Claims

~~1. A method for laser marking an egg shell, comprising a step of:~~

~~(a) controlling a laser beam directed onto an area of the egg shell so as to discolor an outer layer of the egg shell without completely etching away the outer layer at the area of the egg shell, wherein the step (a) comprises sweeping the laser beam multiple times across the area of the egg shell.~~

~~2. The method claim 1, wherein the laser beam has an energy density of less than about 2000 watts/sq. in. at the surface of the egg shell.~~

~~3. The method of claim 2, wherein the step (a) further comprises sweeping the laser beam across the area of the egg shell at different sweeping rates during at least two of the multiple times.~~

~~4. The method claim 1, wherein the a laser beam has an energy density of less than about 1600 watts/sq. in. at the surface of the egg shell.~~

~~5. The method of claim 1, wherein the step (a) further comprises controlling the laser beam such that the egg shell is etched no more than about 25 micrometers deep.~~

~~6. A method for processing a package of eggs, comprising:~~

~~(a) after the eggs have been placed in the package, mechanically adjusting a position of one or more of the eggs so that all of the eggs assume a same orientation within the package; and~~

~~(b) after performing the step (a), marking information on a surface of one or more of the eggs while the eggs are in the package.~~

~~7. The method of claim 6, wherein the step (b) comprises laser marking the information on the surface of the one or more of the eggs while the eggs are in the package.~~

~~8. The method of claim 6, wherein the steps (a) and (b) are performed such that, for at least one egg that is marked, a center point of the information marked~~

~~on the egg is located between the middle and an end of the egg.~~

~~9. The method of claim 6, further comprising a step of:~~

~~(c) prior to performing the step (b), blowing air onto the eggs while the eggs are disposed in the package.~~

~~10. The method of claim 9, wherein the step (c) comprises blowing the air onto the eggs while performing at least a portion of the step (a).~~

~~11. The method of claim 6, wherein the step (a) is performed while the package is disposed on a section of a conveyor of an egg packer.~~

~~12. The method of claim 11, wherein the section of the conveyor is located between an egg packing section and a package closing section of the egg packer.~~

~~13. The method of claim 11, wherein the step (a) is performed using an egg orienter positioned above the conveyor.~~

~~14. The method of claim 13, wherein the egg orienter comprises a plurality of resilient members configured and arranged to be moved relative to the eggs in the package so as to urge the eggs to predetermined orientations.~~

~~15. The method of claim 6, further comprising a step of:~~

~~(c) blowing air onto the eggs while performing at least a portion of the step (a).~~

~~16. The method of claim 6, wherein the step (a) further comprises adjusting the position of the one or more eggs in the package so that a long axis of each egg in the package is substantially parallel to a long axis of each other egg in the package, offset no more than 20 degrees from the long axis of each other egg in the package.~~

~~17. The method of claim 6, wherein the step (a) further comprises adjusting the position of the one or more eggs in the package so that a long axis of each egg~~

~~in the package is substantially parallel to a long axis of each other egg in the package, offset no more than 10 degrees from the long axis of each other egg in the package.~~

~~18. The method of claim 6, wherein the step (a) further comprises adjusting the position of the one or more eggs in the package so that a long axis of each egg in the package is tilted toward the back of the package so as to be at least slightly offset from vertical.~~

~~19. The method of claim 18, wherein the step (a) further comprises adjusting the position of the one or more eggs in the package so that the long axis of each egg in the package is substantially parallel to a long axis of each other egg in the package, offset no more than 20 degrees from the long axis of each other egg in the package.~~

~~20. The method of claim 18, wherein the step (a) further comprises adjusting the position of the one or more eggs in the package so that the long axis of each egg in the package is substantially parallel to a long axis of each other egg in the package, offset no more than 10 degrees from the long axis of each other egg in the package.~~

~~21. The method of claim 18, wherein the step (a) further comprises adjusting the position of the one or more eggs in the package so that the long axes of all of the eggs in each row of eggs in the package form approximate right angles with respect to a line intercepting bottoms of receptacles holding the eggs in such a row.~~

~~22. The method of claim 6, wherein the step (a) further comprises adjusting the position of the one or more eggs in the package so that a long axis of each egg in the package is tilted toward the back of the package so as to be offset from vertical by a minimum of 3 degrees.~~

~~23. The method of claim 6, wherein the step (a) further comprises adjusting the position of the one or more eggs in the package so that a long axis of each egg~~

~~in the package is tilted toward the back of the package so as to be offset from vertical by a minimum of 10 degrees.~~

~~24. The method of claim 6, wherein the step (a) further comprises adjusting the position of the one or more eggs in the package so that the long axes of all of the eggs in each row of eggs in the package form approximate right angles with respect to a line intercepting bottoms of receptacles holding the eggs in such a row.~~

~~25. The method of claim 6, wherein:~~

~~step (a) is performed while the package is disposed on a section of a conveyor of an egg packer; and~~

~~step (b) comprises, after performing step (a), laser marking the information on the surface of the one or more of the eggs while the eggs are in the package and while the package is substantially stationary.~~

~~26. An apparatus for processing packages of eggs on a conveyor, comprising:~~

~~an egg orienter configured and arranged with respect to the conveyor so as to adjust a position of one or more of the eggs in a package disposed on the conveyor so that each of the eggs in the package assumes a consistent, particular orientation; and~~

~~a marking apparatus located downstream from the egg orienter along a conveying direction of the conveyor, the marking apparatus configured and arranged to mark information on a surface of the one or more of the eggs while the eggs are in the package disposed on the conveyor.~~

~~27. The apparatus of claim 26, wherein the marking apparatus further comprises:~~

~~a laser source; and~~

~~one or more optical steering elements configured and arranged to direct laser energy from the laser source so as to laser mark the information on the surface of the one or more of the eggs while the eggs are in the package disposed on the conveyor and in said particular orientation.~~

~~28. The apparatus of claim 27, wherein the one or more optical steering elements are further configured and arranged to laser mark the information such that, for at least one egg that is marked, a center point of the information marked on the egg is located between the middle and an end of the egg.~~

~~29. The apparatus of claim 27, further comprising an air source configured and arranged to blow air onto the eggs in the package before the laser energy is directed onto any of the eggs in that package.~~

~~30. The apparatus of claim 29, wherein the air source is configured and arranged to blow air onto the eggs in the package during at least a portion of a time period during which the egg orienter is adjusting the position of the one or more eggs in that package.~~

~~31. The apparatus of claim 29, wherein the egg orienter is positioned above the conveyor.~~

~~32. The apparatus of claim 26, wherein the conveyor is a belt conveyor of an egg packing station.~~

~~33. The apparatus of claim 26, wherein the egg orienter is configured and arranged to blow air onto the eggs in the package during at least a portion of a time period during which the egg orienter is adjusting the position of the one or more eggs in that package.~~

~~34. The apparatus of claim 26, wherein the egg orienter is further configured and arranged to adjust the position of the one or more eggs in the package so that a long axis of each egg in the package is tilted toward the back of the package so as to be at least slightly offset from vertical.~~

~~35. The apparatus of claim 26 or 34, wherein the egg orienter is further configured and arranged to adjust the position of the one or more eggs in the package so that the long axis of each egg in the package is substantially parallel to a long axis of each other egg in the package, offset no more than 20 degrees from~~

~~the long axis of each other egg in the same package.~~

~~36. The apparatus of claim 26 or 34, wherein the egg orienter is further configured and arranged to adjust the position of the one or more eggs in the package so that the long axis of each egg in the package is substantially parallel to a long axis of each other egg in the package, offset no more than 10 degrees from the long axis of each other egg in the same package.~~

~~37. The apparatus of claim 26, wherein the egg orienter comprises a plurality of resilient members configured and arranged to be moved relative to the eggs in the package so as to urge them to predetermined orientations.~~

~~38. The apparatus of claim 26, wherein the conveyor is a belt conveyor.~~

~~39. The apparatus of claim 26, wherein the egg orienter is located between an egg loading section and a package closing section of an egg packer.~~

~~40. The apparatus of claim 26, wherein the egg orienter is further configured and arranged to adjust the position of the one or more eggs in the package so that a long axis of each egg in the package is tilted toward the back of the package so as to be offset from vertical by a minimum of 3 degrees.~~

~~41. The apparatus of claim 26, wherein the egg orienter is further configured and arranged to adjust the position of the one or more eggs in the package so that a long axis of each egg in the package is tilted toward the back of the package so as to be offset from vertical by a minimum of 10 degrees.~~

~~42. The apparatus of claim 26 or 34, wherein the egg orienter is further configured and arranged to adjust the position of the one or more eggs in the package so that the long axes of all of the eggs in each row of eggs in the package form approximate right angles with respect to a line intercepting bottoms of receptacles holding the eggs in such a row.~~

~~43. The apparatus of claim 27, wherein the one or more optical steering~~

elements are further configured and arranged to direct laser energy from the laser source so as to laser mark the information on the surface of the one or more of the eggs while the package is stationary with respect to the one or more optical steering elements.

44. An apparatus for processing packages of eggs on a conveyor, comprising:

means for adjusting a position of one or more of the eggs in each package so that each of the eggs in a given package assumes a consistent, particular orientation; and

at least one sensor configured and arranged to sense a position of each of the packages of eggs with respect to the means for adjusting as the conveyor and the means for adjusting move relative to each other.

45. A method for laser marking eggs, comprising steps of:

(a) laser marking information onto one or more eggs while the eggs are in a package disposed on a conveyor of a packing station; and

(b) prior to performing the step (a), blowing air onto the eggs while the eggs are in the package disposed on the conveyor.

46. The method of claim 45, wherein the step (a) is performed while the package is disposed on a section of the conveyor located between an egg loading section and a package closing section of an egg packer.

47. The method of claim 45, further comprising a step of:

(c) after performing the step (a), vacuuming the eggs prior to closing the package while supplying air to be taken in by the vacuum.

48. The method of claim 45, wherein the step (a) is performed such that, for at least one egg that is marked, a center point of the information laser marked onto the egg is located between the middle and an end of the egg.

49. The method of claim 45, wherein the conveyor comprises a belt conveyor.

50. The method of claim 45, wherein the step (a) is performed during one or

~~more periods when the package is stationary.~~

~~51. An apparatus for laser marking eggs on a conveyor of a packing station, comprising:~~

~~a laser source;~~

~~one or more optical steering elements configured and arranged to direct energy from the laser source so as to mark information onto one or more eggs in packages of eggs disposed on the conveyor; and~~

~~an air source configured and arranged to blow air onto the eggs while the eggs are in the packages disposed on the conveyor and before the one or more optical steering elements direct energy from the laser source so as to mark the information onto the one or more eggs in the packages.~~

~~52. The apparatus of claim 51, wherein the one or more steering elements are configured and arranged with respect to an egg packer such that the one or more steering elements direct laser energy from the laser source so as to mark information onto the one or more eggs in the packages of eggs while the packages of eggs are located between an egg loading section and a package closing section of the egg packer.~~

~~53. The apparatus of claim 51, further comprising:~~

~~a vacuum configured and arranged to vacuum the eggs after the one or more optical steering elements direct energy from the laser source so as to mark the information onto the one or more eggs in the packages and before the packages are closed, wherein the air source is further configured and arranged to supply air to be taken in by the vacuum.~~

~~54. The apparatus of claim 51, wherein the one or more steering elements are configured and arranged with respect to the conveyor such that, for at least one egg that is marked, a center point of the information laser marked onto the egg is located between the middle and an end of the egg.~~

~~55. The apparatus of claim 51, wherein the conveyor comprises a belt conveyor.~~

~~56. The apparatus of claim 51, wherein the one or more optical steering elements are further configured and arranged to direct energy from the laser source so as to mark information onto one or more eggs in packages of eggs while the package are stationary with respect to the one or more optical steering elements.~~

1~~57~~. A package of eggs comprising a plurality of eggs arranged in a plurality of rows, wherein the eggs are arranged in the package so that, for every row of the plurality of rows, a long axis of each egg in the row is tilted toward the back of the package so as to be at least slightly offset from vertical, wherein:

each of the eggs in the package has information laser marked on it in substantially the same location as the other eggs in the package; and

the eggs are oriented in the package such that information marked on each egg faces substantially the same direction as the information marked on the other eggs in the package.

2~~58~~. The package of eggs of claim 1~~57~~, wherein the eggs are further arranged in the package so that the long axis of each egg in the package is offset no more than 20 degrees from the long axis of each other egg in the package.

3~~59~~. The package of eggs of claim 1~~57~~, wherein the eggs are further arranged in the package so that the long axis of each egg in the package is offset no more than 10 degrees from the long axis of each other egg in the package.

~~60. The package of eggs of any of claims 57-59, wherein:~~

~~each of the eggs in the package has information laser marked on it in substantially the same location as the other eggs in the package; and~~

~~the eggs are oriented in the package such that information marked on each egg faces substantially the same direction as the information marked on the other eggs in the package.~~

4~~61~~. The package of eggs of any of claims 1-3~~57-60~~, wherein, for at least one egg that is marked, a center point of the information marked onto the egg is

located between the middle and an end of the egg.

~~62. The package of eggs of claim 57, wherein the eggs are arranged in the package so that the long axis of each egg in the package is tilted toward the back of the package so as to be offset from vertical by a minimum of 3 degrees.~~

~~63. The package of eggs of claim 57, wherein the eggs are arranged in the package so that the long axis of each egg in the package is tilted toward the back of the package so as to be offset from vertical by a minimum of 10 degrees.~~

~~64. The package of eggs of claim 57, 62, or 63, wherein:~~

~~each of the eggs in the package has particular information marked on it; and~~

~~each of the eggs in the package is positioned in the package such that at least the particular information is visible upon opening the package, without altering a position of the egg.~~

~~65. The package of eggs of claim 64, wherein at least some of the information marked on each egg is marked by laser.~~

~~66. The apparatus of claim 57 or 58, wherein eggs are arranged in the package such that the long axes of all of the eggs in each row of eggs in the package form approximate right angles with respect to a line intercepting bottoms of receptacles holding the eggs in such a row.~~

5~~67~~. A package of eggs comprising a plurality of eggs arranged in one or more rows, wherein the eggs are further arranged in the package so that a long axis of each egg in the package is offset no more than 20 degrees from a long axis of each other egg in the package;

each of the eggs in the package has information marked on it in substantially the same location as the other eggs in the package; and

the eggs are oriented in the package such that the information marked on each egg faces substantially the same direction as the information marked on the other eggs in the package.

~~6~~8. The package of eggs of claim 5~~6~~7, wherein the eggs are further arranged in the package so that the long axis of each egg in the package is offset no more than 10 degrees from the long axis of each other egg in the package.

7~~6~~9. The package of eggs of claim 5~~6~~7 or 6~~8~~, wherein at least some of the information marked on at least one egg of the plurality of eggs is marked by laser.

8~~7~~0. The package of eggs of claim 5~~6~~7 or 6~~8~~, wherein at least some of the information marked on at least one egg of the plurality of eggs is marked with ink.

9~~7~~1. The package of eggs of any of claims 5-8~~6~~7-7~~0~~, wherein, for at least one egg that is marked, a center point of the information marked onto the egg is located between the middle and an end of the egg.

10~~7~~2. The package of eggs of claim 5~~6~~7, wherein:

each of the eggs in the package has particular information marked on it; and

each of the eggs in the package is positioned in the package such that at least the particular information is visible upon opening the package, without altering a position of the egg.

11~~7~~3. The package of eggs of claim 10~~7~~2, wherein the particular information marked on at least some of the eggs is marked by laser.

12~~7~~4. The package of eggs of claim 10~~7~~2, wherein the particular information marked on at least some of the eggs is marked with ink.

13~~7~~5. A package of eggs comprising a plurality of eggs arranged in one or more rows, wherein the eggs are further arranged in the package so that the long axes of all of the eggs in the package are substantially parallel~~.~~

~~76. The package of eggs of claim 75~~, wherein:

each of the eggs in the package has information marked on it in

substantially the same location as the other eggs in the package; and

the eggs are oriented in the package such that information marked on each egg faces substantially the same direction as the information marked on the other eggs in the package.

~~77. The package of eggs of claim 75 or 76, wherein, for at least one egg that is marked, a center point of the information marked onto the egg is located between the middle and an end of each egg that is marked.~~

14~~78~~. A package of eggs comprising a plurality of eggs arranged in one or more rows, wherein the eggs are further arranged in the package so that the long axes of all of the eggs in the package are substantially parallel~~The package of eggs of claim 75 or 77~~, wherein:

each of the eggs in the package has particular information marked on it; and

each of the eggs in the package is positioned in the package such that at least the particular information is visible upon opening the package, without altering a position of the egg.

15. The package of eggs of claim 13 or 14, wherein, for at least one egg that is marked, a center point of the information marked onto the egg is located between the middle and an end of each egg that is marked.

16. A package of eggs comprising a plurality of eggs arranged in one or more rows, wherein the eggs are further arranged in the package so that the long axes of all of the eggs in the package are substantially parallel, wherein, for at least one egg that is marked, a center point of the information marked onto the egg is located between the middle and an end of each egg that is marked.

17~~79~~. The package of eggs of any of claims 13-16~~76-78~~, wherein the information marked on at least some of the eggs is marked by laser.

18~~80~~. The package of eggs of any of claims 13-16~~76-78~~, wherein the information marked on at least some of the eggs is marked with ink.

1981. The package of eggs of claim 1779, wherein eggs are arranged in the package such that the long axes of all of the eggs in each row of eggs in the package form approximate right angles with respect to a line intercepting bottoms of receptacles holding the eggs in such a row.

2082. The package of eggs of claim 1981, wherein the eggs are arranged in the package so that a long axis of each egg in the package is tilted toward the back of the package so as to be at least slightly offset from vertical.

~~83. A package of eggs comprising a plurality of eggs arranged in one or more rows, wherein the eggs are arranged in the package such that long axes of all of the eggs in each row of eggs in the package form approximate right angles with respect to a line intercepting bottoms of receptacles holding the eggs in such a row so that each such long axis is no more than about 7 degrees from any other such long axis.~~

~~84. The apparatus of claim 83, wherein the eggs are arranged in the package so that a long axis of each egg in the package is tilted toward the back of the package so as to be at least slightly offset from vertical.~~

~~85. The package of eggs of claim 84, wherein, for at least one egg that is marked, a center point of the information laser marked onto the egg is located between the middle and an end of each egg that is marked.~~

~~86. The package of eggs of claim 85, wherein:~~

~~each of the eggs in the package has particular information marked on it; and~~

~~each of the eggs in the package is positioned in the package such that at least the particular information is visible upon opening the package, without altering a position of the egg.~~

~~87. A package of eggs, wherein:~~

~~each of the eggs in the package has first information laser marked on it in substantially the same location as the first information on the other eggs in the~~

~~package;~~

~~the eggs are oriented in the package such that the first information laser marked on each egg faces substantially the same direction as the first information laser marked on the other eggs in the package;~~

~~each of the eggs in the package has second information laser marked on it in substantially the same location as the first information on the other eggs in the package; and~~

~~for each of the eggs in the package, the second information faces a substantially different direction than the first information.~~

~~88. A method for laser marking eggs, comprising:~~

~~(a) using a machine vision system to monitor laser marking of eggs by a laser marking system; and~~

~~(b) adjusting one or more parameters of the laser marking system based upon determinations made by the machine vision system.~~

~~89. The method of claim 88, wherein:~~

~~the step (a) comprises using the machine vision system to monitor a performance characteristic of the laser marking process; and~~

~~the step (b) comprises adjusting an operational parameter of at least one component of the laser marking system based upon the monitored performance characteristic.~~

~~90. The method of claim 88, wherein:~~

~~the step (a) comprises using the machine vision system to monitor one or more characteristics of the eggs that are to be marked by the laser marking system; and~~

~~the step (b) comprises adjusting an operational parameter of at least one component of the laser marking system based upon the one or more measured characteristics.~~

~~91. A system for laser marking eggs, comprising:~~

~~a machine vision system configured and arranged to monitor laser marking of eggs by a laser marking system; and~~

one or more control elements configured and arranged to adjust one or more parameters of the laser marking system based upon determinations made by the machine vision system.

92. The system of claim 91, wherein:

the machine vision system is further configured and arranged to monitor a performance characteristic of the laser marking process; and

the one or more control elements are further configured to adjust an operational parameter of at least one component of the laser marking system based upon the monitored performance characteristic.

93. The system of claim 91, wherein:

the machine vision system is further configured and arranged to monitor one or more characteristics of the eggs that are to be marked by the laser marking system; and

the one or more control elements are further configured to adjust an operational parameter of at least one component of the laser marking system based upon the one or more measured characteristics.

94. A system for laser marking eggs, comprising:

a plurality of laser marking apparatuses configured and arranged to perform laser marking jobs queued by local computers for laser marking eggs being packed by egg packing stations; and

a central server, coupled to the local computers, configured to distribute the laser marking jobs to the local computers.

95. The system of claim 94, wherein the central server is coupled to the local computers via the Internet.

96. A method for controlling laser marking jobs, comprising a step of:

(a) with a central server, distributing the laser marking jobs from the central computer to local computers responsible for queuing laser marking jobs to one or more laser marking apparatuses configured and arranged to laser mark information on eggs.

~~97. The method of claim 96, wherein the step (a) comprises distributing the laser marking jobs from the central server to the local computers via the Internet.~~

21~~98~~. An apparatus for processing packages of eggs on a conveyor, comprising:

an egg orienter configured and arranged with respect to the conveyor so as to adjust a position of one or more of the eggs in each of the packages so that each of the eggs in a given package assumes a particular orientation within that package;

the orienter comprising a plurality of resilient members configured and arranged to be moved relative to the eggs in each package so as to urge them to predetermined orientations;

each package having a bottom portion for receiving eggs and a hinged lid, comprising:

(a) a package reversing mechanism upstream of the orienter, which receives packages with lids open and oriented toward an upstream direction and then reverses the package direction so that the open lid is disposed toward the orienter and leading the package; and

(b) downstream of the orienter, one or more printing stations for printing information on the eggs.

22~~99~~. The apparatus of claim 21~~98~~, wherein the conveyor is slanted in an upward direction relative to movement of the packages with respect to the orienter and the one or more printing stations.

23~~100~~. The apparatus of claim 21~~98~~, wherein the one or more printing stations include a laser printing station and an ink printing station.