Oct. 7, 1969 O. H. LINDSTROM ET AL 3,470,668

SHINGLING BACON PROCESS AND APPARATUS

Filed Sept. 15, 1966 2 Sheets-Sheet 1

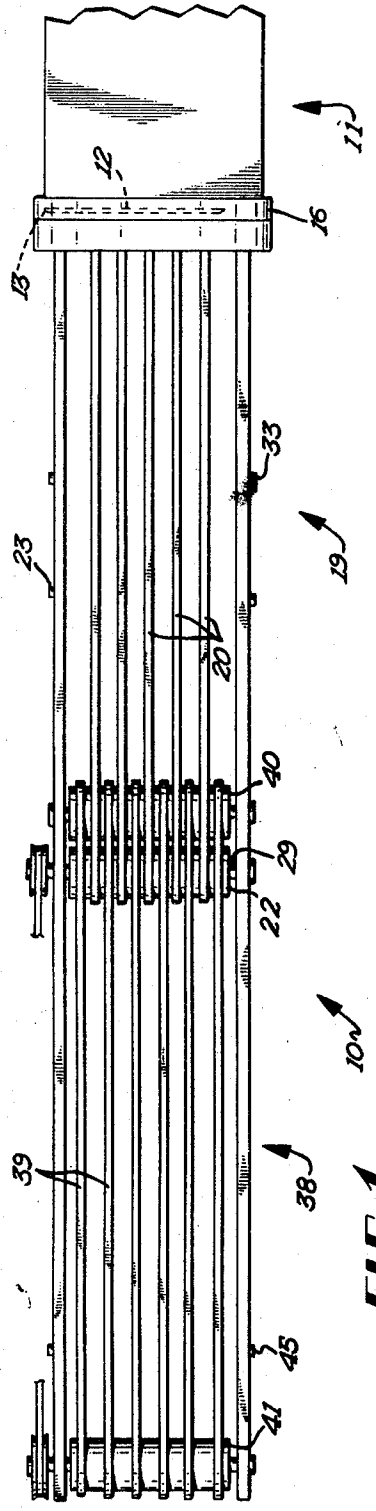


FIG 1

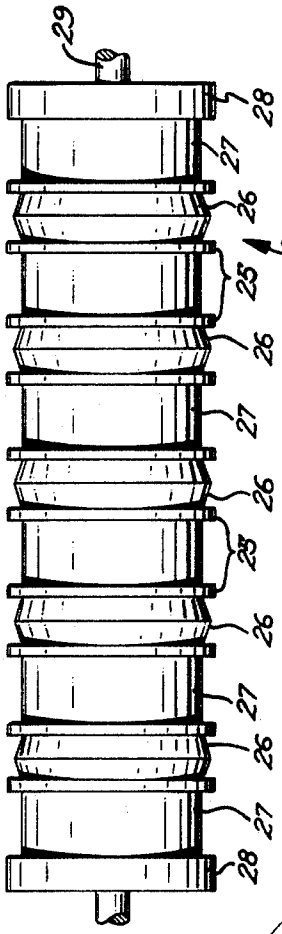


FIG 4

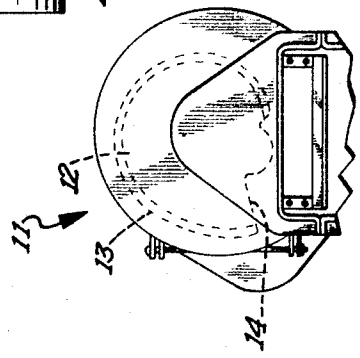


FIG 3

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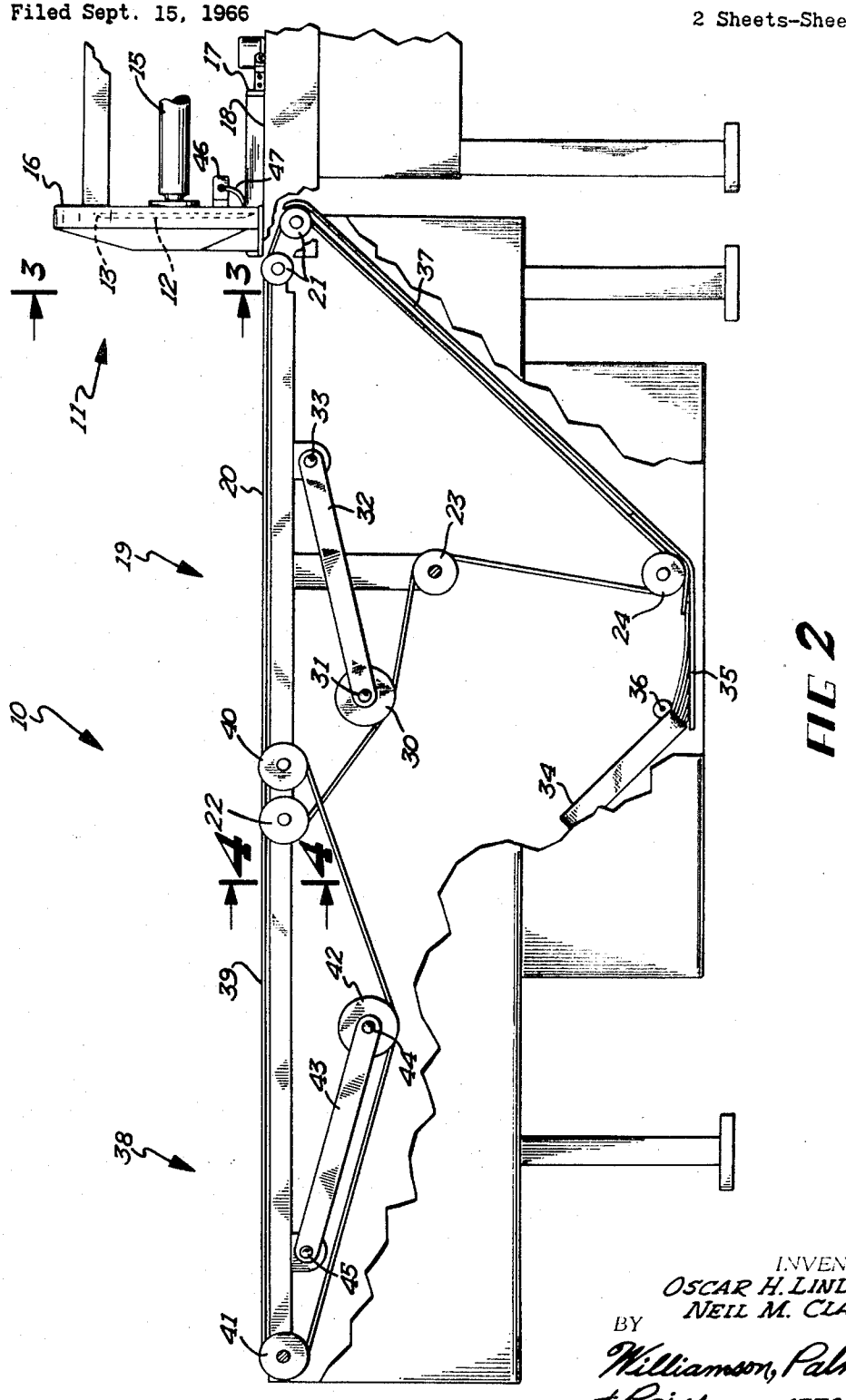


FIG 2

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United States Patent Office 3,470,668
Patented Oct. 7, 1969

3,470,668

SHINGLING BACON PROCESS AND APPARATUS

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Filed Sept. 15, 1966, Ser. No. 579,726
Int. Cl. B65b 25/06, 35/50; B65g 37/00
U.S. Cl. 53—23 4 Claims

ABSTRACT OF THE DISCLOSURE

Process and apparatus for slicing and packaging bacon in which sheets of packaging paper are successively fed upon a first conveyor mechanism so that the sheets are disposed in substantially end-to-end relation as they are passed below a cutting mechanism, which continuously slices a slab of bacon into a plurality of elongate slices. The conveyor mechanism and cutting mechanism being coordinated so that the bacon slices fall upon each sheet in substantially side-by-side relation with little if any overlap of adjacent slices. A second conveyor mechanism disposed in lapped relation with the first conveyor mechanism and operating at a greater speed than said first mechanism to cause separation of the sheets as they are moved from the first conveyor mechanism to the second conveyor mechanism.

This invention relates to a meat processing system and more particularly to a bacon slicing and packaging system.

In many of the conventional bacon slicing systems, slab bacon is continuously sliced by a slicer and the slices are deposited on sheets of paper for packaging. In the conventional commercial practice, the sheets will contain a predetermined number of slices and the slices of each sheet will be disposed in overlapping or shingled relationship. When the product is to be cooked, it is necessary for the consumer to separate the slices which involves a time consuming procedure and is inconvenient for institutional use especially where relatively large quantities of bacon are cooked by restaurants and the like.

It is therefore a general object of this invention to provide an apparatus for slicing bacon into a plurality of strips so that the strips are continuously deposited in side-by-side relation on sheets of packaging material such as paper and the like, whereby there is little if any overlap between adjacent strips of the bacon on each sheet. With this arrangement the strips on a sheet may be applied to a cooking surface by merely inverting the packaging sheet and without necessitating separation of the adjacent strips.

A more specific object of this invention is to provide an apparatus for slicing and packaging bacon including a bacon slicing device which is arranged and constructed to slice bacon slabs into strips, a plurality of such strips being deposited on a sheet of paper moved by a first conveyor system which operates at a predetermined speed so that the slices are deposited on each sheet in side-by-side relation with little if any overlap, and a second conveyor system which is arranged in overlapping relation with respect to said first conveyor system and which operates at a greater rate of speed than the first conveyor system to thereby separate the sheets.

These and other objects and advantages of this invention will more fully appear from the following description made in connection with the accompanying drawings wherein like reference characters refer to the same or similar parts throughout the several views, and in which:

FIG. 1 is a top plan view of the slicing and packaging apparatus;

FIG. 2 is a side elevational view thereof;

FIG. 3 is a cross-sectional view taken approximately along line 3—3 of FIG. 2 and looking in the direction of the arrows;

FIG. 4 is a cross-sectional view taken approximately along line 4—4 of FIG. 2 and looking in the direction of the arrows.

Referring now to the drawings and more specifically to FIG. 1, it will be seen that one embodiment of the novel bacon slicing and packaging apparatus designated generally by the reference numeral **10** is there shown.

The bacon slicing and packaging device **10** includes a slicer device **11** comprising a revolvable blade **12** having a peripheral cutting edge **13**, the blade being recessed as at **14** as best seen in FIGS. 2 and 3. The blade is secured to a drive shaft **15** which may be driven by any suitable means such as an electric motor, the blade being revolvable with the shaft. The revolvable blade **12** is positioned within the housing **16** which may be mounted on a suitable supporting structure to space blade above the surface of the floor. A gripper carriage **17** is mounted for movement along a table **18** which extends rearwardly from the blade housing **16**. The gripper carriage is movable along the table towards and away from the blade housing to force a slab of bacon into position to be sliced by the revolving blade **12**. Movement of the gripper carriage towards and away from the blade may be accomplished by a fluid pressure cylinder and piston unit in a well-known manner. The slab of bacon to be cut is urged forwardly and successive slices are made along the forwardly positioned edge of the slab.

The slices are adapted to fall in side-by-side relation upon paper sheets which are moved below the cutting device by first conveyor mechanism **19**, one end of which is positioned below the slicer device **11**. This first conveyor mechanism **19** includes a plurality of similar endless conveyor belts or ribbons **20**, positioned in laterally spaced apart side-by-side relation as best seen in FIGS. 1 and 2. The conveyor ribbons **20** are trained about a pair of rear upper rollers **21** and a forward upper drive roller **22**. These conveyor ribbons **20** are then trained rearwardly over an intermediate roller **23** and thereafter downwardly over a lower roller **24**. It will be seen that the conveyor ribbons while extending between the upper front and rear rollers define the upper run of the conveyor mechanism **19**.

It is pointed out that the various rollers of the first conveyor mechanism **19** as well as the rollers of the second conveyor mechanism to be described hereinbelow are similar in construction to the driven roller **22** illustrated in FIG. 4 of the drawing. To this end, it will be seen that roller **22** includes a plurality of pairs of annular flanges **25** which project radially outwardly of and are spaced axially along the roller. Each pair of flanges is positioned on opposite sides of one of a plurality of convex guide surfaces **26** about which the conveyor ribbons **19** are trained. Each pair of annular flanges is spaced apart from adjacent pairs of flanges by annular surfaces **27** which as shown have a greater axial dimension that the convex surfaces **26**, but have a smaller radii than these convex surfaces. Each roller is provided with end flanges **28** at opposite ends thereof and suitable shafts **29** which project axially therefrom to be received in suitable bearings. Drive means are provided for the forward roller **22** to revolve the same so that the conveyor ribbons **20** are moved at a predetermined speed. It will be noted that the rollers of the first conveyor mechanism **19** have six convex ribbon engaging surfaces **26** which are spaced apart from each other as best seen in FIG. 3. It will also be noted that a suitable tensioning roller **30** engages the rib-

bons to tension the same. This roller is revolvably mounted on arms **32** which are journalled on a shaft **33** that is secured to the supporting frame for the bacon slicing and packaging device. The tensioning or tightener roller **30** serves to tighten all of the conveyor ribbons **20**.

An inclined paper holder structure **34** is positioned below the first conveyor mechanism **19** and this paper holder is adapted to have a plurality of sheets of paper stacked thereon. The paper is moved one sheet at a time from the stack of sheets to a paper feeder **35** by means of suitable rollers **36** which revolve in a direction to urge the paper towards the first conveyor mechanism **19**.

An elongate guide plate **37** is positioned below in close proximity to the upwardly inclined run of conveyor belts or ribbons **20** so that the sheets of paper be fed upwardly therealong by the cooperative action of the conveyor ribbons with the guide plate **37**. The sheets of paper will be fed from the paper holder and paper feeder in overlapped relation.

However, the conveyor ribbons **20** will be moving at a much faster rate than the movement of the paper by the paper feeder, so that when a sheet of paper is moved between the guide plate **37** and the conveyor ribbons **20**, each sheet of paper will be moved out of overlapped relation with respect to the next adjacent sheet, and the sheets of paper will be moved in substantially end-to-end relation.

The sheets of paper will be moved below the slicer device **11** and the slices of bacon will be deposited thereon. The speed of the conveyor ribbons **20** in relation to the revolving movement of the plate **12** is such that the slices of bacon will be positioned upon each sheet of paper so that the edges of adjacent slices engage or abut each other or so that there is only a slight overlap of perhaps ⅛-inch between adjacent slices. Each sheet of paper will have a predetermined number of slices thereon, and the sheets with the slices thereon will be moved forwardly along the upper run of the conveyor mechanism **19**.

A second conveyor mechanism **38** is provided and forms a continuation of the first conveyor mechanism **19**. The second conveyor mechanism **38** also includes a plurality of conveyor belts or ribbons **39** which are trained around a rear roller **40** and a front roller **41**. A tensioning roller **42** is also provided and is revolvably mounted on arms **43** by shaft **44**. The arms **43** are also journalled on a shaft **45** which is carried by the supporting structure of the slicing and packaging device. The conveyor ribbons **39** are each of the same width as the width of the conveyor elements **20** and each of the rollers **40** and **41** are also provided with a plurality of concave annular belt engaging surfaces which are spaced apart. Rollers **40** and **41** are also provided with a pair of radially projecting annular flanges, a pair of such flanges being located on opposite ends of each belt engaging surfaces. Each of the rollers also include a reduced annular surface located between each belt engaging surface, in the manner of the roller **22**. It is also pointed out that the roller **41** is driven so that the upper run of the second conveyor mechanism is moved in a forward direction.

It will be noted that the driven roller **22** is positioned forwardly of the roller **40** and the axis of these rollers is disposed in substantially parallel relationship. The second conveyor mechanism **38** is provided with five conveyor ribbons while the first conveyor mechanism, as pointed out above, is provided with six such conveyor ribbons. Thus, the roller **40** has five convex belt engaging surfaces, while the roller **42** has six such convex belt engaging surfaces. The roller **40** on the other hand, has six reduced annular surfaces located between the belt engaging surfaces while the roller **42** has five such reduced annular surfaces between the belt engaging surfaces. It will be seen that with this arrangement, the conveyor ribbons **20** will engage the convex annular belt engaging surfaces on the roller **22**, while the conveyor ribbons **39** will pass over the reduced annular surfaces located between the convex belt engaging surfaces.

Referring again to FIG. 4, it will be seen that the conveyor ribbons **39** do not engage the reduced annular surfaces **27** and therefore do not contact the roller **22**. Similarly, the conveyor ribbons **20** pass over the annular surfaces located between the belt engaging surfaces on the roller **40** and are therefore not disposed in engaging relation with the roller **40**. However, the conveyor ribbons **39** do in fact engage the belt engaging convex surfaces of the roller **40**. It is pointed out that the annular convex belt engaging surfaces on the uppermost of the rear rollers **21**, roller **22**, roller **40** and the roller **41**, respectively, are disposed in substantially coplanar relation so that the upper runs of the conveyor ribbons of each conveyor mechanism are also disposed in substantially the same horizontal plane.

The second conveyor mechanism **38** is operated at a higher rate of speed than the first conveyor mechanism so that as the sheets of paper with the slices of bacon thereon are moved from the first conveyor mechanism to the second conveyor mechanism, the sheets which are then in substantially end-to-end relation will be separated.

In operation, slabs of bacon to be sliced will be positioned upon the table **18** and will be gripped by the gripper carriage **17** so that the slab of bacon will be urged towards the slicer device **11**. The revolvable blade **12** will progressively slice the slab of bacon into a plurality of slices, so that the slices are deposited upon each sheet of paper in substantially side-by-side relation.

Suitable drive means are provided for revolving rollers **22** and **41** of the first and second conveyor mechanism. This drive means may include a belt and pulley, or a chain sprocket system which is driven from an electric motor. The circuit for controlling operation of the electric motor for driving the rollers **22** and **41**, is provided with a control switch **46** which is interposed in circuit controlling relation therewith. This control switch mechanism is mounted on the housing **16** and has an actuating arm **47** depending downwardly therefrom. This arm is adapted to engage the upper surface of the slab of bacon which is being sliced, so that the switch is in closed condition while the slab is being cut. However, as the slab is moved forwardly, it will be moved out of engaging relation with respect to the arm of the switch mechanism and the arm will move downwardly to thereby open the contacts in the switch mechanism. The switch mechanism **46** is provided with a delay circuit which delays opening of the circuit to the drive means for the rollers **22** and **41** for a short time after downward movement of the arm **47** opens the switch contacts of the switch mechanism **46**. This permits the final portion of the bacon slab to be passed through a slicer device and sliced before the conveyor mechanisms are energized for operation.

Although it is preferred that the edges of adjacent strips of bacon on a sheet abut each other or alternatively be slightly separated, slices which do overlap each other approximately ⅛-inch or less is also acceptable. To this end, it is pointed out that when the strips of bacon on a single sheet of paper are applied to a cooking surface by merely inverting the packaging sheet with the strips thereon, even though the adjacent strips overlap each other approximately ⅛ of an inch, the strips will shrink during cooking and will separate.

Each sheet of packaging material will have a predetermined number of strips thereon and the sheets will be moved along the upper run of the first conveyor mechanism **19**. Thereafter, the sheets will pass from the first conveyor mechanism to the second conveyor mechanism **38**, the upper run of which is disposed in overlapping relation with respect to the first conveyor mechanism. As the sheets are moved from the first conveyor mechanism to the second conveyor mechanism, the sheets which are then disposed in end-to-end relation will be separated a predetermined amount, preferably several inches to

permit an operator at a removal station to remove the sheets and to stack them in a container.

In the embodiments shown, sheets of paper are fed continuously, one sheet at a time, to the first conveyor mechanism **19**. As an alternative form, a roll of paper may be provided which is constantly unwound and fed along the paper guide in the manner of the sheet feeder illustrated in the present embodiment. Suitable cutter means will be provided for cutting the roll into sheets of desired size as the paper is unwound from the roll.

By utilizing the above apparatus, it will be seen that bacon may be very effectively sliced into strips and deposited upon the sheets of paper so that adjacent strips are disposed substantially in side-by-side relation with at most only one-eighth of an inch overlap between adjacent strips. Consumers then may apply the strips to a cooking medium without having to separate the strips one by one from each other. The packaging sheets of paper may be perforated throughout thereby permitting a user to tear the same so that a predetermined number of strips may be applied simultaneously to a cooking surface. Althernatively, all of the strips on one sheet may be readily applied to one cooking surface by merely inverting the sheet so that the strips engage the surface and thereafter removing the sheet from the strips. Again, as pointed out above, even where there is approximately one-eighth of an inch overlap between adjacent strips, shrinkage of the strips due to cooking, causes such strips to readily separate.

It will also be noted that by using a ribbon conveyor system, the first and second conveyor mechanisms have adjacent ends disposed in overlapped relation permitting a smooth transfer of the sheets with bacon thereon, even though the conveyor mechanisms are driven at different rates of speed.

Thus, it will be seen from the foregoing description that not only is the slicing and packaging device of simple and inexpensive construction, but one which functions in a more efficient manner than any heretofore known comparable device.

It will, of course, be understood that various changes may be made in the form, details, arrangement and proportions of the various parts without departing from the scope of my invention.

What is claimed is:

1. Apparatus for slicing and packaging bacon comprising a slicer device including a revolvable blade operable to continuously slice a slab of bacon into a plurality of relatively thin slices, a first conveyor mechanism including a plurality of laterally spaced apart similar substantially parallel driven endless conveyor elements each including an upper generally horizontal run positioned below and in close proximity to said slicer device and extending forwardly therefrom, a lower run extending rearwardly from the forward run, an inclined run extending upwardly and rearwardly from the lower run to the rear end of the upper run below the slicer device, a feed mechanism positioned in close proximity to said first conveyor mechanism and adapted to feed sheets of paper, one sheet at a time, to said first conveyor mechanism, an inclined guide plate extending in an upwardly and rearwardly direction and positioned in close proximity to and cooperating with the conveyor elements of said first conveyor mechanism to guide such sheets towards the upper run thereof, said conveyor elements to be moved at a predetermined speed with respect to the speed of rotation of the slicer device whereby a plurality of slices of bacon will be deposited on each sheet in substantially side-by-side relation with only a slight overlap of adjacent slices, a second conveyor mechanism including a plurality of similar laterally spaced apart substantially parallel endless driven conveyor elements each including a lower run and an upper run, disposed in substantially coplanar relation with respect to the upper run of the endless conveyor elements of said first conveyor mechanism and extending longitudinally therefrom, portions of the upper runs of the conveyor elements of said first conveyor mechanism extending between portions of the upper runs of adjacent conveyor elements of said second conveyor mechanism so that said second conveyor mechanism forms a continuation of said first conveyor mechanism, the conveyor element of said second conveyor mechanism being driven at a greater speed than said conveyor elements of the first conveyor mechanism.

2. The apparatus as defined in claim **1** wherein each of said conveyor mechanisms includes a plurality of revolvable rollers about which said associated endless conveyor elements are trained, one roller of one conveyor mechanism being positioned in close proximity to the roller of the second conveyor mechanism, said adjacent rollers each having a plurality of axially spaced apart annular convex surfaces about which the associated conveyor elements are trained, and each adjacent roller including a plurality of reduced annular surfaces located on opposite sides of each convex annular surface, said reduced annular surfaces each being defined by a radius less than the radius of the convex annular surfaces.

3. The apparatus as defined in claim **1** wherein the conveyor elements of said first conveyor mechanism are driven at a predetermined speed with respect to the revolvable blade of the slicer device so that the adjacent strips of bacon positioned on a sheet of paper will have an overlap not greater than one-eight of an inch whereby when the bacon is applied to a cooking medium, and heated, the bacon will shrink and separate.

4. A process for slicing and packaging bacon comprising the steps of,

successively moving a plurality of sheets of packaging paper in an upwardly and rearwardly path of travel and at a predetermined speed, then moving each sheet in a forward direction of travel below a cutting medium, each sheet being disposed in substantially end-to-end relation with adjacent sheets as the sheets are passed below the cutting medium,

progressively urging a slab of bacon into the path of a cutting medium to successively cut the slab into elongate slices, the cut slices falling by action of gravity upon the moving sheets, the speed of operation of the cutting medium being coordinated with the speed of the moving sheets so that the slices are disposed in side-by-side relation with each other on each sheet with the longitudinal edges of the slices being disposed in substantially abutting relation,

continuing movement of said sheets with the bacon slices thereon and then rapidly increasing the speed of each sheet to cause substantial spacing between adjacent sheets.

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U.S. Cl. X.R.

53—123, 160; 198—34