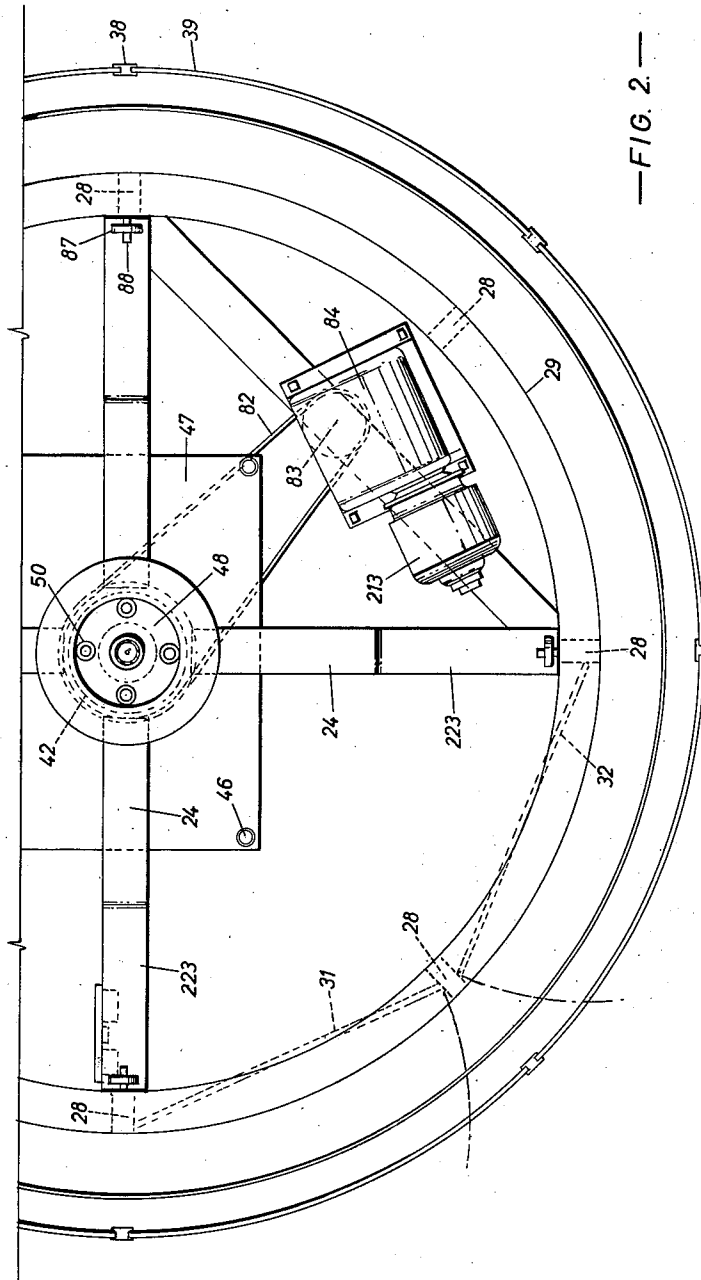
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—FIG. 2.—

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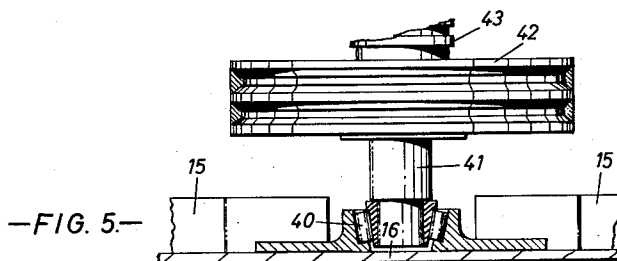
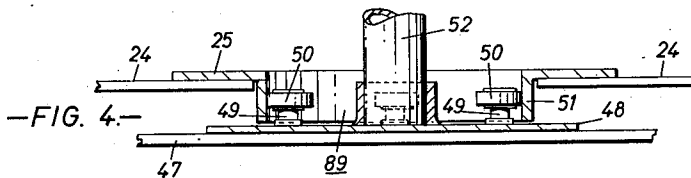
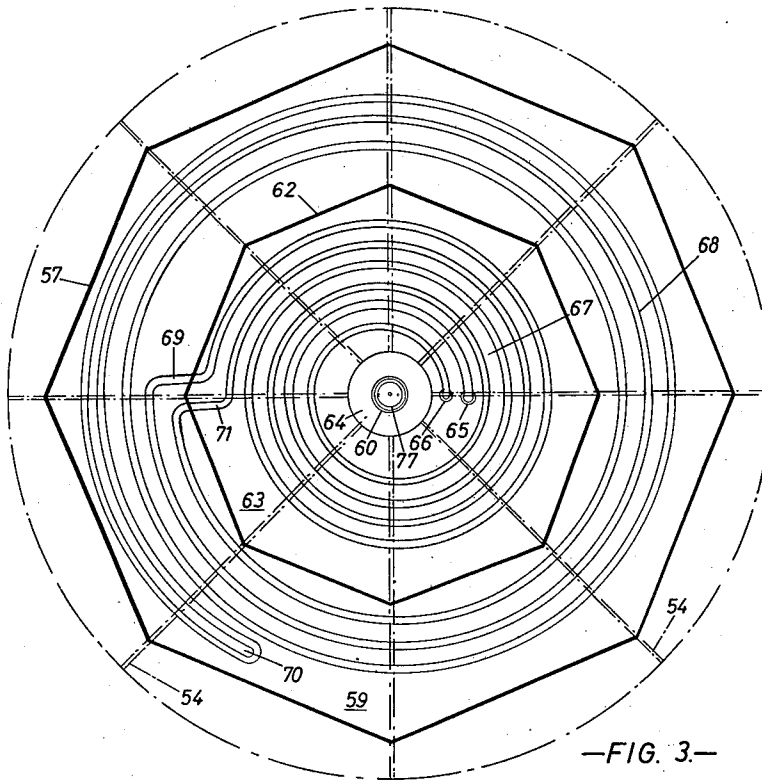
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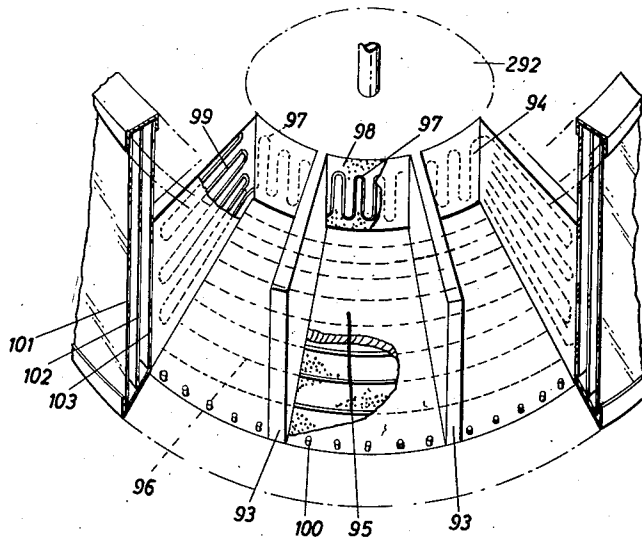
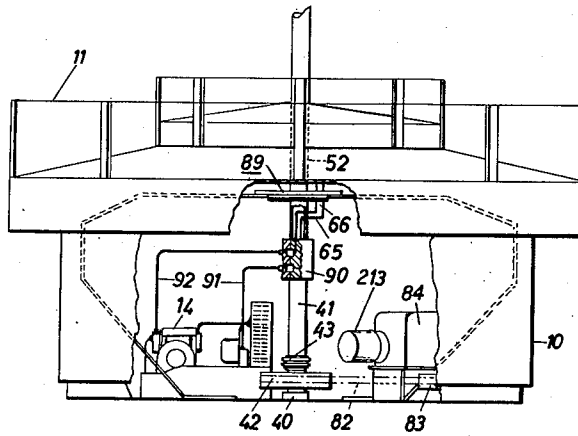
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5 Sheets-Sheet 4

— FIG. 6. —



— FIG. 7. —

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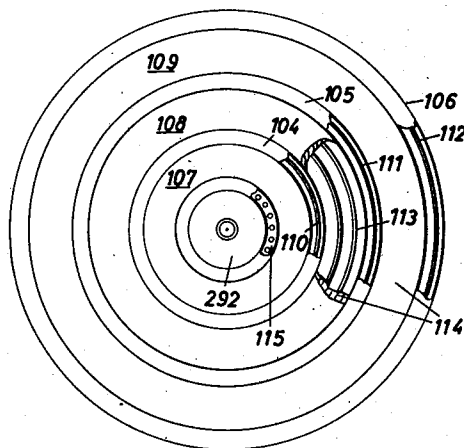
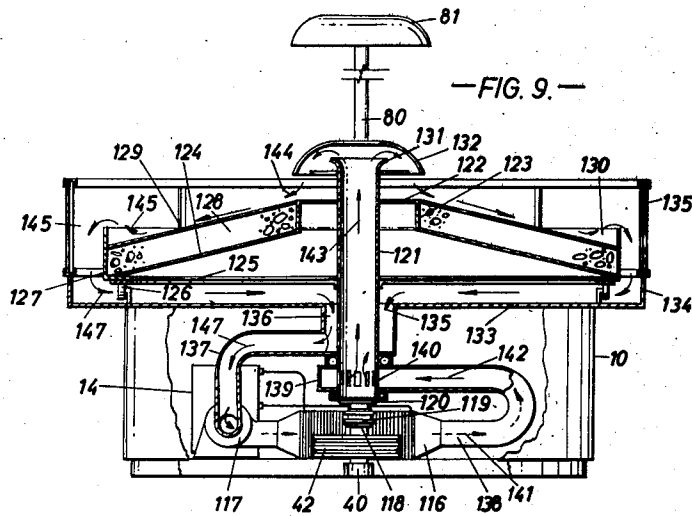
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5 Sheets-Sheet 5



—FIG. 8.—

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15 Claims. (Cl. 62—250)

The present invention relates to article display apparatus, and is especially though not exclusively applicable to display means for presenting food products.

It is well known to provide a small rotatable turntable for the support and display of small articles in shop windows and elsewhere and the presence of a moving display often attracts the attention of a passer-by. In many cases some food products are displayed in an unwrapped condition, for example in the butchery and fishmongery trade, and it has for many years been quite common practice to display meat and fish on a slab. In recent years it has become customary for the slab to be cooled in order to prevent deterioration of the meat or fish. In all such cases, however, the display table or slab is stationary and difficulty is often experienced in making such meat or fish displayed in an attractive manner.

According to one feature of the present invention display apparatus for the display of articles such as perishable and frozen food and food products comprises in combination a base structure, a turntable structure rotatably carried by said base structure for rotation about a substantially vertical axis, drive means for rotating said turntable structure about said axis, article receiving means on said turntable structure, a refrigerating unit within said base and turntable structures, and means for circulating a cooling fluid through parts of said turntable structure and in close proximity to said article receiving means for cooling articles.

According to a further feature of the present invention a display device for receiving and presenting a food or food products comprises a turntable structure, means for rotatably mounting said structure for rotation about a substantially vertical axis, drive means for rotating said turntable about said axis, a plurality of article receiving members or slabs on said turntable structure, a labyrinth or network of pipes carried by said turntable structure below and close to said article receiving members for rotation with said turntable structure, a refrigerating unit and piping means connecting said network or labyrinth of pipes to said refrigerating unit for the circulation of a cooling fluid therethrough.

The article receiving surfaces may be generally frusto-conical or frusto-pyramidal in shape, thus presenting a downwardly and outwardly inclined surface or surfaces for the more ready display of food or food products and also for drainage purposes. The article receiving surfaces may be on two or more levels and in one embodiment the article receiving members present a quasi pyramidal upper article receiving surface and spaced therebeneath a quasi frusto-pyramidal article receiving surface.

The turntable structure is conveniently rotatably mounted within an enclosed base structure of which the sides extend vertically around and above the lower perimeter of the article receiving surface of the turntable structure. The sides of the base structure may conveniently be stepped outwardly and where they extend upwardly above the perimeter of the article receiving members

2

of the turntable structure be provided with a plurality of side wall portions of transparent material such as glass or a plastic substance. The drive means for rotating the turntable structure may conveniently be in the form of an electric motor which is housed within the base structure. In one embodiment the turntable structure includes, at a level conveniently below the general level of the article receiving members, a cage or structure for receiving a refrigerating unit. The refrigerating unit is conveniently of the condensing type and is operated by one or more electric motors to which connection can be made by a plurality of slip-rings. It is not essential for the refrigerating unit to rotate with the turntable and the invention also envisages mounting the refrigerating unit in a stationary position within the base structure and providing two or more sealed joint connections, such as so-called banjo connections, between the refrigerating unit and the network of pipes.

When the article receiving members are arranged on two levels a transparent peripheral side wall may conveniently be provided at the outer perimeter of the upper article receiving member. For this purpose the turntable structure may be provided with a plurality of risers and a plurality of curved sheets of transparent substance such as glass or a plastic substance may be inserted and retained between these risers. If desired, the turntable structure may be provided with a vertical tube extending upwardly above the centre of the article receiving members and such tube may at its upper region carry suitable lighting fittings for illuminating articles received and displayed.

In recent years deep frozen food products have become well known and in most cases they are displayed in refrigerated cabinets.

The article receiving surfaces carried on the turntable structure can be in the form of a plurality of compartments instead of presenting a generally frusto-conical or quasi frusto-pyramidal surface. The compartments may be in part defined by radially extending partition members or in part by a series of annular partition members. Such compartments are eminently suitable for receiving frozen food products. In addition to pipes beneath the article receiving surfaces, refrigerant circulating pipes may be provided within the radial and within the annular partition members to provide for cooling of articles within the compartments. In this way it is possible for deep frozen food products to be safely received and presented. Moreover, if desired, the device may include a composite article receiving surface arrangement in which over certain sectors a quasi frusto conical or quasi frusto-pyramidal plane surface is presented whilst over other sectors compartments are provided.

It is not essential for the turntable structure to be provided with networks of pipes for the circulation of a coolant from the refrigerating unit and alternatively in a further embodiment cooled air passed through a heat exchanger connected to the refrigerating unit can be blown over the article receiving surfaces or through the compartments and then preferably withdrawn and recirculated to the heat exchanger by means of a fan. The air can pass upwards through a central tubular member forming part of the turntable structure and be discharged radially outwards and downwardly from a central diffusing outlet so as to flow over exposed parts of the article receiving surfaces, over and around articles received thereon and then to pass over the edge of the turntable structure, through an annular passage between the turntable structure and the curved transparent members of the base structure and be withdrawn radially inwards towards the centre and into an annular conduit leading to the inlet of the fan.

In many cases, in order to reduce the heat transfer at

the outer regions of the turntable structure, particularly when the apparatus is intended for the display of deep frozen food products which in general require the establishment of lower temperature conditions than do ordinary perishable foods, the curved sheets of transparent substance arranged around the perimeter of the base structure are arranged in a multi-ply formation with three or more sheets in spaced parallel relationship, the spaces between adjacent sheets being either evacuated and sealed or filled with substantially dry air and sealed.

The invention will be further and more particularly described with reference to the accompanying drawings, in which:

Fig. 1 is a part sectional side elevation of one embodiment of the invention,

Fig. 2 is a detail view in plan with certain parts of the turntable structure removed,

Fig. 3 is a detail view to the upper part of the turntable structure with the article receiving members removed to show the provision of the refrigerant circulating pipes,

Fig. 4 is a detail view, partly in section, of the main bearing of Fig. 1,

Fig. 5 is a detail view, partly in section, of the support bearing,

Fig. 6 is a side elevation of a second embodiment, partly cut away and partly in section,

Fig. 7 is a detail perspective view of part of a modified turntable structure,

Fig. 8 is a plan detail view of a further modified turntable structure, and

Fig. 9 is a side elevation, mainly in section, of a still further embodiment.

Referring now to the embodiment of Figs. 1 to 5, and primarily to Fig. 1, a device for displaying food or food products comprises a base structure indicated generally at 10, and a turntable structure indicated generally at 11 carrying a plurality of article receiving members 12. The turntable structure 11 is rotated by an electric motor driving means indicated generally at 13 and carries a refrigerating unit indicated generally at 14.

Four channel-section members 15 extend radially substantially at right angles to one another from a central plate 16 to a peripherally extending angle member 17. Near their outer ends the channel section members 15 carry affixed thereto a plurality of cranked members 18 each having an inwardly directed portion 19 and an outwardly directed portion 20. Near their upper ends the cranked members 18 are connected to vertically extending portions 21 of brace members 22 which are connected to the channel-section members 15 near their inner ends by horizontally extending portions 23. The upper portions of the brace members 22 extend upwardly and inwardly at 223 and horizontally inwardly at 24 to adjoin a main bearing member 25 as may be seen more clearly in Fig. 4. Affixed to the cranked members 18 near their lower ends is an annular member 26 whilst a second annular member 27 is affixed in the angle between the vertical portion of the cranked members 18 and the outwardly extending portions 20. Between the two annular members 26 and 27 a plurality of vertically extending members 28 are provided at substantially equispaced angles. A decorative outer coating such as an enamelled facia member 29 is attached to the two annular members 26, 27 and to the vertically extending members 28. Beneath the annular member 26 and outside the peripherally extending angle member 17 there is provided a plinth 30 of black rubber-like material. The facia plate 29 is generally substantially cylindrical in shape over the major portion thereof, but is broken away in two places, as illustrated in Fig. 2, to provide a pair of doors 31, 32 to give access to the base therewithin.

The outwardly extending portions 20 of the cranked members 18 carry at their outer ends an annular member 33 to the outside of which is affixed a second facia mem-

ber 34. A second annular ring 35 is provided above the ring 33 and a plurality of vertically extending spacers 36 are equally angularly disposed therebetween. The uppermost annular member 35 serves to support a drip gutter 37. Extending vertically upwards from the facia 35 are a plurality of equi-angularly disposed risers 38 for receiving a plurality of curved side wall members 39 of glass or other transparent plastic material.

As may be most clearly seen from Fig. 5 the central plate 16 supports a thrust bearing 40 in which there is journaled the lower end of a shaft 41. The shaft 41 carries keyed or otherwise secured thereto a pulley 42, slip-rings 43, and a bossed member 44. To the bossed member 44 there is attached a lower plate 45 of a frame-work for receiving the refrigerating unit 14. At the four corners of the plate 45 are connected vertically extending members 46 connected at their upper ends to an upper plate 47 connected to a bossed central member 48 of a main bearing 89 as can be most clearly seen from Figs. 1 and 4. Upstanding from the bossed member 48 are a plurality of studs 49 each of which carries a ball-bearing 50 for engaging the inside surface of an annular part 51 of the main bearing member 25 connected to the inwardly extending portions 24 of the brace members 22. Upstanding from the boss of the bossed member 48 and attached thereto such as by welding is a tubular shaft member 52 which serves as central support for the turntable structure.

From a bossed member 53 around the shaft member 52 and connected thereto for rotation therewith there extends a plurality of equiangularly spaced downwardly inclined spoke members 54 which connect near their outer ends with an annular member 55. The spoke members 54 carry two vertically extending members 56, 57 and a series of plate members 58 which together serve as inner and outer peripheral sides and bottom of a compartment for receiving a heat insulating material 59 such as cork. The members 56, 57 may each form an octagon with apices registering with the spoke members 54 or can be cylindrical. The plate members 58 can similarly be generally trapezoidal in shape with substantially straight or with concentric curved inner and outer edges, their generally radially extending edges also registering with the spoke members 54, or in combination frusto-conical. Also attached to the bossed member 53 is a tubular member 60 to which there is attached a series of plate members 61 which rest on the upper edges of the members 56 and at their other extremities abut a further vertically extending member 62. The tubular member 60, the plate members 61 and the member 62 serve as inner and outer peripheral sides and bottom of a further compartment for receiving a heat insulating material 63 such as cork. The member 62 may form an octagon with apices registering with the spoke members 54 or can be cylindrical. The plate members 61 can similarly be approximately trapezoidal in shape with a curved inner edge, substantially radially extending edges, preferably registering with the spoke members 54, and either straight or concentric curved outer edges, or in combination can be frusto-conical. The bossed member 63 and a washer-like member 64 surrounding the upper region of the tubular member 60 are drilled to receive a supply pipe 65 and a return pipe 66 for a cooling liquid or refrigerant from the refrigerating unit 14. Disposed on top of the heat insulating materials 59, 63 is a network or labyrinth of pipes indicated diagrammatically at 67, 68 in Fig. 3. It will be observed that the supply pipe 65 leads into a first or upper spiral above the heat insulating material 63. This spiral terminates at 69 and connects with a second spiral on top of the heat of insulating material 59 and which terminates at a loop 70 to return in a third spiral within the second spiral and connect with a fourth spiral within the first spiral. The fourth spiral terminates at the centre and connects with the return pipe 66.

5

The member 62 carries a plurality of risers 72 which serve to receive and retain an annular fascia member 73 and a plurality of curved transparent members 74 of glass or other suitable transparent plastic material.

Disposed above the cooling pipes are article receiving members 75, 76 which may conveniently be in the form of a plurality of sector-like slabs of a suitable substance such as glass, preferably translucent glass marketed under the trade name of Vitrolite. The slabs 75, 76 are secured in place by means of a suitable adhesive in a well known manner.

The inner ends of the slab 75 are conveniently concealed by a flanged tubular insert member 77 which is inserted within the tubular member 60 and the outer edges of the slab 75 are conveniently recessed at spaced localities so as to pass around the risers 72 and provide a peripheral edge 78 which overhangs the fascia member 73. The inner edges of the slab 76 preferably extend under the fascia member 73 whilst the outer edges 79 overhang the annular member 57 so as to be disposed above the drip gutter 37. Inserted within the member 77 is an upstanding tubular member 80 carrying a lighting canopy 81 within which are provided lighting units for illumination of the device.

Part of the weight of the refrigerator unit and the turntable structure is taken by the thrust bearing 40 and part by a plurality of ball races 87 carried on upstanding brackets 88 upstanding from the inclined portions 223 of the brace members 22. These ball races 87 engage the under surface of the annular member 55 which forms a running ring on the turntable structure. The main bearing 89 embodying the ball races 50 and the annular member 51 as illustrated in Fig. 4 serves to restrict play in a lateral direction.

For rotating the turntable structure the pulley 42 is connected by driving belts 82 to a driving pulley 83 depending from a speed reduction gear unit 84 driven by electric motor 213. Electrical connections to the refrigerating unit 14 and to the lighting units within the canopy 81 can be effected through the slip-rings 43 and brushes 85. Preferably there is provided at least one push button control station such as indicated diagrammatically at 86 for controlling the motor 213 driving the turntable structure. One or more thermostats or temperature sensitive control devices (not shown) may be provided for controlling the operation of the refrigeration unit 14 in a well known manner to enable any particular desired temperature to be maintained as far as possible.

It is not essential for the refrigerating unit 14 to rotate with the turntable structure. In the modified embodiment illustrated diagrammatically in Fig. 6 the refrigerating unit 14 is mounted upon the base structure 10 and the turntable structure 11 is in consequence somewhat lighter than in the embodiment of Figs. 1 to 5. The turntable structure is constructed substantially in the same manner as that previously described in connection with the embodiments of Figs. 1 to 5. The turntable structure is carried by the thrust bearing 40 and the main bearing 89 but the shaft 41 extending upwardly from the thrust bearing 40 continues up through the main bearing 89. The shaft 41 is interrupted by a sealed connecting unit 90 for providing fluid flow connections between a go pipe 91 and a return pipe 92 connected to the refrigerating unit 14 and the feed pipe 65 and the return pipe 66 connecting with the labyrinth of pipes contained in the turntable structure as previously described in connection with the embodiment of Figs. 1 to 5. The shaft 41 carries the pulley 42 which is connected by means of driving belts 82 to pulley 83 driven by the electric motor 213 through the speed-reducing gear box 84. The shaft 41 also carries slip rings 43 but in contrast to the embodiment of Figs. 1 to 5 only two rings need be provided for connection with the lighting unit in the canopy 81. Additional slip rings may be provided for connection with a thermostat or temperature-

6

sensitive device provided on the turntable structure for controlling the operation of the refrigerating unit 14.

In both of the embodiments illustrated in Figs. 1 to 5 and 6 respectively the turntable structures are provided with slab-like article receiving surfaces, namely the members 75 and 76 in the embodiments of Figs. 1 to 5. The apparatus according to the present invention is however not restricted to the provision of only such surfaces for receiving and displaying articles. Apparatus according to the present invention may include a turntable structure more suited for the display of frozen food stuffs. In general, frozen food and food products require storage at a lower temperature than do perishable fresh food and food products and whilst it is possible to construct a single turntable structure provided with slab-like members for receiving fresh food and food products and otherwise adapted to receive and display frozen food and food products the different temperature requirements present complications since greater cooling capacity must be provided in those regions which are intended to receive those that are frozen. Whilst this can be achieved by providing a greater concentration of cooling capacity, such as by providing a larger number of more closely spaced refrigerant-containing pipes, in those regions where frozen food and food products are to be received as compared with those regions where fresh food and food products are to be received, it may be preferable to provide one form of apparatus with a turntable structure entirely adapted for the receipt and display of frozen food and food products. A part of a turntable structure suitable for this purpose is illustrated diagrammatically in Fig. 7.

The turntable structure of Fig. 7 is provided with a central boss 292 and a plurality of equiangularly spaced radially extending partition members 93 to define a plurality of article receiving compartments. The bottoms of the article receiving compartments are formed by plate members 95 which may be arranged similarly to the plate members 76 in the embodiment of Figs. 1 to 5. Beneath the plate members 95 there is disposed a labyrinth or network of pipes indicated diagrammatically at 96 which may correspond to the spirals indicated diagrammatically in Fig. 3. Within the boss 92 and adjacent the outer surface 94 thereof there is provided a series of pipe networks indicated diagrammatically at 97 backed by heat insulating material 98. Within each of the radially extending partition members 93 there is provided a similar network of pipes 99. The pipe networks 99 and 97 are connected in series with one another and also in series with the network 96 so that refrigerant can flow through all the pipe networks 99 in the radially extending partitions, through all the pipe networks 97 in the central boss and through the pipe networks 96 beneath the plate members 95 of the article receiving compartments to establish suitable low temperature conditions within each of the compartments. The plate members 95 forming the bottom of the compartments preferably extend downwardly outwardly so that articles received thereupon can be readily displayed. In order to reduce the risk of articles falling out of these compartments a peripheral row of upwardly extending studs or pegs 100 is provided near the outer edges. In order to reduce the heat transfer in the region of the outer parts of the compartments the base structure is preferably provided with three spaced sheets of glass or other transparent plastic material 101, 102, 103 in place of the single sheet 39 in the embodiment of Figs. 1 to 5. The sheets 101, 102, 103 are in spaced parallel relation to one another and the spaces between adjacent sheets are either evacuated and sealed or evacuated, filled with substantially dry air and sealed. These sheets 101, 102, 103 may be carried in risers similar to those 38 of Figs. 1 to 5 and preferably extend down to the level of the bottom of the compartment.

Whilst it is desirable to provide the turntable struc-

7

ture with compartments for receiving and displaying frozen food and food products it is not essential for the compartments to extend radially outwards as illustrated in Fig. 7 and the compartments can extend around the turntable structure generally in the form of annular troughs as illustrated diagrammatically in Fig. 8 which is a detail plan view of a further modified turntable structure. The turntable structure is provided with a central boss 292 as described with reference to Fig. 7 but instead of the radially extending partition members is provided with a plurality of concentric and coaxial annular partition members 104, 105, 106. The central boss 292 and the annular partition members define a series of article receiving compartments 107, 108, 109. Each of the partition members 104, 105, 106 is provided with a network of pipes 110, 111, 112 and a spiral network of pipes 113 is provided beneath the plate members 114 which form the bases of the article receiving compartments. The boss 292 includes a network of pipes 115 adjacent its outer surface. The networks 110, 111, 112, 113, and 115 are connected in series with one another for the passage of refrigerant therethrough so as to establish desired temperature conditions within the article receiving compartments 107, 108, 109. The base structure is preferably provided with a multi-layer transparent sheet structure similar to that 101, 102, 103 illustrated in Fig. 7.

In order to establish appropriate conditions on the turntable structure for the display of fresh food products or frozen food products it is not essential for the refrigerant from the refrigerating unit to be circulated through a network or labyrinth of pipes on the turntable and it is possible to establish suitable conditions by circulating cool air through a refrigerating heat exchanger and then over the turntable structure. One arrangement in which this can be carried out is illustrated partly in section in Fig. 9 which is partly diagrammatic and partly in section. The base structure 10 carries the refrigerating unit 14, which is connected to a finned heat exchanger 116, and also carries the electric motor for driving the turntable structure through the pulley 42 in the same manner as that previously described in connection with the embodiment of Figs. 1 to 5. Also mounted on the base structure 10 is an electrically driven fan 117 for circulating air through the heat exchanger 116 and around the surface of the turntable structure.

Upstanding from the thrust bearing 40 carried by the base structure 10 is a shaft member 118 carrying pulley 42 and slip rings 119. Carried on the shaft 118 in a boss member 120 on which is carried an upstanding tubular member 121. Attached to an upper level of the tubular member 121 is an inverted dishlike member 122 having an outer annular portion 123. To the lower edge of this annular portion 123 is attached a plurality of radially outwardly and downwardly extending plates forming a frusto-conical member 124, which connects at its outer edge with a series of radially inwardly extending spoke-like members 125 also connected to the tubular member 121. The spoke-like members carry an annular bearing ring 126 and connect with an outer annular member 127. The annular portion 123, the annular member 127, and the frusto-conical member 124 form a compartment to receive heat insulating material 128, on top of which there is provided a series of plates which together form a frusto-conical article receiving member 129. At equiangularly spaced intervals around the turntable structure there may be provided a series of radially extending partition members 130. At or near the periphery of the frusto-conical member 129 a series of upstanding studs or pegs may be provided with a view to restraining articles from sliding off. The upper portion of the tubular member 121 is flared outwardly at 131 and carries a downwardly directing diffusing canopy 132 from the centre of which there is upstanding a tubular member 80 for supporting a lighting canopy 31. The base structure 10 is provided with a

8

substantially horizontally extending disc 133, the outer edge of which connects with an upwardly extending annular member 134 carrying a multi-plate glass surround 135 in like manner to that described in connection with Fig. 7. The centre of the disc 133 is apertured at 135 and connects with a downwardly extending tubular member 136 connecting with a conduit 137 which communicates with the inlet of the fan 117. The heat exchanger 116 communicates with a conduit 138 which communicates with a portion 139 surrounding and in sealing contact with the tubular member 121. The lower portion of the tubular member 121 is apertured as at 140 so that air passing through the conduit 138 can pass upwardly through the tubular member 121 as illustrated diagrammatically by the arrows 141, 142, 143 and be discharged through the diffusing canopy 132 as illustrated diagrammatically by the arrow 144 to flow down over the surface of the turntable structure and any frozen or other food products thereupon. After passing over the surface of the turntable structure air is withdrawn through the annular space between the turntable structure and the annular member 134 so as then to pass radially inwardly and then downwardly through the tubular member 136 into the conduit 137 to the inlet of the fan 117 to be directed therefrom into the heat exchanger 116 the path of the air being illustrated diagrammatically by the arrows 145, 146, 147.

Thus the present invention provides means for attractively displaying food products, both fresh food products and frozen food products, in such a manner that they can readily attract the attention of passers-by and yet can be readily accessible when a sale is effected. By providing for a rotating display structure to be equipped with means for cooling the article receiving surface thereof or articles when received thereon it is possible to display perishable food stuffs in a safe and yet attractive manner. By providing the display apparatus with a surrounding screen of glass or like structure, the effect of local drafts on the temperature of storage of the articles on display can be reduced. Moreover by providing for the display of articles at more than one level it is possible to attract the attention of passers-by at some distance from the apparatus as well as provide interest for those adjacent thereto.

I claim:

1. In apparatus for the display of articles such as perishable and frozen food and food products, the combination comprising an open-topped base structure, a stationary generally circular outer wall member mounted about the lower part of said base structure, a stationary vertically projecting generally transparent upper outer wall member mounted about said base structure above said lower outer wall member and defining a generally cylindrical open-topped space, a turntable structure, means for rotatably mounting said turntable structure for rotation about a substantially vertical axis within said base structure, drive means within said base structure for rotating said turntable about said axis, said turntable structure including a plurality of article receiving members contained substantially wholly within said space defined by said upper wall member, a refrigerating unit and means for circulating a cooling fluid to parts of said turntable structure and in close proximity to said article receiving means.

2. Apparatus according to claim 1, in which said refrigerating unit is disposed on said turntable structure for rotation therewith.

3. Apparatus according to claim 1, in which said means for circulating a cooling fluid comprises a network of pipes on said turntable structure in close proximity to and beneath said article receiving surfaces, conduit means connecting said network of pipes to said refrigerating unit for the circulation of a refrigerant therethrough.

4. Apparatus according to claim 1, including a heat exchanger, conduit means connecting said refrigerating unit with said heat exchanger for the circulation of a refrigerant fluid therethrough, and in which said means for

circulating a cooling fluid comprises a fan having an inlet and an outlet, driving means for said fan, first conduit means connecting the outlet of said fan with said heat exchanger, second conduit means communicating with said heat exchanger and with an air discharge device carried centrally by and forming part of said turntable structure for the directing of air discharged therethrough over the article receiving surfaces of said turntable structure, and third conduit means communicating with an annular space surrounding the periphery of the turntable structure and with the inlet of said fan.

5. Apparatus according to claim 2, including on said turntable structure a network of pipes below said article receiving surfaces and pipe means connecting said network of pipes with said refrigerating unit for the circulation of a refrigerant therethrough.

6. Apparatus according to claim 5, in which said refrigerating unit and said heat exchanger are mounted on said base structure and in which said second conduit means includes a first portion connecting with said heat exchanger, a second portion connecting with said discharge device and rotating with said turntable structure and a sealed rotary connecting gland interconnecting with said first and second portions.

7. Apparatus according to claim 5 in which said refrigerating unit and said heat exchanger are mounted on said base structure and in which said second conduit means includes a vertically extending tubular member forming part of said turntable structure and a sealed rotary gland joint, and in which said third conduit includes an annular conduit surrounding said tubular member.

8. Apparatus according to claim 3, in which said refrigerating unit is disposed on said turntable structure for rotation therewith.

9. Apparatus according to claim 3, in which said refrigerating unit is disposed on said base structure, and in which said means for circulating includes sealed rotary connecting gland means for connecting said pipe network on said turntable structure with conduit means communicating with said refrigerating unit.

10. In apparatus for the display of articles such as perishable and frozen food and food products, the combination comprising an open-topped base structure, a stationary generally circular outer wall member mounted about the lower part of said base structure, a stationary vertically projecting generally transparent upper outer wall member mounted about said base structure above said lower outer wall member and defining a generally cylindrical open-topped space, a turntable structure, means for rotatably mounting said turntable structure for rotation about a substantially vertical axis within said base structure, drive means within said base structure for rotating said turntable about said axis, said turntable structure having an article receiving portion contained substantially wholly within said space defined by said upper wall member, said article receiving portion including a plurality of article receiving members, a central upstanding boss member, a plurality of radially extending partition members above and adjoining said article receiving members, each of said article receiving members having an article receiving surface extending radially outwardly and downwardly from said boss member, said central boss member and said partition members and said article receiving members defining a plurality of sector-like article receiving compartments, a first network of pipes within each of said partition members, a second network of pipes within said central boss member and adjacent the outer peripheral surface thereof, a third network of pipes beneath said article receiving members, said networks of pipes being connected in series with one another, a refrigerating unit and piping means connecting said network of pipes with said refrigerating unit for the circulation of a cooling fluid therethrough.

11. In apparatus for the display of articles such as perishable and frozen food and food products, the com-

bination comprising an open-topped base structure, a stationary generally circular outer wall member mounted about the lower part of said base structure, a stationary vertically projecting generally transparent upper outer wall member mounted about said base structure above said lower outer wall member and defining a generally cylindrical open-topped space, a turntable structure, means for rotatably mounting said turntable structure for rotation about a substantially vertical axis within said base structure, drive means within said base structure for rotating said turntable about said axis, said turntable structure having an article receiving portion contained substantially wholly within said space defined by said upper wall member, said article receiving portion including a plurality of article receiving members, a central upstanding boss member, a plurality of concentric annular partition members above and adjoining said article receiving members, each of said article receiving members having an article receiving surface extending radially outwardly and downwardly from said boss member, said central boss member and said partition members and said article receiving members defining a plurality of annular article receiving compartments, a first network of pipes within each of said partition members, a second network of pipes within said central boss member and adjacent the outer peripheral surface thereof, a third network of pipes beneath said article receiving members, said networks of pipes being connected in series with one another, a refrigerating unit and piping means connecting said network of pipes with said refrigerating unit for the circulation of a cooling fluid therethrough.

12. In apparatus for the display of articles such as perishable and frozen food and food products, the combination comprising an open-topped base structure, a stationary generally circular outer wall member mounted about the lower part of said base structure, a stationary vertically projecting generally transparent upper outer wall member mounted about said base structure above said lower outer wall member and defining a generally cylindrical open-topped space, a turntable structure, means for rotatably mounting said turntable structure for rotation about a substantially vertical axis within said base structure, drive means within said base structure for rotating said turntable about said axis, said article receiving portion comprising two sets each of a plurality of article receiving members on said turntable structure, a first one of said sets of article receiving members being at a level higher than the second one of said sets of article receiving members, each of said sets of article receiving members comprising a plurality of downwardly and outwardly inclined members presenting in aggregate a frusto-conical shape, a labyrinth of pipes carried by said turntable structure below and close to each of said sets of article receiving members for rotation with said turntable structure, a refrigerating unit and piping means connecting said labyrinth of pipes to said refrigerating unit for circulation of a cooling fluid therethrough.

13. Apparatus according to claim 12, in which the refrigerating unit is disposed on said turntable structure for rotation therewith.

14. Apparatus according to claim 12, in which said refrigerating unit is disposed on said base structure and in which said piping means includes sealed rotary connecting glands, means for connecting said labyrinth of pipes on said turntable structure with conduit means communicating with said refrigerating unit.

15. Apparatus for the display of articles such as perishable and frozen food and food products, the combination comprising an open-topped base structure, a stationary generally circular outer wall member mounted about the lower part of said base structure, a stationary vertically projecting generally transparent upper outer wall member mounted about said base structure above said lower outer wall member and defining a generally cylindrical open-topped space, a turntable structure, means for rotatably

11

mounting said turntable structure for rotation about a substantially vertical axis within said base structure, drive means within said base structure for rotating said turntable about said axis, said turntable structure including a plurality of article receiving members contained substantially wholly within said space defined by said upper wall member, a refrigerating unit, a heat exchanger, conduit means connecting said refrigerating unit at said heat exchanger, with circulation of said refrigerant fluid there-
through, a fan having an inlet and an outlet, driving means
for said fan, first conduit means connecting the outlet of
said fan with said heat exchanger, second conduit means
communicating with said second heat exchanger and with
an air discharge device carried centrally by and forming

12

part of said turntable structure, for the directing of air dis-
charged therethrough over the article receiving surfaces
of said turntable structure, and third conduit means com-
municating with an annular space defined by the periphery
of said turntable structure and the upper outer wall and
with the inlet of said fan.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 2,986,019

May 30, 1961

William Richard Armour Happer

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

In the heading to the printed specification, between lines 5 and 6, insert the following:

Claims priority, application Great Britain December 10, 1957

Signed and sealed this 14th day of November 1961.

(SEAL)

Attest:

ERNEST W. SWIDER

Attesting Officer

DAVID L. LADD

Commissioner of Patents

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