Feb. 10, 1942. R. P. BOLLING 2,272,291

BAKE OVEN CONVEYER

Filed June 9, 1939 4 Sheets-Sheet 1

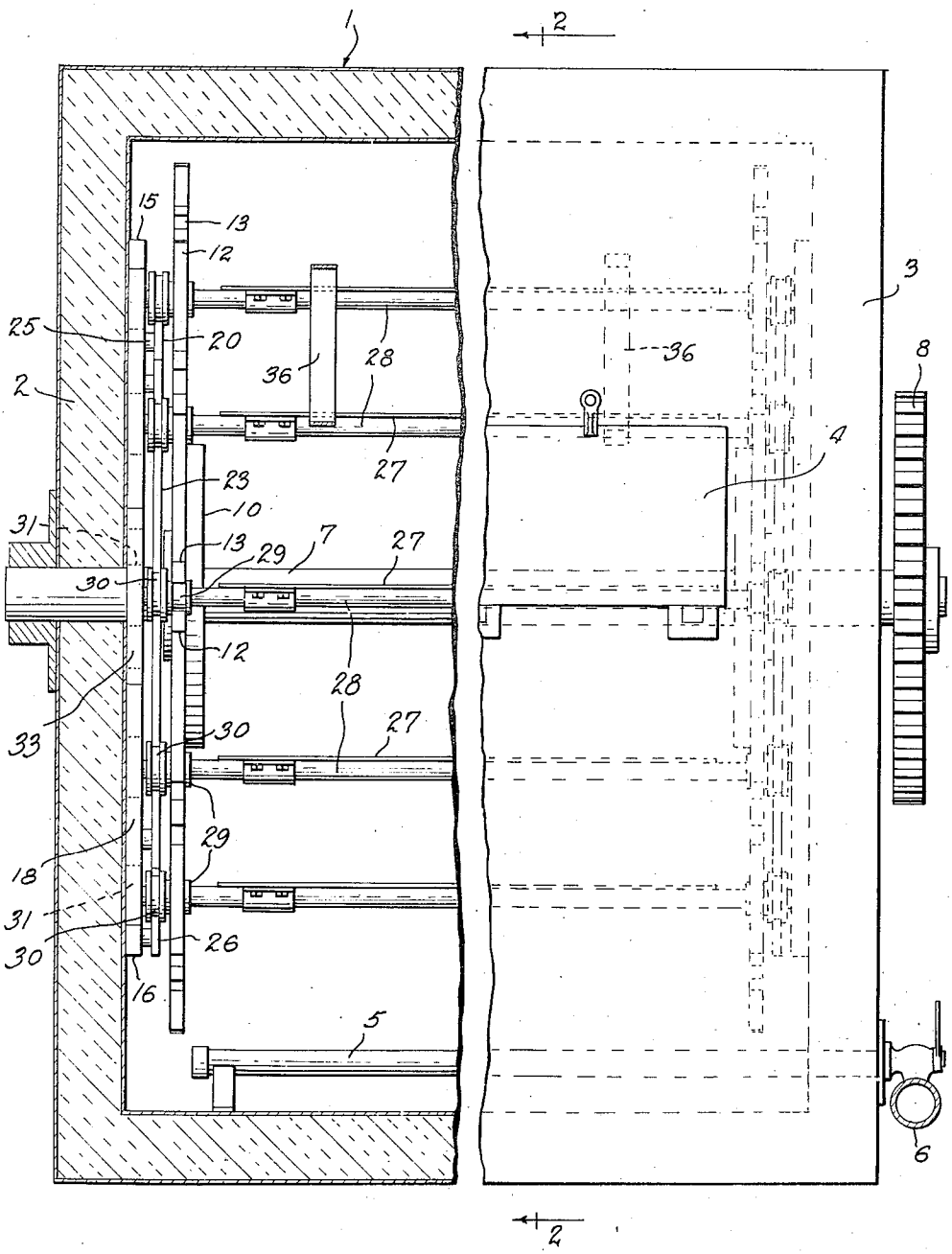


Fig. 1.

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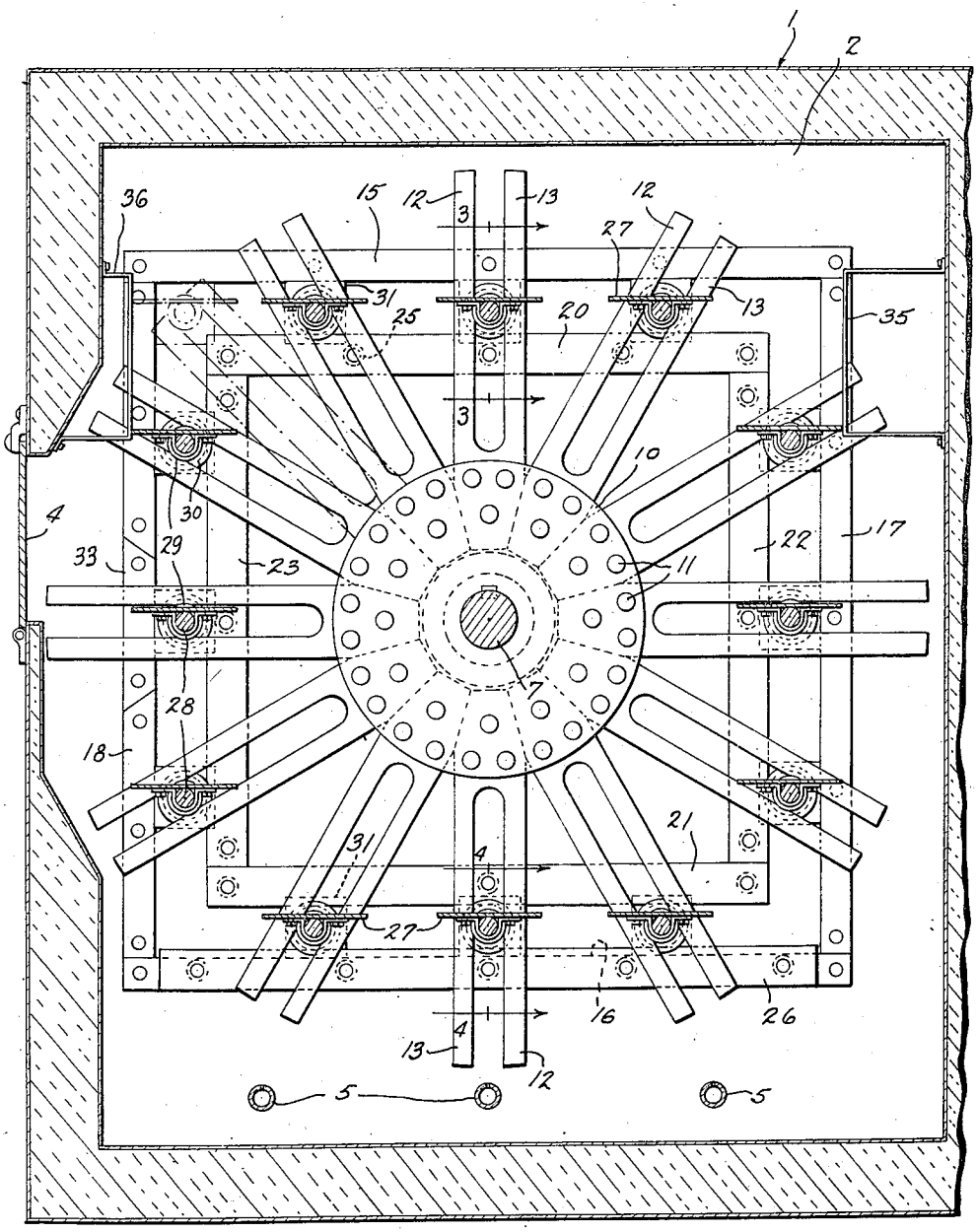


Fig. 2.

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Fig. 3.

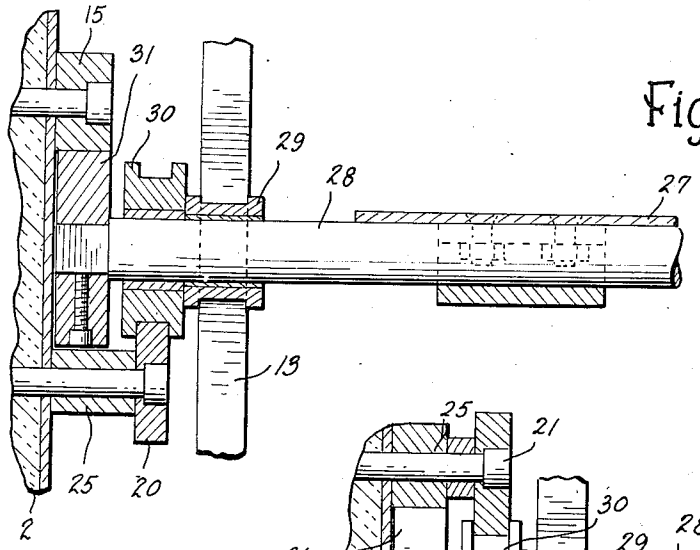


Fig. 4.

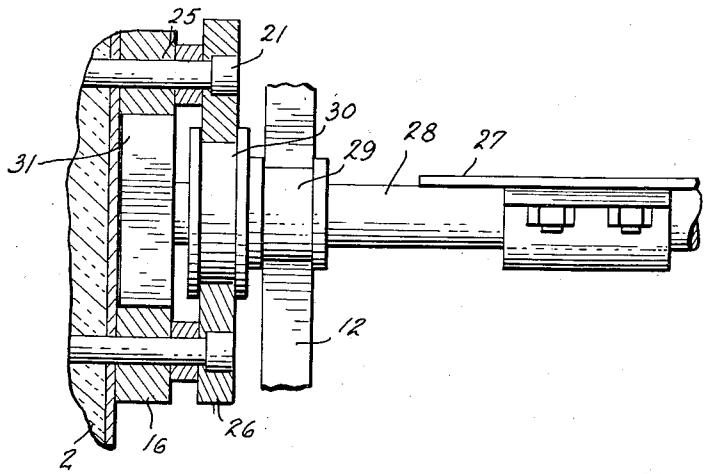
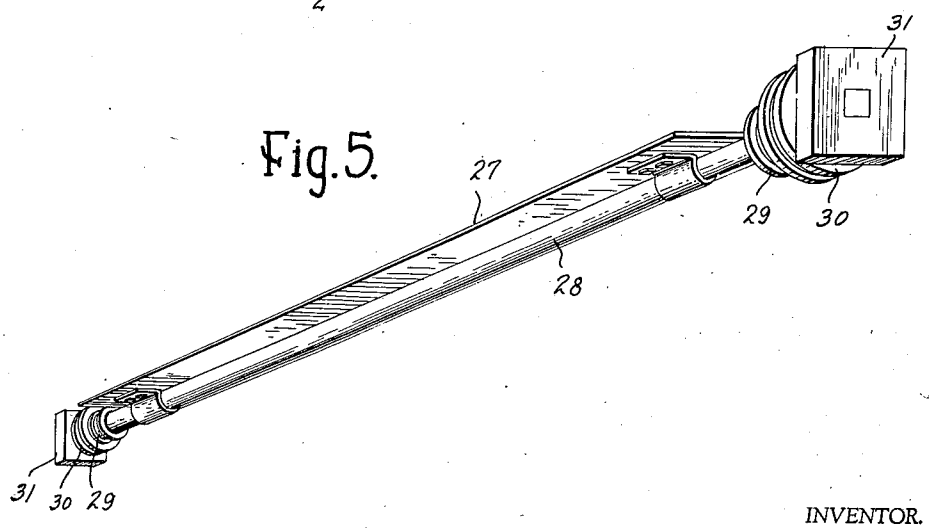


Fig. 5.



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Fig. 6.

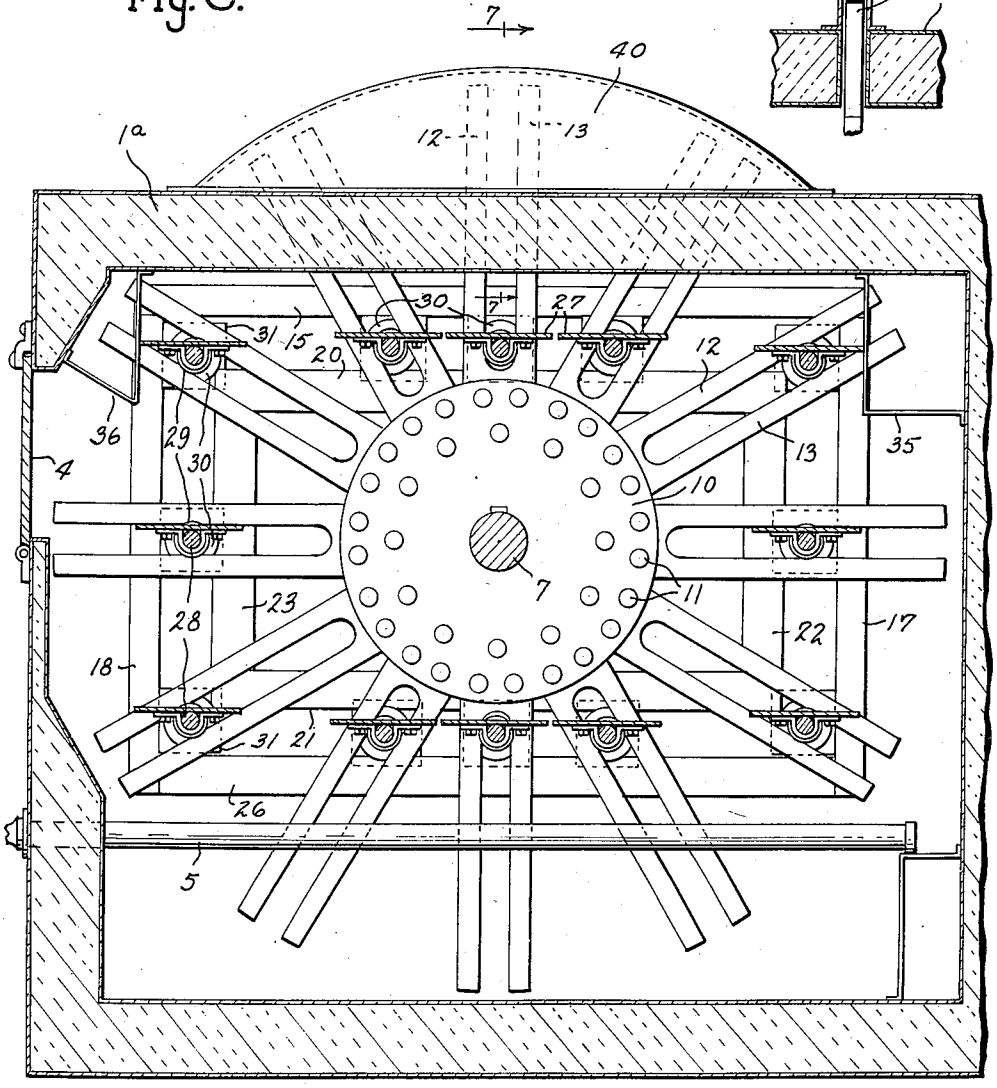


Fig. 7.

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Patented Feb. 10, 1942 2,272,291

UNITED STATES PATENT OFFICE

2,272,291

BAKE OVEN CONVEYER

Robert P. Bolling, Detroit, Mich.

Application June 9, 1939, Serial No. 278,246

10 Claims. (Cl. 198—1)

This invention relates to a bake oven conveyer, and more particularly to a bake oven conveyer of the so-called reel type. The invention is directed to an improved arrangement in a reel oven for defining the path of movement of the shelves for containing the goods and which serves to stabilize the shelves in a novel manner. By following the invention the reel structure may be lightened in weight and strength because the reel does not carry so much weight, while at the same time more shelves and more baked goods can be disposed in an oven of given dimensions.

Still further, it is an object of the invention to provide a reel type of oven wherein the goods being baked are so located and have a path of movement such that better baking conditions are obtained, particularly with respect to the baking condition at the bottom or lower portion of the oven, and with respect to conditions at the top or upper portion of the oven. Due also to the fact that the reel does not carry so much weight it may be operated with less power, and in this same connection the structure is cheaper to build than those of the reel type which have been heretofore proposed. These and other objects of the invention, and the results obtained thereby, will be appreciated more fully as the detailed description progresses.

Fig. 1 is a view showing part of the front of an oven and with part of the oven cut away to show interior structure.

Fig. 2 is a view showing some parts in section and taken substantially on line 2—2 of Fig. 1.

Fig. 3 is an enlarged detail view taken substantially on line 3—3 of Fig. 2 showing the guiding and supporting arrangement for the shelves at the top of the oven.

Fig. 4 is an enlarged cross sectional view taken substantially on line 4—4 of Fig. 2 showing the guiding and supporting arrangement at the bottom of the oven.

Fig. 5 is a perspective view of a shelf assembly.

Fig. 6 is a view similar to Fig. 2 illustrating a modified form of the invention.

Fig. 7 is a sectional view taken substantially on line 7—7 of Fig. 6.

The oven may comprise suitable walls as illustrated, the oven being generally depicted at 1 having side walls 2 and 3. One of the walls, which may be termed the front, has a door 4 for the loading and unloading of the oven. No particular attempt is made herein to show just how the oven is heated, as it may be heated in a variety of ways and by a variety of fuels. In Figs. 1 and 2, however, gas burners 5 are illustrated in the lower portion of the oven which may be fed from a manifold 6. In Fig. 6 showing a modified form, a gas burner is also shown, and this bears the same reference character.

Passing through the oven, or at least journaled in the walls, is a central shaft 7 which may have a gear outside the oven, as shown at 8, by means of which it is driven. Mounted on this shaft are devices in the nature of a spider or reel, one adjacent each wall. As shown in Fig. 2 the spider takes the form of a disc 10 provided with a plurality of arms which may be riveted or otherwise secured thereto as shown at 11, each arm being of a bifurcated nature, having a tine 12 and a tine 13 which define a slot therebetween. These spiders are arranged to rotate with the central shaft.

On opposite walls of the oven and interior of the oven are track or guide devices. There is an outer track or guide having a top portion 15, a bottom portion 16, a vertical portion 17 at the rear of the oven and a vertical portion 18 at the front of the oven. Within the confines of this outer track or guide is another track having an upper portion 20, a lower portion 21, a vertical portion 22 at the rear, and a vertical portion 23 at the front of the oven. The inner track or guide is spaced inwardly axially from the outer track as shown in Figs. 3 and 4, this being accomplished by the use of spacer elements 25. Another rail 26 is disposed at the lower portion of the track and, as shown in Fig. 4, it is also spaced away from the outer track portion 16 and lies in the same plane as the inner track. These track devices are arranged to form a parallelogram which may be square, as illustrated in Fig. 2, or may be otherwise formed, as will later appear.

A shelf assembly is illustrated in Fig. 5 wherein the shelf proper 27 is mounted upon a cross rod 28 which is provided with grooved rollers 29, and grooved rollers 30, and has on its ends rectangular blocks or shoes 31 non-rotatably secured thereto. The shoes 31 at opposite ends of each shaft have surfaces which function on the outer track constituted by the elements 15, 16, 17 and 18. The rollers 29 fit in the bifurcated arms, as shown in Figs. 3 and 4, while the rollers 30 function upon the inner track members 20, 21, 22 and 23, and also upon the additional lower rail member 26, as shown in Fig. 4.

The outer track preferably has a removable section adjacent the loading door 4, this section being shown at 33 so that by removing this sec-

tion an entire shelf assembly, such as is shown in Fig. 5, may be removed or installed. Guide devices of an auxiliary nature are illustrated in the upper portion of the oven as shown at **35** and **36** for frictionally engaging the shelves at this point in their circuitous path for assisting in their stabilization.

The operation of this structure is substantially as follows: The goods to be baked may be loaded into the oven through the door **4** and on to the adjacent shelf while the reel is stationary. The reel may be stopped for each shelf until it is completely loaded. As the reel rotates, the shelves with the bake goods thereon are moved in a polygonal circuitous path. Starting, say, at the top of Fig. 2 and, assuming that the reel is rotating counter-clockwise, an arm moves over from the 12 o'clock position to the 11 o'clock position and the shelf travels with the arm, with the weight being supported by the track portion **20** through the rollers **30**. At this time the shelf and rollers **29** shift outwardly relative to the center of rotation. When the corner is reached, as indicated by the dotted lines, the horizontal movement of the shelf is arrested, and then the shelf begins its downward movement, at which time the load, or at least a component of the load, is supported by the reel, the other component being resisted by the rollers **30** functioning against the rail **23**. As the shelf passes a horizontal position, the shelf may tend to shift outwardly, but this is resisted by reason of the shoe **31** slidably engaging the track portion **18**. When the shelf reaches the lower left-hand corner, its vertical movement is arrested and then the movement is horizontal from left to right, at which time the weight is supported on the track portion **26** (Fig. 4) through the roller **30**. At this time the track portion **21** prevents upward movement of the shelf for any reason. For example, when the shelf approaches the 5 o'clock position, as shown, the force shifting it has an upward component, due to the angularity of the arms of the spider. As the shelf reaches the lower right-hand corner, its horizontal movement is arrested and it moves upward in a manner just opposite its downward movement at the front side of the oven. Of course, the reel may rotate in either direction. The shoes which function upon the outer track members serve to stabilize the shelves and prevent them from rotating or oscillating. The auxiliary stabilizing elements **35** and **36** are arranged to engage individual shelves as they traverse the upper corners to provide for additional stabilization at these points. There is a frictional engagement which places a torque on the shelf and causes the shoe to snugly engage the guide.

It will be noted that the reel or spider structure supports only some of the shelves. For instance, as shown in Fig. 2, the shelves at the top and bottom are supported by the tracks, and only those having vertical movement are supported by the reel. Therefore, the reel need not be constructed to carry the entire weight.

Another point of importance is that more shelves may be disposed in a given sized oven than can be used with the old type of reel which carried the shelves in a circular path. In this connection consider Fig. 2: The shelf at the top, or at the 12 o'clock position, in the ordinary reel would move to the 9 o'clock position on a radius around the center, and when the shelves rock in this manner considerable clearance is needed to clear the top of the bake goods thereon from the shelf moving in above the same. With this arrangement, however, the shelves move laterally and then straight downwardly so that adequate clearance is provided.

The baking conditions are better in that the bake goods are in the upper zone of the oven for a longer period of time. The steam which exists in the upper part of the furnace, usually live steam being introduced, has access to the surface of the goods all the while the goods are traversing the top of the oven; whereas, with the circular form the bake goods is only in the uppermost position at one point. Also, the baking conditions at the bottom are better since the bake goods at their bottom are close to the source of heat all the while the goods are moving transversely across the bottom of the oven. The space within the oven is better utilized than is the case where an oven is square on the inside and confines shelves which move circularly.

This structure lends itself also to an arrangement where the polygonal shape of the track may be otherwise than square. This permits of constructing an oven which must be so designed as to go into a space where the vertical limits are close or where the horizontal dimensions are limited. The track in this case may be of rectangular form and, as shown in the modified form in Fig. 6, the oven is flattened or shortened in its vertical dimensions. In this form the same reference characters are applied to corresponding parts, and thus a duplication of description is avoided. The oven shown herein may be used where there is not adequate vertical space. Where the lateral space is limited the trackage may be arranged to be elongated vertically. In this case, however, provision may, in some instances, have to be made for accommodating the arms of the spiders. As shown in Fig. 6, the top wall of the oven has been lowered as shown at *1a*, and a small narrow extension of the housing **40** is formed on top of the housing to accommodate the upper swing of the spider. In some instances this arrangement may also be employed at the bottom of the oven, or both bottom and top. While the structure of the modified form is substantially the same as to parts, the function varies in that there is a greater movement in and out radially of the shelves relative to the center of rotation. As indicated in Fig. 6, those shelves at the top and bottom of the oven are relatively close to the center, while those at the sides are relatively removed from the center. The depth of the slot between the arms **12** and **13** of the spider structure may be varied to accommodate such movement.

I claim:

1. A bake oven comprising opposite walls, track means on the opposite walls of substantially complete polygonal shape, shelves extending across the oven, rotary means having an axis within the track means and having a slidable connection with each of the shelves for moving the shelves circuitously on the track means.

2. A bake oven comprising opposite walls, track means on the opposite walls of substantially complete polygonal shape, shelves extending across the oven, rotary means having an axis within the track means and having a connection with each of the shelves for moving the shelves circuitously on the track means, said connections being constructed and arranged to afford relative movement between the shelves and the rotary means.

3. A bake oven comprising walls defining a

baking compartment of polygonal shape in cross section, track means on opposite walls of substantially complete polygonal shape which runs substantially paralleling the walls of the compartment, a reel structure with radial arms rotatably mounted in the compartment on an axis disposed within the track means, shelves extending across the compartment and carried by the track means, and movable connections between each shelf and the arms of the reel whereby the reel, in revolving, moves the shelves circuitously on the track means.

4. A bake oven comprising a compartment having opposite walls, said compartment being substantially square in cross section, a track on opposite walls substantially square in formation, shelves extending across the compartment having end portions guided by the track, a reel structure with radial arms rotatably mounted in the compartment on an axis within the confines of the track means, the arms of the reel structure and shelves being operably interconnected for movement of the shelves circuitously on the track means upon rotation of the reel structure and for movement of the shelves radially inwardly and outwardly relative to the axis of the reel structure as the shelves follow the formation of the track.

5. A bake oven comprising a compartment having a door in one wall, a reel structure rotatably mounted within the compartment on an axis extending in the same direction as said one wall, track means of substantially complete polygonal shape on the opposite walls intersected by the axis, shelves extending across the compartment and having ends guided by said track means, said shelves and reel structure being interconnected for movement of the shelves circuitously on the track means upon rotation of the reel structure, and a removable section of the track means adjacent said door for affording removal or replacement of the shelf.

6. A bake oven comprising opposite walls, track means on the opposite walls having inner and outer track members, said track means being of polygonal shape, a reel structure rotatably mounted between the opposite walls and on an axis disposed within the confines of the track means, a plurality of shelves extending across the oven and each having a shoe engaging the track means and shaped to non-rotatably engage the track means for stabilizing the shelves, and a slidable connection between the reel structure and each shelf for movement of the shelves along the track upon rotation of the reel structure.

7. A bake oven comprising opposite walls, track means on the opposite walls having inner and outer track members, said track means being of polygonal shape, a reel structure rotatably mounted between the opposite walls and on an axis disposed within the confines of the track means, a plurality of shelves extending across the oven and each having a shoe engaging the track means and shaped to non-rotatably engage the track means for stabilizing the shelves, a slidable connection between the reel structure and each shelf for movement of the shelves along the track upon rotation of the reel structure, and auxiliary stabilizing means at some of the corners of the track means for engaging and stabilizing the shelves as they pass said corners.

8. A bake oven comprising opposite walls, track means on opposite walls of polygonal shape, and each having inner and outer track members, shelves extending across the oven and each having a shoe engaging the track means for stabilizing the shelves, a roller at the end of each shelf for engaging the track means and for supporting the weight of the shelves, a reel structure rotatably mounted in the oven and having radially extending arms of bifurcated formation moving the shelves along the track means.

9. A bake oven comprising opposite walls, track means on opposite walls of polygonal shape, and each having inner and outer track members, shelf means extending across the oven and each having a shoe engaging the track means for stabilizing the shelf means, a roller at the end of each shelf means for engaging the track means and for supporting the weight of the shelf means, a reel structure rotatably mounted in the oven and having radially extending arms of bifurcated formation embracing the shelf means and a roller near each end of each shelf means and disposed between the bifurcation of the arm.

10. A bake oven comprising opposite walls, a track on each wall, said track having an upper portion extending across the top of the oven, a lower portion extending across the bottom of the oven and vertical portions connecting the upper and lower portions, shelves extending across the oven and having end parts mounted on the tracks, a reel structure independent of the tracks rotatably mounted on an axis within the tracks and having radially extending parts operably and movably connected to the shelves, whereby rotation of the reel structure moves the shelves circuitously on the tracks, the upper and lower portions of the tracks having parts for supporting the weight of the shelves.

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