



PATENT SPECIFICATION

(11) S85265

(21) Application No. S2007/0651

(22) Date of Filing of Application: 12/09/2007

(45) Specification Published: 10 June 2009

(51) Int. Cl. (2009)
A22C 9/00
A22C 17/00
A23P 1/00

(54) Title: A process and apparatus for producing ham

(72) Inventor: TOM HYLAND
DAVID LAWLOR

(73) Patent Granted to: BREEO ENTERPRISES LIMITED, an Irish Company, Building 5100,
Cork Airport Business Park, Kinsale Road, Cork, Ireland

Title

A process and apparatus for producing ham.

Field of the Invention

- 5 The present invention relates to the processing of meat. In particular the invention relates to a process and apparatus for producing ham.

Background to the Invention

- 10 The processing of raw meats such as pork into ham typically involves a series of individual steps as the meat is conveyed through a processing line. In typical prior art processes, raw pork leg meat undergoes an injection step, a massaging step, a scarifying step, and a tumbling step prior to cooking. During the scarifying step, cuts up to 10 mm are put into the ham pieces to increase their surface area, in order to produce a better ham which binds and slices better for the end user.

- 15 Accordingly it will be appreciated that increasing the surface area of the meat as much as possible is desirable. It is an object of the invention to provide an improved process and apparatus for producing ham wherein the surface area of the ham is increased prior to cooking without effecting the final quality, texture or brine content of the ham.

20

Summary of the Invention

- Accordingly, the present invention provides a process for producing ham comprising: injecting raw meat with a brine; slicing injected meat into portions; scarifying the sliced portions of meat to increase their surface area; tumbling the scarified portions of meat; 25 packing the tumbled portions of meat; and cooking the packed meat.

- Preferably, the step of slicing the injected meat comprises passing the injected meat under at least one rotating blade, wherein the speed of linear travel of the meat and the speed of rotation of the at least one blade are substantially equal. The speed of rotation 30 of each blade is preferably approximately 5 RPM.

It will be appreciated that the term scarifying as used herein is intended to indicate that the meat is scored rather than cut through. It will be appreciated that the term slicing as used herein is intended to indicate that the meat is cut through.

- 5 The invention further provides an apparatus for producing ham comprising: an injector for injecting raw meat with a brine; a slicer arranged to slice injected meat into portions; a scarifier arranged to scarify the sliced portions of meat to increase their surface area; a tumbler arranged to tumble the scarified portions of meat; a packer for packing the tumbled portions of meat; and cooking means for cooking the packed meat.

10

In a preferred embodiment, the slicer comprises a plurality of blades to slice the injected meat into slices.

- The invention further comprises a slicing machine for use in a ham production line, the
15 slicing machine comprising:

a conveyer belt for transporting meat on a linear path through the slicing machine having an upper surface for receiving meat to be sliced; and

- at least one substantially circular cutting blade arranged to rotate relative to the conveyer belt wherein the cutting edge of each blade maintains contact with the upper
20 surface of the belt as it rotates to cut meat thereon into at least two individual portions;

and wherein the at least one cutting blade is arranged to rotate at substantially the same speed as the speed of the conveyer belt (through the slicing machine).

- Preferably the slicing machine further comprises means for maintaining the meat on the
25 conveyer belt as it is sliced. The means for maintaining the meat on the conveyer belt may be one or more slides having a finger-like form, each having a fixed end pivotally mounted above the belt and a free end biased towards the upper surface of the conveyer belt. As meat on the conveyer passes under a rotating blade, contact is made between the meat and the free end of each slide, creating a downward force on the meat to
30 maintain positive contact between the meat and the belt. The slicing machine may be used as the slicer in the apparatus of the invention.

The present invention has the benefit of cutting the meat muscle into smaller regular sizes without imparting a large energy to the product which would result in a poorer texture ham which would have a rubbery texture. These smaller sizes are still large enough to give a good quality finished ham face. The slicer/slicing machine also by its
5 low energy cutting does not affect the level of brine which is injected at the previous step.

Brief Description of the Drawings

Figure 1 is a flow diagram of the process blocks of an apparatus for producing ham in
10 accordance with the present invention;

Figure 2 is a side cross-sectional view of a slicing machine in accordance with the present invention;

Figure 3 is an end cross-sectional view of the slicing machine of Figure 2;

Figure 4 is a side view of a slide portion of the slicing machine of Figure 2; and

15 Figure 5 is a perspective view of the slide portion of Figure 4.

Detailed Description of the Drawings

Figure 1 is a flow diagram of the process blocks of an apparatus for producing ham in accordance with one embodiment of the present invention. The apparatus comprises an
20 injector 8, a standard scarifier 10 for putting shallow cuts into the ham to increase its surface area, a slicing scarifier (slicing machine) 12 located between the injector and the standard scarifier for slicing the injected ham prior to being scarified by the standard scarifier, a tumbler 16, a packing machine 20 and at least one oven 24 or water cooking tank 26. The individual components of the apparatus are linked by a series of conveyer
25 belts 6 and lifting machines 4, 14, 18.

Figure 1 shows that in use, at the start of the processing, unprocessed ham is lifted from a bin 2 using a lifting machine 4 onto a conveyer belt 6. The conveyer belt feeds the ham into and through the injector 8. As the ham passes through the injector, a plurality
30 of vertically aligned needles are dropped down into the underlying ham and a brine, which is a water, salt, nitrate, nitrite, ascorbate mixture, is injected into the ham. The ham exits the injector on a conveyor and is introduced into the slicing scarifier 12, wherein the ham pieces are sliced by closely aligned rotating circular blades. The cut

portions of ham are then conveyed into the standard scarifier 10 which places cuts in the ham to increase its surface area. The sliced ham is then tumbled in tumbler 16 to facilitate cure development and protein extraction and to aid binding of the formed ham, before being packed by a packing machine 20. The packing machine fills the meat into
 5 logs in a plastic casing under vacuum so that there will be no holes in the finished ham. These logs are then placed in moulds 22 for cooking. The moulds are then introduced into an oven 24 or water cooking tanks 26 to cook the ham.

Figure 2 is a side cross-sectional view of one embodiment of slicer 28 (also referred to
 10 herein as a slicing scarifier or slicing machine) according to the present invention. The slicer comprises a plurality of circular blades 30. Each blade is approximately 400mm in diameter. Each blade is held on a substantially horizontal central axle 32 and held parallel to, and a distance apart from, its neighbouring blade by a pair of locking rings 34, one on each side of the blade. In a preferred embodiment the blades are held 85mm
 15 apart. The locking rings may be moved to adjust the spacing between the blades. The central axle is positioned over a substantially horizontal driven conveyer 36, which is used to pass ham through the scarifier under the blades. A motor 38 is provided to drive the blades by rotating the axle to which the blades are fixed. The blades do not move relative to the axle, the rotating axle in turn rotates the blades thereon. Substantially
 20 vertical side arms 41 maintain the ends of the axle 32 a short height above the conveyer. Drive means are provided to rotate the axle relative to the side arms. The axle is spring loaded on the arms to provide a suspension effect when the blades contact the meat.

The scarifier further comprises a plurality of slides 40. Each slide 40 is finger like in
 25 form, as shown in detail in figures 4 and 5. Each slide has two bends 42, 44 along its length to form an upper portion 46, an intermediate portion 48, and a lower portion 50. When viewed in cross-section, the upper portion 46 is angled relative to the intermediate portion 48, which is in turn angled relative to the lower portion 50. The angle between the upper and intermediate portion is approximately 30 degrees, while
 30 the angle between the intermediate portion and the lower portion is approximately 40 degrees. The longest portion of the slide is the upper portion, which measures approximately 490mm. The intermediate portion measures approximately 380mm, while the shortest lower portion is approximately 83mm in length.

For clarity, the slides are not shown in Figure 3, however, in use, a plurality of slides are positioned in a spaced parallel orientation across the width of the conveyer belt, interspersing the blades. The longitudinal axis of each slide is substantially aligned with the direction of travel of the conveyer belt. Each slide has a width less than the spacing between the blades. As seen in Figure 2, the slides are held in a parallel orientation by a shaft 52, which runs across the width of the conveyer belt, parallel to the blade axle 32. The shaft 52 is located above the conveyer belt proximal to the entrance 54 of the scarifier 28. The end of the upper portion of each slide has defined therein a bush through which the shaft passes. The bush allows the end of the slide to rotate freely relative to the shaft. Each slide is prevented from lateral movement along the shaft by one or more locking ring(s). In use, at rest, the lower portion 50 of each slide rests on the conveyer belt 36 with the free end 56 of the lower portion facing the direction of travel of the belt. As ham on the conveyer passes under a slide, contact is made between the ham and the underside of the slide, typically the underside of the intermediate portion. As the upper end of the slide is free to rotate about the shaft, the forward movement of the ham along the conveyer forces the free end of the slide upwards. The purpose of the slide is to ensure the meat remains on the conveyer belt. At rest, each slide is biased towards the belt by its own weight.

20

Each blade has a slide on each side. The blades and slides arrangement is housed in a frame 58 through which the conveyer belt passes. Ham enters the frame on the conveyer belt through an opening 54 in the frame housing and exits through an exit 60 in the housing. Doors operated by a pneumatic spring are provided both in the opening and at the exit of the scarifier frame housing. A second motor 62 is provided to drive the conveyer. Both motors are variable speed geared motors. A safety stop switch is also provided in contact with both motors to enable them to stop in an emergency.

As the ham is passed through the scarifier frame the ham is held down on the belt by the slides as the rotating blades contact and cut into the meat. The axle is arranged at a predetermined distance above the belt so as to ensure that the blades cut into the meat, and cut right through it. This is done in as very slow procedure as the blades only revolve at the same speed as the conveyor carrying the meat. This is a very important

30

part of the process. In a preferred embodiment, the blades rotate at approximately 5 RPM, although speeds in the range of approximately 3 RPM to 7 RPM may be used. As the belt moves each meat piece clear of the blades and the slides, the lower end of each slide falls back down under gravity onto the conveyer belt, ready for the next piece of meat. The scarified meat is then conveyed by the belt out through the frame exit for further processing.

It will be appreciated that in alternative embodiments of the invention, the slicing scarifier may take an alternative form and may contain any number of blades.

The words “comprises/comprising” and the words “having/including” when used herein with reference to the present invention are used to specify the presence of stated features, integers, steps or components but does not preclude the presence or addition of one or more other features, integers, steps, components or groups thereof.

It is appreciated that certain features of the invention, which are, for clarity, described in the context of separate embodiments, may also be provided in combination in a single embodiment. Conversely, various features of the invention which are, for brevity, described in the context of a single embodiment, may also be provided separately or in any suitable sub-combination.

Claims

1. A process for producing ham comprising:
 - a. injecting raw meat with a brine;
 - 5 b. slicing injected meat into portions;
 - c. scarifying the sliced portions of meat to increase their surface area;
 - d. tumbling the scarified portions of meat;
 - e. packing the tumbled portions of meat; and
 - f. cooking the packed meat.
- 10 2. Apparatus for producing ham comprising:
 - a. an injector for injecting raw meat with a brine;
 - b. a slicer arranged to slice injected meat into portions;
 - c. a scarifier arranged to scarify the sliced portions of meat to increase
 - 15 their surface area;
 - d. a tumbler arranged to tumble the scarified portions of meat;
 - e. a packer for packing the tumbled portions of meat; and
 - f. cooking means for cooking the packed meat.
- 20 3. A slicing machine for use in a ham production line, the slicing machine comprising:
 - a. a conveyer belt for transporting meat on a linear path though the slicing machine having an upper surface for receiving meat to be sliced; and
 - b. at least one substantially circular cutting blade arranged to rotate relative
 - 25 to the conveyer belt wherein the cutting edge of each blade maintains contact with the upper surface of the belt as it rotates to cut meat thereon into at least two individual portions;wherein the at least one cutting blade is arranged to rotate at substantially the same speed as the speed of the conveyer belt.
- 30 4. A method of producing ham substantially as described herein with reference to and as shown in the accompanying drawings.

5. An apparatus of producing ham substantially as described herein with reference to and as shown in the accompanying drawings.

1/3.

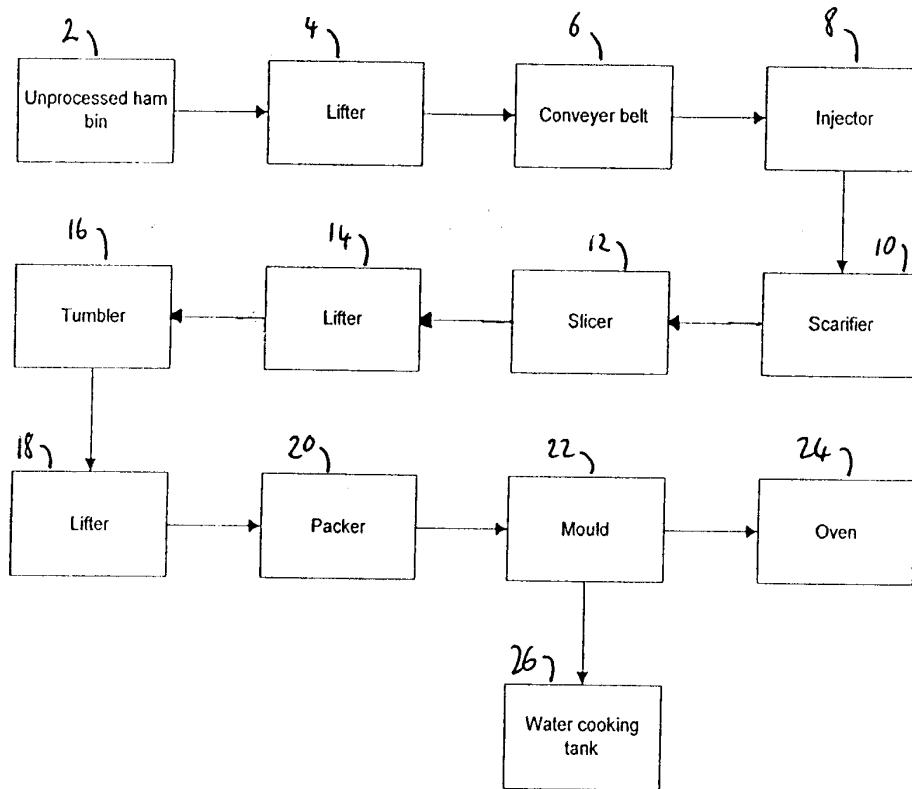


FIG. 1

2/3

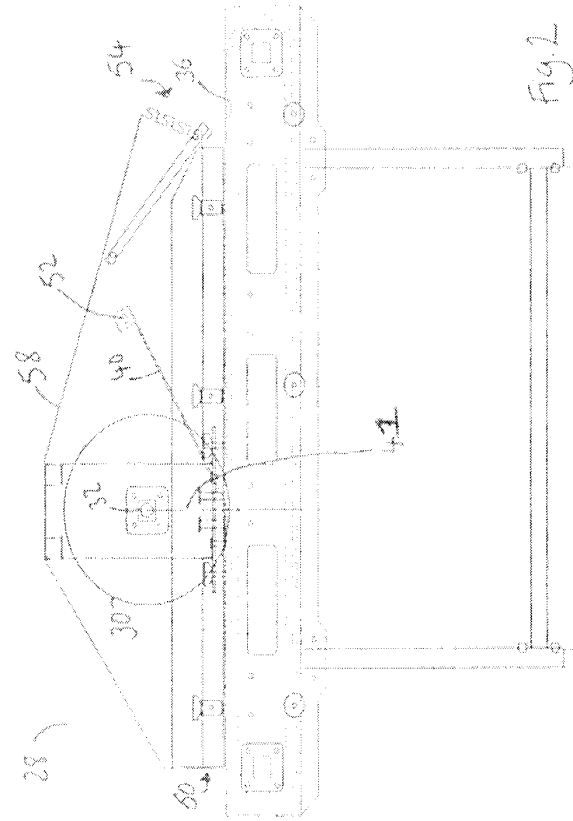


Fig. 2

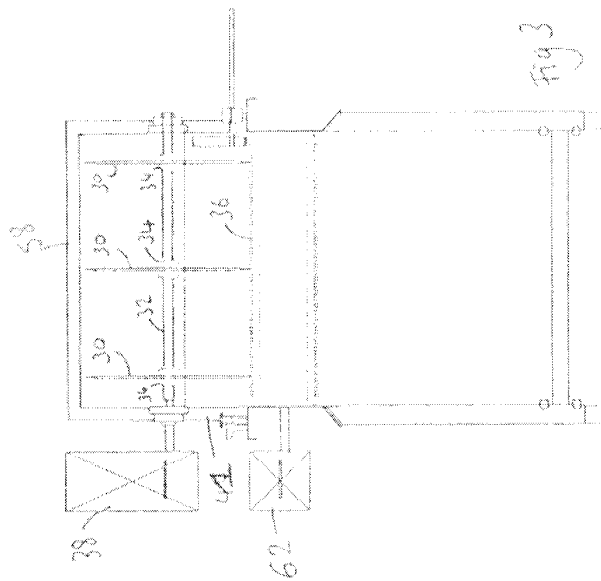


Fig. 3

3/3.

