

batches of raw meat, and the rattan trays need to be turned at various stages. All these operations require the oven doors to be opened while smoking is in progress. Every time the oven doors are opened, smoke escapes (and therefore needs replenishing) and the oven temperature drops. The working environment for the oven operators is therefore very hot and smoky. Indeed, the unpleasant working environment makes it difficult to find workers who will operate the existing ovens.

The problems are compounded because, in large scale production facilities, a number of such ovens are used, so doors are continuously being opened.

The racks supporting the rattan trays do not allow automatic turning of the rattan trays. Accordingly, to turn the rattan trays, it is necessary to open the oven doors. With the doors open it is possible to access the rattan trays in the racks to turn the trays. However, the oven doors are open and need to be kept open whilst the rattan trays are being turned.

Known ovens use two layers of trays, a bottom layer and an upper layer stacked above the bottom layer. The bottom layer needs to be as close as possible to a charcoal bed in the base of the oven to allow sufficient heat from the charcoal to reach the upper layer of trays. The space between the bottom layer of trays and the charcoal bed is, therefore, small. It is common practice in such a system for the trays on the bottom level to be stocked with meat which is in its first stage of cooking and for the upper layer of trays to be stocked with meat which has already been cooked on the bottom layer. The meat on the upper layer is between 60 and 70% cooked. Maintenance of such an oven is extremely difficult as the fixtures inside the oven

supporting the rattan trays become clogged with meat which slips from the rattan trays and which also drops into the charcoal bed.

Some manufacturers have, in the past, attempted to build large scale ovens but have found that control of the temperature within the oven is difficult because of the size of the oven. To reduce this problem, partition walls have been provided in the ovens to maintain the spaces between the partitions within the required temperature range. The provision of such partition walls is inconvenient, restricts the amount of space available to an operator within the oven and makes maintenance procedures more difficult.

The present invention seeks to overcome the above problems and provides a method of cooking a foodstuff using a cooking apparatus comprising an oven and a conveyor disposed partially within the oven, a first part of the conveyor located outside the oven comprising a handling station and a second part of the conveyor located inside the oven comprising a cooking station, which method comprises the steps of: providing a supply of raw or partially cooked foodstuff at the handling station; locating the foodstuff on the conveyor at the handling station; transporting the foodstuff on the conveyor from the handling station into the oven; cooking the foodstuff on the cooking station of the conveyor in the oven; transporting the foodstuff from the cooking station through and out of the oven and back to the handling station.

In order that the present invention may be more readily understood, embodiments thereof will now be described, by way of example, with reference to the accompanying drawings in which:



Figure 1 is a perspective view of a cooking apparatus embodying the present invention, the structure of an oven being shown in phantom;

Figure 2 is a perspective view of a carriage for use with a cooking apparatus embodying the present invention; and

Figure 3 is a side view of the carriage of Figure 2.

Figure 1 shows a cooking apparatus embodying the present invention. The cooking apparatus comprises an oven 1 and a chain conveyor 2.

The oven 1 comprises an elongate hollow concrete structure having a base 3, two elongate side walls 4, 4', one end wall 5 and a roof 6. The end wall 5 closes one end of the oven whilst the opposite end 7 is open.

The base 3 is formed with a trough 3a which is filled with a layer of charcoal which is lit to produce the heat and smoke for the oven 1.

By locating the trough 3a containing the charcoal away from the open end 7 loss of heat and smoke through the open end 7 is reduced. Preferably, means are provided to prevent smoke and heat from exiting through the open end 7. In the preferred embodiment, an extractor unit (not shown) is provided over the open end 7. The extractor unit is housed in a hood (not shown) and exhausts any smoke and/or heat which escapes through the open end 7. The exhausted smoke and/or heat may either be reintroduced into the oven thereby reducing heat wastage or can be exhausted outside

the factory housing the oven. This provides an much cleaner and cooler working environment.

The chain conveyor 2 is located over the base 3 and describes a circuit entering the oven 1 through the open end 7, travelling the length of one side wall 4, turning through 180° at the end wall 5, travelling the length of the other side wall 4', exiting the oven 1 at the open end 7, turning through 180° outside of the oven 1 and then re-entering the oven 1 to complete the circuit.

The chain conveyor 2 comprises a sprocketed drive wheel 8 located outside the oven 1 at the open end 7 thereof and a guide wheel 9 located within the oven 1 toward the end wall 5. A drive chain 10 loops around the drive wheel 8 and the idler wheel 9. By driving the drive wheel 8, the drive chain 10 follows the above described circuit around the drive wheel 8 and the idler wheel 9.

A guide rail 11 is mounted at the same height as the drive chain 10 above the base 3. The guide rail 11 defines a wider circuit than the above described drive chain circuit. The guide rail 11 is equi-spaced from the drive chain 10 throughout the circuit.

A carriage 12, as shown in Figures 2 & 3, comprising a pair of parallel rods 13a, 13b interconnected by cross-members 14 is mounted on the chain conveyor 2. The cross-members 14 are regularly spaced apart along the length of the carriage 12. The cross-members 14 are spaced apart by a small distance sufficient to stop the meat on the rattan trays from slipping through the cross-members 14 and onto the charcoal below thereby preventing wastage of meat. Additionally, less maintenance of the oven and the

conveyor system is required as less meat falls into the charcoal bed and parts of the conveyor system.

Along one of the rods 13b, a prop bar 15 extends upwardly from one end of each of the cross-members 14. The prop bars 15 are inclined by approximately 60° to the horizontal but remain within a vertical plane which extends through the rod 13b. A third rod 16 extends parallel to the first and second rods 13a, 13b and caps the ends of all of the prop bars 15. A pair of struts 17a, 17b extend from the endmost cross-members 14 to respective ones of the endmost prop bars 15 to provide the structure with the requisite rigidity.

The inclination of the prop bars 15 allows rattan trays to be located between the cross-members 14 and leant against a respective prop bar 15 so that a number of rattan trays can be stacked on a single carriage 12.

The cross-members 14 may be formed with downwardly extending lugs 18 for engaging with the chain conveyor 2. The carriage 12 thereby accompanies the drive chain 10 in its motion around the circuit.

A number of such carriages 12 are fixed to the chain conveyor 2 around the drive chain 10 so that rattan trays 16 may be loaded on and retrieved from the chain conveyor 2 when the carriages 12 are outside the oven. The chain conveyor 2 is driven continuously and provides, for example, a smoking time between thirty minutes and one hour. When the speed at which the drive chain 10 is driven is increased, then the smoking time is reduced and vice versa.

The size of the oven 1 is dictated by the length of the chain conveyor 2 which is, in turn, governed by the required output capacity of the oven 1. For example, if the oven 1 needs to produce 2,000 rattan trays of "bak-kwa" in an 8.8 hour period, then the output rate needs to be in the region of 250 rattan trays per hour. Based on one and three quarter hours of smoking per batch of "bak-kwa", 438 rattan trays would be required to achieve continuous operation.

In a preferred embodiment, thirteen frames are provided on each carriage 12 and, therefore, each carriage 12 can carry thirteen rattan trays. Thus, thirty four ($\approx 438/13$) carriages 12 are provided. The carriages 12 are 25" (635mm) in length and are separated from each other by a 10" (254mm) gap. As thirty four trays are required, the drive chain 10 of the conveyor 2 needs to be 1190" ($34 \times (25" + 10")$) in length (≈ 100 feet, ≈ 30 metres).

The carriages 12 are preferably circulated around the oven 1 three times, each circuit in the oven 1 taking approximately 35 minutes, the speed of the carriages 12 on the chain conveyor 2 being approximately 0.5 to 1" per second (12.7 to 25.4mm per second). The worker in charge of loading trays 16 can then also turn the trays 16 exiting the oven 1 through 120° , whilst also performing a quality inspection of the trays 16 exiting the oven 1.

The chain conveyor 2 may be spaced from the base 3 by a distance sufficient to allow an operator access to the charcoal bed to renew the charcoal. In known systems, the provision of this space between the trays 16 and the bed was not possible as known systems use two layers of trays, the bottom layer needing to be as close as possible to the

charcoal bed to allow sufficient heat from the charcoal to reach the upper layer of trays.



CLAIMS:

1. A method of cooking a foodstuff using a cooking apparatus comprising an oven and a conveyor disposed partially within the oven, a first part of the conveyor located outside the oven comprising a handling station and a second part of the conveyor located inside the oven comprising a cooking station, which method comprises the steps of: providing a supply of raw or partially cooked foodstuff at the handling station; locating the foodstuff on the conveyor at the handling station; transporting the foodstuff on the conveyor from the handling station into the oven; cooking the foodstuff on the cooking station of the conveyor in the oven; transporting the foodstuff from the cooking station through and out of the oven and back to the handling station.

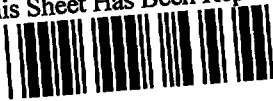
2. A method according to Claim 1, wherein, in use, the foodstuff is continuously transported into and out of the oven by the conveyor to provide a continuous supply of partially cooked, or cooked, foodstuff at the handling station.

3. A method according to Claim 1 or 2, wherein the conveyor transports the foodstuff in a circuit from the handling station to the cooking station and back to the handling station.

4. A method of cooking a foodstuff according to any preceding claim, wherein the foodstuff is inspected whilst on the handling station and, if required, the foodstuff is allowed to be transported back through the oven for further cooking without intervention.



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5. A method according to any preceding claim wherein partially cooked foodstuff being transported out of the oven is manipulated on the handling station prior to re-entering the oven.
6. A method according Claim 5, wherein the partially cooked foodstuff is manipulated by being turned.
7. A method according to any preceding claim, wherein the cooking step includes smoking the foodstuff.
8. A cooking apparatus comprising an oven for cooking a foodstuff and a conveyor for continuously transporting the foodstuff, the oven comprising an enclosure having at least one opening and the conveyor having a handling portion located externally of the enclosure and a cooking portion located within the enclosure, the conveyor transporting the foodstuff from the handling station, through the at least one opening and into the enclosure, through either the at least one opening or another opening and out of the enclosure, the foodstuff being cooked whilst in the enclosure.
9. A cooking apparatus according to Claim 8, wherein means are provided to prevent heat and/or smoke escaping through the at least one opening.
10. A cooking apparatus according to Claim 9, wherein the means comprises an extractor unit.
11. A cooking apparatus according to Claim 10, wherein the extractor unit is operable to remove escaping heat and/or smoke through a hood located adjacent the at least one opening.



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12. A cooking apparatus according to any one of Claims 9 to 11, wherein escaping heat and/or smoke is reintroduced into the oven.

13. A method of cooking substantially as hereinbefore described with reference to the accompanying drawings.

14. An apparatus substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

15. Any novel feature or combination of features disclosed herein.

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