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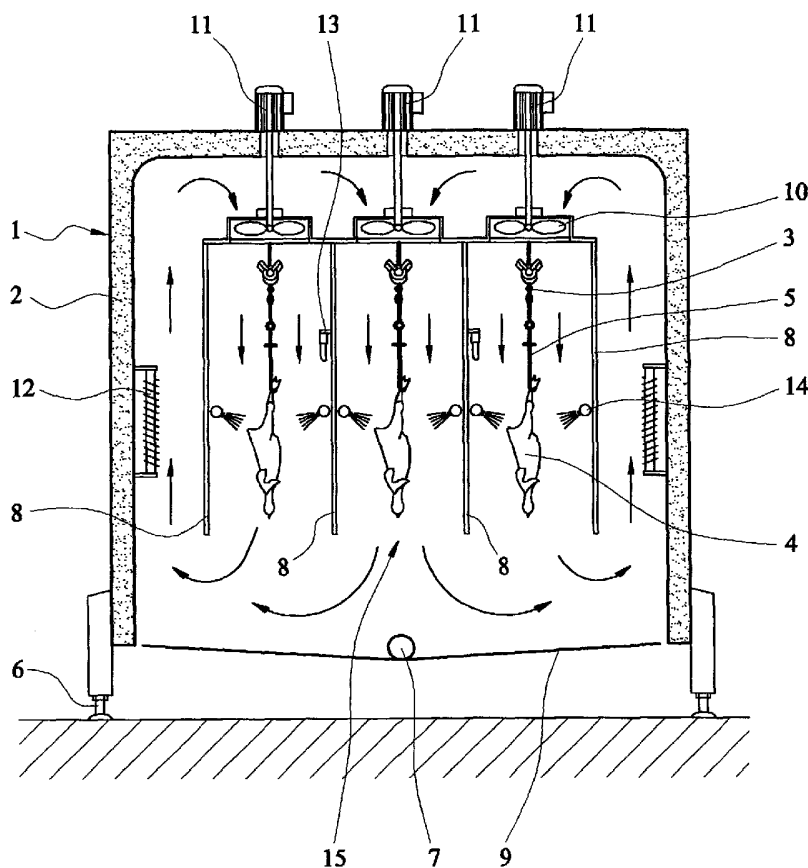
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(54) Title: CARCASS PROCESSING APPARATUS



(57) Abstract: Apparatus for processing carcasses of gallinaceous animals, including a conveyor line (3) from which, in operation, carcasses are suspended by their legs, a heating cabinet (1) through which the carcasses are transported on the conveyor line (3) the heating cabinet (1) including hot air means (10, 11, 15) to project a flow of hot air onto the carcasses to warm the outer surface on the carcasses to thereby loosen the feathers.



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CARCASS PROCESSING APPARATUS

This invention relates to apparatus for processing carcasses of gallinaceous animals, particularly but not exclusively, chickens and turkeys.

A conventional process for processing the carcasses of chickens, for example, includes the steps of first suspending the animals by their feet on an overhead conveyor line, stunning the animals, slitting their throats and passing them through a bleeding station where the blood drains out. Thereafter, the carcasses are passed through a hot water tank which serves to heat the outer surface of the carcass to loosen the feathers, prior to passing the carcasses through a plucking machine which removes the feathers.

This known process has a number of disadvantages. The principal disadvantage is relatively poor hygiene since, as all carcasses pass through the same hot water tank, there is a substantial risk of cross-contamination. To reduce this risk it is necessary to ensure on that bleeding of the carcasses has terminated before they enter the water. This has the disadvantage that the carcasses cool down, which means that they must spend longer in the water for their outer surfaces to be heated up again, before they enter the plucking machine. Additionally, to reduce the risk of fouling or cross-contamination, the water in the tank must be cleaned and/or replaced and reheated regularly, which increases the cost of processing. Further, the requirement for bleeding to be completed before the carcasses enter the hot water tank inevitably means that the bleeding station must be relatively larger than is necessary and it must be spaced from the hot water tank, which necessitates a relatively large amount of factory floor space for the apparatus.

The present invention seeks to provide an improved apparatus for processing carcasses which overcomes or reduces the disadvantages of the known process and provides a more compact and cost-effective process which produces a better product.

According to the present invention there is provided apparatus for processing carcasses of gallinaceous animals, including a conveyor line from which, in operation, carcasses are suspended by their feet, a heating zone through which the carcasses are

transported on the conveyor line, the heating zone including hot air means to project a flow of hot air onto the carcasses to warm the outer surface of the carcasses to thereby loosen the feathers.

Preferably, the hot air is directed generally downwardly to penetrate the feathers through to the skin onto the carcasses for a predetermined period which may be for between four and six minutes, depending on the size of the bird. The air is preferably recirculated round the heating zone.

In a preferred embodiment, a water mist spray is provided in the heating zone to lay dust and feathers which fall out of the carcasses. The conveyor line preferably follows a serpentine path through the cabinet. Preferably, the heating zone is contained in a substantially closed cabinet, which is insulated against the loss of heat. The cabinet may have a bleeding station immediately adjacent to the inlet where the carcasses enter the cabinet and may have a plucking machine positioned immediately adjacent the outlet where the carcasses leave the heating zone.

Preferred embodiments of the present invention will now be described, by way of example, with reference to the accompanying drawing, in which:

Figure 1 shows an end view of a heating cabinet, and

Figure 2 shows a schematic plan view of a heating cabinet.

Figure 3 shows a cross-section through the heating cabinet of Figure 1.

Referring now to Figure 1 of the drawings, there is shown a cross-sectional view of a heating cabinet 1 for incorporation in a carcass processing plant for processing, in particular, chickens. It will be appreciated that other types of gallinaceous animals, such as turkeys and ducks, may also be processed in this apparatus.

The heating cabinet 1 consists of an outer casing incorporating a layer of heat insulating material 2 through which cabinet an overhead conveyor line 3 passes from an inlet (not shown) to an outlet (not shown) following a serpentine path through the cabinet. Figure 2 shows, schematically, a plan view of a typical serpentine path. The cabinet 1 is

essentially self-contained being mounted on adjustable feet 6. In this way, no significant structural work is required to the factory floor when installing the apparatus and flexibility is maintained if it is subsequently desired to move the cabinet to a different position.

The heating cabinet 1 includes a waste outlet shown schematically as reference 7 through which dust, feathers and other debris is removed from the cabinet. The waste outlet 7 may include a water channel to assist in the removal of the debris and the floor of the cabinet slopes down towards this outlet. The conveyor line 3 and carcasses suspended therefrom is enclosed by sidewalls 8 which depend from a position near the top of the cabinet to a position spaced from the floor to form a substantially closed channel open at its bottom end. At the upper ends, the sidewalls 8 are connected to fans 10 driven by appropriate electric motors 11 which drive hot air downwardly through the closed channel formed by the side walls. On exiting the closed channel at the open lower end 15, the hot air passes upwardly to the top of the heating cabinet for recirculation by the fans 10. The heating cabinet 1 includes heaters 12 to heat the air being recirculated. The channel includes, at intervals, thermostats 13 which measure the temperature in the channel. The channel also includes, at spaced intervals, water mist sprayers 14 which spray a fine mist downwardly in the channel to entrain dust and to assist the downward movement of feathers dislodged from the carcasses.

The fact that the hot air is directed downwardly onto the carcasses has the advantage that it is in a direction opposite to the natural lie of the feathers so to enter between feathers to assist in opening them out and allowing the hot air to impinge on the surface of the carcass. The fact that the air exits the lower ends of the channels and then passes through a directional change of 180 degrees before passing upwardly assists in the separation of dust and stray matter from the air flow since, as its weight is inevitably more than air, its mass inertia tends to keep it falling to the bottom of the cabinet in the manner of a centrifugal filter. Baffles may be provided to assist this directional change of the airflow.

Figure 3 illustrates an alternative embodiment utilising hot air jets and shows four lengths of the conveyor line as it follows its serpentine path through the heating cabinet. Each length of conveyor line has opposed air jets 16 which are located adjacent carcasses

passing along the conveyor line and are arranged to direct a high-pressure jet of air onto the carcasses passing along the conveyor so as to enter between the feathers. The jet or jets is/are directed generally downwardly onto the carcasses against the lie of the feathers as this tends to open the feathers out and facilitates the hot jet of air contacting the skin of the carcass. Each air jet is connected to a hot air supply passage 17, through which hot air recirculated from the cabinet is supplied to the air jets. The orientation of the air jets is adjustable by pivoting the air jets about their axes where they are connected to the hot air supply passage 17 to enable the air jets to be adjusted to accommodate the different sizes of bird passing along the conveyor line. The jets are grouped together in a small array in an air jet unit pivotally mounted on the hot air passage 17. The position of the carcasses relative to the jets may be determined by the provision of an appropriate length of the shackle by which the carcass is suspended.

It has been found that the supply of high-pressure, narrow jets of hot air to the carcasses improves the plucking effect since the hot air has a greater efficiency in penetrating to the skin of the carcass.

To further improve the penetration of hot air to the skin of the carcass, the carcass may be subjected to a pre-plucking process using conventional plucking fingers which removes approximately 30 percent of the feathers and alters the set of the remaining feathers to facilitate the flow of hot air towards the skin.

Carcasses to be processed are suspended by their legs from the conveyor line on shackles 5 in a known manner. As mentioned earlier, the carcasses are first stunned and then have their throats slit as they pass through a bleeding station. In the present apparatus, the bleeding station may be positioned adjacent to the inlet to the heating cabinet 1 since it is no longer essential for bleeding to be terminated before the carcasses enter the heating stage. It is envisaged that the majority of bleeding will take place before the carcasses enter the heating cabinet 1 but, since the carcasses do not touch each other and are not in touch with a common fluid like the water in a hot water tank which would take up any stray blood on a carcass, and hence increase the risk of cross-contamination, some bleeding can take place in the heating cabinet. The bleeding station can therefore be located immediately adjacent the inlet to the heating cabinet which not only reduces the space

taken by the installation, but loss of heat from the carcasses is kept to a minimum. The carcasses can therefore be processed much faster than with the known method and the reduction in temperature changes in the processing and the increased speed of processing results in a better quality end product.

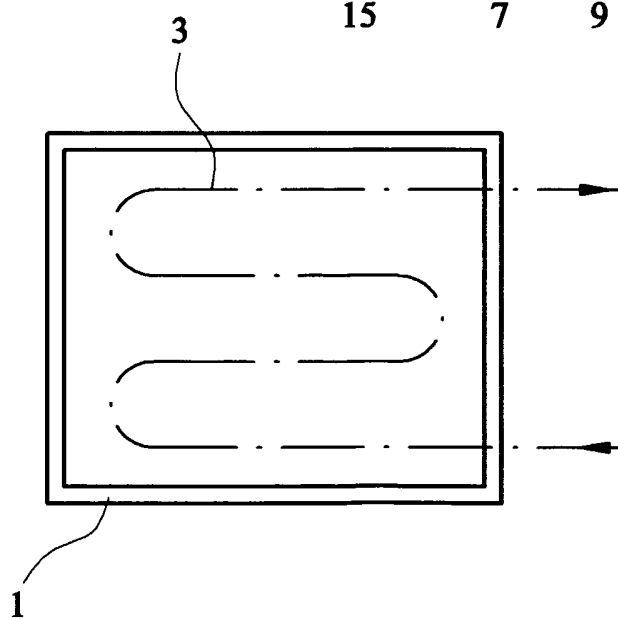
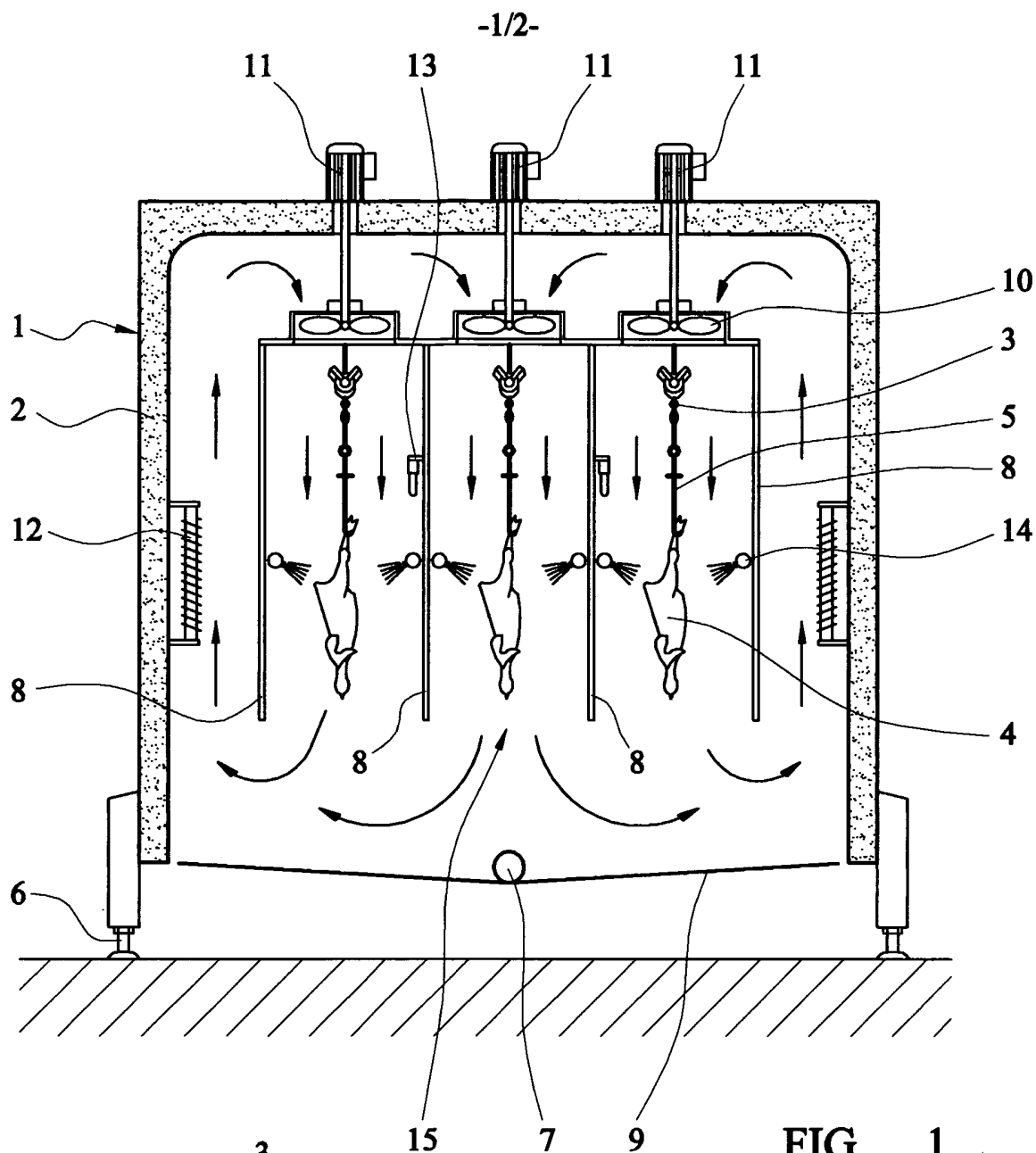
Although not shown, additional filters may be included in the cabinet 1 at the inlet to the fans. It will be understood that the fans and drive arrangement illustrated is by way of example only and may be in the form of a duct arrangement using just one or two powerful fans located at intervals along with the serpentine path. The dwell time for carcasses within the cabinet depends upon the type and size of the carcasses to be the feathered but typically, would be between four and six minutes.

The use of the present invention has the added advantage that the size of the bleeding station may be reduced compared with the known installations. It is envisaged that no hot water tank need be provided although it is possible that in certain circumstances and installations a small hot water tank may be retained to dip the wings which are more difficult for the hot air to raise in temperatures.

CLAIMS

1. Apparatus for processing carcasses of gallinaceous animals, including a conveyor line from which, in operation, carcasses are suspended by their feet, a heating zone through which the carcasses are transported on the conveyor line, the heating zone including hot air means to project a flow of hot air onto the carcasses to warm the outer surface of the carcasses to thereby loosen the feathers.
2. Apparatus according to claim 1, wherein the hot air is directed generally downwardly onto the carcasses.
3. Apparatus according to claim 1 or 2, wherein the hot air is recirculated round the heating zone.
4. Apparatus according to claim 3 when dependent on claim 2, wherein after passing over the carcasses, the hot air flow is deflected substantially through 180 degrees to pass upwardly to the top of the heating zone, for recirculation.
5. Apparatus according to any one of claims 1 to 4, wherein the hot air means comprises at least one hot air jet located adjacent to the path of the carcasses through the heating zone.
6. Apparatus according to claim 5, wherein a plurality of the said hot air jets are located along the path of the carcasses through the heating zone.
7. Apparatus according to claim 6 wherein the said hot air jets are located on both sides of the path of the carcasses through the heating zone.
8. Apparatus according to any one of claims 5 to 7, wherein a plurality of the jets are mounted in an array in an air jet unit.

9. Apparatus according to any one of claims 5 to 8, wherein the angular relationship of the or each hot air jet is adjustable relative to the path of the carcasses through the heating zone.
10. Apparatus according to any one of the preceding claims, wherein a pre-plucking zone is provided adjacent to the heating zone to subject the carcasses to an initial pre-plucking process before the carcasses enter the heating zone.
11. Apparatus according to any one of claims 5 to 10, wherein the hot air jet or jets is/are arranged to be directed generally downwardly onto the carcass against the lie of the feathers.
12. Apparatus according to any one of claims 1 to 11, wherein a water mist spray is provided in the heating zone to lay dust and feathers which fall out of the carcasses.
13. Apparatus according to any one of the preceding claims, wherein the conveyor line follows a serpentine path through the heating zone.
14. Apparatus according to any one of the preceding claims, wherein the heating zone is contained in a substantially closed cabinet, which is insulated against the loss of heat.
15. Apparatus according to any one of the preceding claims further including a bleeding station located immediately adjacent to an inlet where the carcasses enter the heating zone.
16. Apparatus according to claim 15, further including a plucking machine positioned immediately adjacent an outlet where the carcasses leave the heating zone.
17. Apparatus according to any one of the preceding claims wherein the carcasses are subjected to the flow of hot air for a predetermined period of between four and six minutes.



INTERNATIONAL SEARCH REPORT

Internat Application No

PCT/GD J2/05439

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A22C21/04

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A22C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3 703 021 A (SHARP ALLEN W) 21 November 1972 (1972-11-21) column 2, line 61 -column 4, line 64; figure 3 ----	1-17
X	US 4 868 950 A (HARBEN JR DECEASED GROVER S) 26 September 1989 (1989-09-26) column 3, line 4 -column 5, line 15; figures ----	1-17
X	US 3 744 088 A (SNOWDEN B) 10 July 1973 (1973-07-10) column 2, line 30-44; figure 1 ----	1
X	DE 20 07 305 A (FOOD EQUIPMENT INC.) 2 September 1971 (1971-09-02) page 8, line 8 -page 10, line 5; figure 1 -----	1



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

* Special categories of cited documents:

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X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

In relation on patent family members

International application No

PCT/Gb J2/05439

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
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