

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

PROVISUR TECHNOLOGIES, INC.,
Petitioner,

v.

WEBER MASCHINENBAU GMBH BREIDENBACH,
Patent Owner.

Case IPR2024-00235
Patent No. 8,529,321

**DECLARATION OF JOHN M. COLLINS, PH.D, IN SUPPORT OF
PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 8,529,321**

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I. INTRODUCTION

I, John M. Collins, Ph.D., hereby declare as follows:

1. I have been retained as an expert witness on behalf of Provisur Technologies, Inc. (“Provisur”) for the above-captioned *inter partes* review (“IPR”). I am an expert in mechanical engineering. I am being compensated for my time in connection with this IPR at my standard consulting rate, which is \$450 per hour. My compensation is not contingent upon the outcome of this IPR. I understand that the Petition for IPR involves U.S. Patent No. 8,529,321 (EX1001, the “’ 321 patent”). The ’321 patent names one inventor, Guenther Weber. EX1001, Cover page. I further understand that current USPTO records show that the ’321 patent is currently assigned to Weber Maschinenbau GmbH Breidenbach. (“Weber”). I understand that the earliest possible priority date for the ’321 patent is October 24, 2007.

2. When preparing my Declaration, I reviewed the’ 321 patent and its file history, (EX1002), and I have considered each of the documents cited in this declaration and the accompanying Petition. I have also considered the general knowledge in the field of the relevant art before around October 24, 2007. When forming my opinion, I also considered the viewpoint of a Person of Ordinary Skill in the Art (a “POSA”) as of October 24, 2007. A summary of my opinions follows.

II. SUMMARY OF OPINIONS

3. The '321 patent claims a fat separation apparatus and has two independent claims. Claim 1 recites an apparatus with a measurement device for automatic determination of the thickness of a fat cover and cutting device for automatic separation of the fat cover including a cutting blade whose position is variable relative to the product support. The cutting blade's position is varies depending on the thickness of the fact cover as determined by a contactless measurement device, such as a camera.

4. Claim 14 is similar but recites a method for separating fat from a meat product using a variably positioned blade. Claim 14 shares many common requirements with claim 1. Claim 14 also recites that the setting of the cutting blade comprises setting its position in a direction transverse to the feed direction.

5. As I discuss in this declaration, the prior art taught all of the features of the '321 patent's fat cover separation apparatus. I discuss that some of the prior art cited in my declaration discloses all of the elements of the challenged claims. I also discuss that, well before the earliest possible priority date of the '321 patent, a person of ordinary skill in the art would have had reason to combine the prior art references to arrive at the claimed fat cover separation apparatus, and they would have had a reasonable expectation of success when implementing the combination.

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6. A POSA would have been motivated to combine the discussed references for several reasons, including to improved hygiene, accuracy, quality, and functionality. A person of ordinary skill in the art would have had a reasonable expectation of success in combining the prior art, for example, because the prior art all relates to similar technologies (i.e. fat removal and imaging technology), and the prior art identifies common, well-known arrangements of routine components and techniques. Further, the prior art on its face discusses that incorporating additional sensing technology to improve efficiency and sophistication was known to be desirable.

7. I am not aware of any publicly available evidence of objective indicia of nonobviousness that would support the patentability of the claims of the '321 patent.

8. Therefore, I conclude that the challenged claims would have been obvious in view of the disclosures in the prior art references for the reasons further expanded upon in this declaration.

III. BACKGROUND AND QUALIFICATIONS

9. My area of expertise is mechanical engineering, with most of my career focused on developing products and manufacturing methods. As described in more detail below, I have worked designing products in a wide range of industries. I have also worked in the commercial food processing industry which shares many

underlying technologies and methods with medical devices, such as cutting or dissecting tissue. Other examples are outlined below.

10. I have experience as an innovator and inventor. I am a named inventor on more than 20 United States patents , in addition to foreign counterparts, on products and manufacturing processes, including food processing systems.

Educational Background

11. I received a B.S. (1980) in mechanical engineering from Rensselaer Polytechnic Institute, and an M.S. (1982) and Ph.D. (1988) in mechanical engineering from Massachusetts Institute of Technology (“MIT”). At MIT, I worked in the Fluids Lab under the direction of Professors Asher Shapiro and Roger Kamm.

12. My academic work was in mechanical engineering with a concentration on biomedical applications of fluid dynamics, including heat/mass transfer. My Ph.D. and M.S. thesis projects applied these principles to pulmonary dynamics. My M.S. thesis involved experimental hardware and analytical methods to study high frequency ventilation: at the time, a novel way to ventilate babies without over-pressurization of the lung, avoiding damage to the lung during ventilator assist. My Ph.D. thesis was on experimental, analytical, and numerical modeling of forced exhalation from the lung. The results included a computational model of the lung that allowed for more sophisticated diagnosis based on the results of the simple Forced Expiration Pulmonary Function (FEPF) test.

Relevant Professional Experience

13. I have over 40 years of product and production system design, development, and consulting expertise covering a wide range of industries and products. In addition to doing engineering work, including design, fabrication, assembly, and testing, my responsibilities have included assembling and managing teams to develop new consumer, industrial and medical products.

14. Since 2008, I have been employed at the Consortia for Improving Medicine with Innovation and Technology (“CIMIT”). Founded by Massachusetts General Hospital, Brigham and Women’s Hospital, Charles Stark Draper Laboratory and Massachusetts Institute of Technology in 1998, CIMIT is now a consortium of thirteen of the greater Boston area’s premier clinical, research and academic institutions, including the Harvard Medical School and its teaching hospitals, along with a growing list of national and international affiliates.

15. CIMIT’s mission is to improve patient care by facilitating collaboration among clinicians, academics, engineers, and entrepreneurs to catalyze the discovery, development and implementation of innovative technologies and procedures/systems that improve patient care. I am generally responsible for ensuring CIMIT’s “Finding, Funding, Facilitation and Following” functions are effective and for facilitating teams of clinicians and engineers emerging from academic labs in the commercialization of technologies. This involves developing

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CIMIT's web-based tools/platforms and working with teams of clinicians, scientists, and engineers from academic institutions and start-ups from across the globe to provide support which helps them accelerate innovative solutions into the market.

16. Several of my projects have been based on imaging or processing the transmission or reflection of light within certain wavelengths. A simple example is pulse oximeters, which rely on photoplethysmography. They use low-intensity infrared (IR) light which, as it travels through biological tissues, is absorbed and/or reflected by bones, skin pigments, and both venous and arterial blood. Among other things, sensors can be used to detect the transmitted or reflected light to determine blood oxygenation and pulse rate. A more complex example is light reflectance spectroscopy. It measures light intensity backscattered from tissue to differentiate malignant from benign tissue. It uses light within the absorption spectrum of hemoglobin (in the blue/green spectrum range between about 400 and 600 nm) to identify angiogenic vasculature in tumors which differs from that in healthy tissue.

17. Also, since 2008, I have been the Chief Technology and Innovation Officer of Reed Collins LLC. In this role, I regularly provide technology, intellectual property, commercialization and business development consulting services for research teams, start-ups, and risk capital groups, as well as support some non-profits. I also serve on review committees as well as steering and advisory boards for non-profit organizations that support healthcare innovation.

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18. Before then, from 2002 to 2008, I worked at TIAX LLC (“TIAX”). TIAX is a privately held technology transformation company focused on advancing and developing technologies for commercialization in several core technology areas, including clean energy and materials, health and wellness, commercial and residential appliances, HVAC systems, and enhanced security. During my tenure at TIAX, part of which I served as President, the World Economic Forum recognized TIAX as a Technology Pioneer in 2002 and as a New Champion in 2007. Examples of food processing products and systems I was involved with at TIAX include commercial and residential appliances including ovens and cook-tops, as well as automated pizza maker for food service applications.

19. From 1988 to 2002, before TIAX and after taking time to return to MIT and complete my Ph.D., I was employed by the international consulting firm Arthur D. Little, Inc. (“ADL”). I joined ADL as a design engineer and progressed to being responsible for its Technology and Innovation (“T&I”) Directorate, with more than 250 staff of scientists, engineers, and technicians. Examples of food processing and other production systems I worked on include:

20. A production system to process and pack fresh cucumbers into jars which were then filled with brine and pickled. The system used conveyors to move cucumbers from a hopper to a vision system that characterized the size and shape of cucumbers as they passed. Commercially available conveyors were evaluated,

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selected, and configured to hold cucumbers in place during transport. Diverters were then used to sort cucumbers off of the conveyors into chute where they were then pressed through a die cutter and the sliced pieces were inserted into jars in a way that filled the volume within the desired range.

21. A production machine to cut and fold Ramen noodles. The system used conventional conveyors to move flat dough through rotary slicing blades to form noodle strips and then commercially available motion controlled conveyors were used to place them in a folded pattern ready for packaging.

22. An automated system for French Fry cooking in a retail food setting. The system dispensed frozen fries into a basket that was transferred to a robotic arm which placed the basket in a fryer. The basket was then automatically removed, and the cooked fries emptied into a holding area for serving.

23. An insulation packaging system to take fiberglass insulation webs from conveyors, cut them into “bats” (typically for residential use) and then transport them to a machine which stacked and placed them in a package.

24. From 1982 to 1986, before ADL and after receiving my M.S. degree at MIT, I worked at Booz, Allen & Hamilton, where I developed products as well as industrial production systems. Examples include:

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25. Diebold cash dispensing machines which utilized a variety of sensors, conveyors, clutches, motors, and other motion control techniques to “pick” and dispense cash.

26. Automated flats processing machine for the U.S. Post Office which used custom designed conveyors and diverters, coupled with commercially available optical sensors for high speed/high reliability sorting.

27. A flexible, high volume wire structure manufacturing system for a leading manufacturer of dishwashers.

28. A copy of my latest curriculum vitae (CV) with additional details of my education, employment, patents, and recent publications filed with this declaration as Exhibit 1019.

IV. DOCUMENTS CONSIDERED

29. When forming my opinions, I considered all of the references cited in my declaration and the Petition, including the documents listed below.

EX	Description
1001	Patent-at-Issue: U.S. Patent No. 8,529,321 B2
1002	File Wrapper for U.S. Patent No. 8,529,321 B2
1004	U.S. Patent No. 5,514,032 (“Young”)
1005	U.S. Patent No. 4,979,269 (“Norrie”)
1006	U.S. Patent No. 6,929,540 (“Johnson”)

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EX	Description
1007	U.S. Patent No. 6,198,843 (“Belk”)
1008	U.S. Patent No. 7,918,718 (“Christensen”)
1010	Weber ASD 460 Brochure
1011	Weber ASD 460 Operation Video
1012	U.S. Pub. No. 2003/0036344 (“Sigurdsson”)
1013	U.S. Patent No. 4,979,269 (“Norrie”)
1014	U.S. Patent No. 6,129,625 (“Cate”)
1015	U.S. Patent No. 4,947,517 (“Boekel”)
1016	U.S. Patent No. 4,423,671 (“Murphy”)
1017	U.S. Patent No. 6,558,242 (“Veldkamp”)
1018	U.S. Patent No. 4,226,540 (“Barten”)
1019	Dr. Collins CV
1020	Light Emitting Diodes: A Primer.
1021	U.S. Patent No. 5,334,084 (“O’Brien”)
1022	U.S. Patent No. 4,413,279 (“Gorl”)
1023	Automation in the Food Industry
1024	Energy Saving Lighting: The History of LED Lighting
1025	GB 2 428 182 (“Burton”)
1026	WO 2006-136814 (“Burton814”)
1027	U.S. Patent No. 6,277,019 (“Veldkamp019”)

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EX	Description
1028	<i>Provisur v. Weber III</i> , Sept. 5, 2023 Hearing Tr.,

V. LEGAL PRINCIPLES

30. I am not an attorney, and I am not offering any opinions on the law in this proceeding. Counsel for Provisur has generally informed me of the following legal standards that are relevant to my analysis. I have considered these standards in arriving at my conclusions.

31. I generally understand that Inter Partes Review (“IPR”) is an administrative proceeding before the United States Patent & Trademark Office (“Patent Office”) for evaluating the patentability of an issued patent claim. IPR essentially allows the Patent Office to reconsider a patent claim that the Patent Office has already issued as patentable and to reconsider if it is still patentable.

32. I understand that a patent claim is a legal description of the scope of the intellectual property patent right (akin to a proverbial fence or deed around a piece of real property). At least one patent claim is included at the end of each patent and includes numbered sets of claim language. I have been told that the specific language or parts of each patent claim may be referred to as claim features, elements, and/or limitations depending on the context.

33. I am informed that there are two types of U.S. patent claims: (1) independent claims, and (2) dependent claims. Independent claims include only the

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elements expressly stated in the properly interpreted independent claim. Dependent claims include the elements expressly stated in that dependent claim and any elements expressly stated in any other claim(s) from which that claim depends.

34. For IPRs, I understand that the Patent Office may consider whether earlier publications and patents, generally referred to as prior art or references, disclose claim features of the patent at issue. I understand prior art may act to make a patent claim unpatentable for two reasons relevant here, referred to by the legal concepts of: (a) anticipation under the 35 U.S.C. § 102 statute, and (b) obviousness under the 35 U.S.C. § 103 statute. The prior art must be viewed from the hypothetical perspective of a person having ordinary skill in the art (“POSA”) at the time of the invention.

35. I believe a person of ordinary skill in the art (“POSA”) of the asserted patents would typically have the experience described below in Section VI.

36. I have formed my opinion regarding the person of ordinary skill in the art for the Asserted Patents by reviewing the patents, the file histories, and based on my knowledge of the level of skill of individuals in the field at the time. Other factors relevant to my opinion regarding the level of ordinary skill in the art include the nature of problems that the Asserted Patents were intended to solve.

37. I understand a patent claim is unpatentable as anticipated when a single prior art reference discloses every element in the claim, either expressly or

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inherently. A prior art reference may inherently teach an element if it necessarily discloses that element.

38. In general, I understand that one or more prior art references that individually disclose fewer than all elements of a patent claim may be relied upon, collectively, to render a patent claim obvious. A patent claim may be obvious if, based on the collective teachings of the prior art, the subject matter of the patent claim would have been obvious to a POSA at the time of the invention. A POSA may rely on their personal judgment and common sense to reach conclusions that do not explicitly require explanation in a reference.

39. I further understand that a patent claim may be obvious if a POSA would have (1) been motivated to combine the references in a manner that would (2) result in the claimed invention with a reasonable expectation of success. I have also been told that the analysis of whether a claim would have been obvious to a POSA at the time of the invention requires an analysis of four criteria known as the *Graham* factors. The *Graham* factors, from a past U.S. Supreme Court case, are: (1) the level of ordinary skill in the art; (2) the scope and content of the prior art; (3) the differences between the prior art and the claims-at-issue; and (4) objective evidence of non-obviousness, such as commercial success of an invention; a long-felt need that was solved by an invention; copying of an invention by others; praise of an invention; or a surprising result an invention achieved.

VI. CLAIM CONSTRUCTION

40. I have applied the plain and ordinary meaning of the claim terms in view of the specification and prosecution history. I am not aware of any claim terms that require an explicit construction to resolve any issues. I understand that Provisur proposes three claim constructions in the district court to help resolve the infringement issues in that forum. I copy these constructions below along with the proposed constructions from Patent Owner Weber in the district court.

Claim Limitation	Provisur's District Court Construction	Weber's District Court Construction
Separation of the fat cover from the flesh component ('321 claim 1); separating the fat cover from the flesh component ('321 claim 14)	Removal of the outer layer of fat and skin from the meat	Plain and ordinary meaning
Travel profile ('321 claims 1 and 14)	Contour of the fat trimming blade height over the length of the meat product	Plain and ordinary meaning
A cutting blade whose position is variable relative to a product support ('321 claim 1)	The position of the cutting blade varies up and down above the product conveyor surface.	Plain and ordinary meaning

41. In any case, in my opinion, the cited prior art meets the claim terms under each of Provisur's and Weber's district court proposed constructions, as described in my declaration. Thus, I understand Provisur applies the same understanding of the claims in this proceeding before the Board and the district court.

VII. LEVEL OF ORDINARY SKILL IN THE ART

42. I understand that for the purposes of this proceeding, Petitioner applies the Board's prior finding of the level of ordinary skill for a related case. That definition is that a POSA would typically have had (1) a bachelor's degree (or equivalent) in mechanical engineering (or a similar field) and at least two years of experience working as an engineer (or similar role) on food processing and/or packaging systems (or in a similar field); or (2) at least seven years of experience working as an engineer (or similar role) on food processing and/or packaging systems (or in a similar field). *See Weber v. Provisur*, No. IPR2022-00599, Paper 65, *10-11 (P.T.A.B. Aug. 23, 2023).

43. Further, the Board recognized a POSA would have had knowledge of the technical literature concerning food processing and packaging systems, including conveyor mechanisms (in both food processing and packaging machines, as well as other conveying machines) and may have worked as part of a multidisciplinary team and drawn upon not only her or his own skills, but of others on the team, e.g., to solve a given problem. *Ibid.* A POSA may have consulted with subject matter experts, such as in the fields of hygiene, meat separation and/or software programming.

VIII. STATE OF THE ART BEFORE OCTOBER 24, 2007**A. Historical Fat Separation Systems**

44. The prior art record shows that fat separation apparatuses were well developed in the food processing industry for a long time, and well known by 2007. EX1004, 2:1-17; EX1005, 1:29-45; EX1006, 1:38-41; EX1015, 1:18-25. Dating back to the 80s, food processing equipment used machines to automate the labor intensive and difficult process of manual fat removal. *See e.g.* EX1004, 2:1-17; EX1005, 1:29-45; EX1006, 1:38-41. The record illustrates that a general desire to increase throughput, reduce waste, and improve efficiency was a driver of change in the industry, as is true in many industries in my experience. EX1004, 2:27-29, 2:43-51; EX1016, 1:21-26. Additionally, It was known that removing the fat and skin from a meat product eases processing and increases palatability and value of the product. *Ibid.* There was also a general desire within the industry to automate a physically strenuous and difficult task. EX1004, 2:1-16. As an example, Young discusses the difficulty of manual fat separation “Using human operators to perform loin pulling, however, poses several problems. Most notably, loin pulling is one of the most difficult jobs found in a pork processing plant. Turnover is relatively high . . . it is difficult to train and keep experienced operators that can efficiently perform the operations . . . [and] even experienced operators are not capable of sufficiently high output due to the difficulty of the operations. Further, since the separate steps

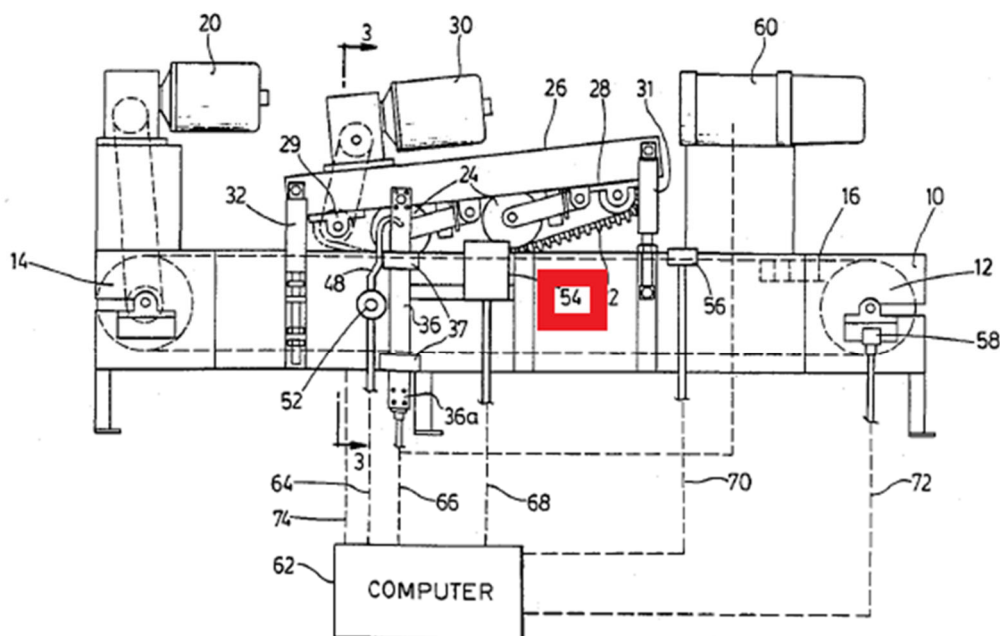
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in separating a loin from a pork belly are performed by different operators at different stations, additional handling and/or transfer steps are often required.” EX1004, 2:1-17. Manual separation was strenuous enough that Johnson describes special devices used by workers during manual fat separation to reduce hand, wrist, and arm strain to prevent injury. EX1006, 1:38-41. Veldkamp also addressed that automation was desired to reduce waste, “until now, the process of removing an optimal amount of fat from meat cuts such as pork butts has required a person who makes repeated cuts until the desired amount of lean meat is exposed. Often this results in waste, as it is impossible to tell without cutting into it at what depth the lean starts and the fat stops.” EX1017, 1:20-26.

B. Prior Art Food Processing Equipment Used Contactless Sensors to Detect and Measure the Fat Cover

45. Well before 2007, several types of machines existed that used contactless sensors, such as cameras, to detect and measure fat layers for food processing purposes. As an example, U.S. Patent No. 4,979,269 to Norrie was filed on August 3, 1989 and taught using a camera to “observe the thickness of fat on the underside of the loin [and] send appropriate fat signals to [a] computer.” EX1005, 4:28-30. The camera 54 is highlighted in the annotated version of Norrie Fig. 1 below:

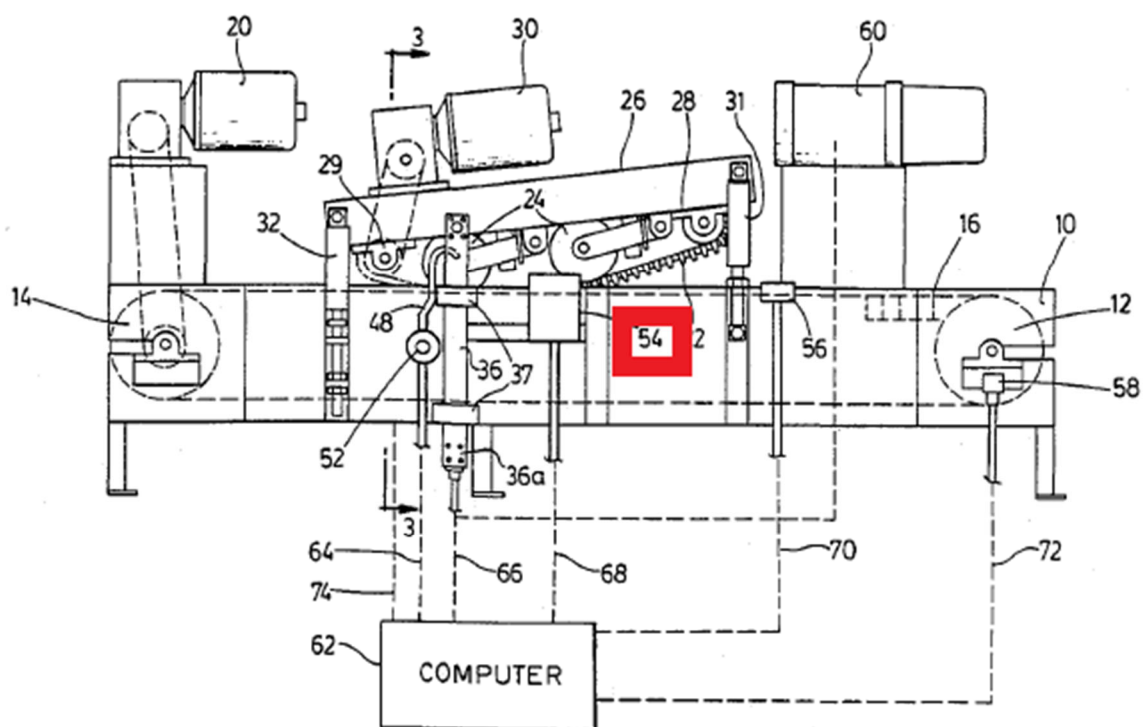
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EX1005, Fig. 1 (showing the position of camera 54).

46. As another example, U.S. Patent No 4,226,540 to Barten was filed on June 26, 1978 and taught a machine “for the contact free determination of features of quality of a . . . meat product[.]” which when presented with a meat product consisting of “fat portions and meat portions . . .through evaluation of such optical-electronic signals, the surface ratio of fat and meat . . . may be accurately determined.” EX1018, Abstract, 4:47-51. Barten also stated that “[D]ifferent other methods and apparatus have become known for the determination of the . . . volume of meat wares and/or for detection of their fat content.” And U.S. Patent No. 6,198,834 to Belk discloses that image data taken using cameras can be processed to determine wide variety of characteristics relevant to a meat product’s quality and

desirability such as: “variability of lean tissue, color and color variability of fat tissue, extent of marbling, average number and variance of marbling flecks per unit area, average size of marbling and the variance of average marbling size . . . density of lean tissue . . . density of fat tissue” as well as lengths and surface areas of the measured area of interest. EX1007, 4:27-32, 15:22-31.



(EX1005, Fig. 1)(showing the position of camera 54.)

47. Further, as the above prior art shows, using contactless sensors was known to increase accuracy, efficiency, speed and be more hygienic than using contact sensors, such as probes. EX1004, Fig. 9, Abstract, 17:34-46; EX1005, Abstract, Fig. 4, 4:3-11; EX1014: 1:39-41. For example, Belk describes that the

impetus behind its invention was to increase the accuracy of measurements, categorization and scoring of meat products via imaging technology. EX1007, 2:51-65. Belk also describes that imaging technology allows for quick and efficient processing of meat products compared to traditional methods, generally processing images in 5-15 seconds. EX1007, 1:33-39, 2:49-51. As another example. U.S. Patent Publication 2003/0036344 to Sigurdsson describes that “Modern food processing demands high levels of productivity and precision. It is the aim . . . to obtain as accurate portion size as possible. It is also an important factor that the [meat product] have certain configurations and/or thickness due to the end buyer’s requests. . . . Enhanced processing technology would lead to much better utilization of raw material and thus cost effectiveness of processing.” EX1019, ¶0007.

C. Prior Art Food Processing Equipment Used Travel Profiles to Control the Path of a Cutting Blade through a Meat Product

48. Food processing machines, including fat separating machines, had used travel profiles before 2007. Travel profiles reflect the fact that the layer of fat varies in thickness along the direction of travel. As such travel profiles are needed to establish the height of the cutting devices as the product transverses. Travel profiles were used to compute an accurate and high yield cutting path to remove the fat from a meat product with minimal loss of lean. Two examples, Young and Johnson, are

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expanded upon below. Travel profiles were used to compute an accurate and high yield cutting path to remove the fat from a meat product with minimal loss of lean.

49. Young discloses that its invention “generate[s] customized cutting profiles . . . based upon the particular dimensions contours, etc. of a specific side of meat, thus optimizing yield and reducing waste product, while providing improved productivity and reduced processing time.” EX1004, 2:55-64. Murphy also discloses the use of travel profiles.

50. Johnson is a fat separation machine which calculates a travel profile in the form of the fat/lean interface, i.e. the line separating the fat cover from the meat product, and then controls a blade assembly to cut along said line. EX1006, 4:53-59, 5:20-30. Johnson explains that automatically determining the travel profile is advantageous because “human cutting cannot determine the fat/lean interface until after the lean has been cut which may down grade the product.” EX1006, 1:42-46. By avoiding this error, meat product quality is increased. *See Ibid.*

D. Young (EX1004)

51. Young is titled “Loin Separation Apparatus and Method of Operation Therefore.” It was filed on February 17, 1995 and issued on May 7, 1996. It was not considered by the examiner.

52. Young describes the field of the invention relating to an apparatus and method for butchering pork and other meat, specifically separating loin and belly

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portions from a side of pork through scribing and loin pulling operations. *See* EX1004, 1:6-19, [Field of Invention]. Young describes scribing as cutting the ribs along the backbone of a pork side to facilitate the later loin pulling operation. *Ibid.*, 5:57-58.

53. Specifically, Young summarizes that the invention can generate customized cutting profiles and/or modify standard cutting profiles based upon the dimensions of a specific side of meat. By more accurately cutting away the fat, yield is optimized, and the waste is reduced. *Ibid.*, 2:58-64. As such, it directly relates to the '321.

54. Young's invention is intended to address the need in the art for an automated system which offers greater control over loin knife and scribe saw operations to optimize yield and reduce amount of waste product and result in higher quality and more consistent end products. *Ibid.*, 2:44-51.

55. Young recognizes that to address the problems associated with manual loin separation processes, many separation systems have been proposed in its prior art, including U.S. Pat. No. 4,979,269 to Norrie. *Ibid.*, 2:18-26.

56. Young acknowledges that many of these prior art attempts to replace human operators with automated loin knives and scribe saws have resulted in more efficiency and more repeatable results. However, many of these prior automated

systems are limited in the degree of control they provide over the loin knife and scribe saw. *Ibid.*, 2:27-33.

57. Young teaches that the invention provides a loin separation apparatus and method with increased control over loin pulling and scribing operations enabling generating customized cutting profiles and/or modify standard cutting profiles for the loin knife and scribe saw assemblies based upon the particular dimensions, contours, etc. of a specific side of meat. The benefit being to optimize yield and reduce waste product, while providing improved productivity and reduced processing time. *Ibid.*, 2:55-64.

58. Young teaches an apparatus that includes, e.g.:

1. A frame.
2. A conveying means that is coupled to the frame for conveying a side of meat through the apparatus.
3. A loin knife assembly, including:
 - i. A generally U-shaped knife blade having first and second sides.
 - ii. First and second lateral moving means for respectively moving the first and second sides of the U-shaped knife blade in a lateral direction.
 - iii. Vertical moving means for moving the U-shaped knife blade in a vertical direction.

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4. A conveying means for conveying a side of meat past the loin knife assembly.
 5. An imaging camera is positioned to generate a top plan image of the side of meat.
 6. A controller, coupled to the loin knife assembly, the conveying means, and the imaging camera. The controller includes:
 - i. Image processing means for determining backbone and fat/lean separation lines from the top plan image.
 - ii. Profile calculating means for generating profiles for the vertical moving means and the first and second lateral moving means to control the first side of the U-shaped knife blade to follow a preset distance from the backbone line, and the second side of the U-shaped knife blade to follow a preset distance from the fat/lean separation line, and activating means for activating the vertical moving means, the first and second lateral moving means and the conveying means to follow the profiles generated by the profile calculating means. *Ibid.*, at 3:60 - 4:14
59. As shown in the annotated Figure 9 from Young below, is functional block diagram of the control system for the apparatus of Figure 1. Young teaches the there are three cameras that respectively capture views from the entire top surface

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of the pork side (camera 196), the end surface of the pork side (camera 197), and a small area of the fat/lean separation line (camera 198) Ibid., 18:53-56.

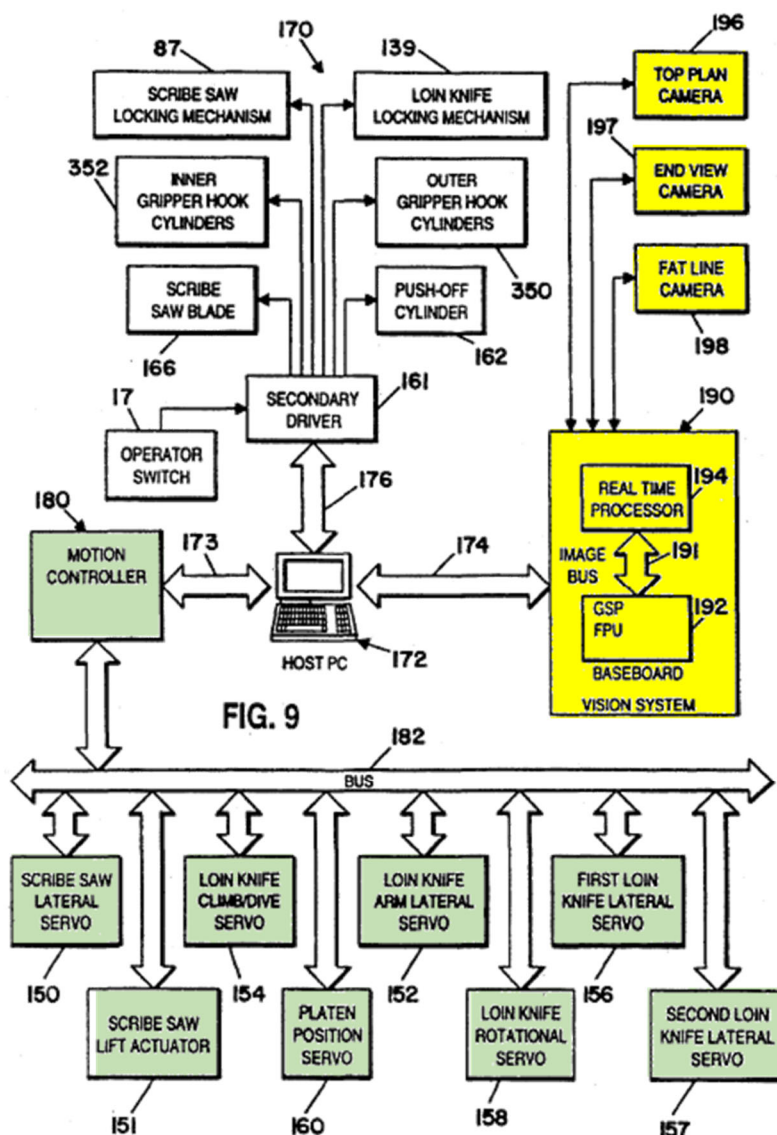
60. The block diagram shows that the images from those cameras are analyzed by a real time vision system (190) that determines the shape of the meat product as it travels (collectively highlighted in yellow). That information is passed to a host PC/controller (172) that establishes and passes motion information to a motion controller (1, 80) which in turn activates controls that various servo motors that control the position of knives and saws (collectively highlighted in green) to

accurately

cut/saw

the

meat.



61. Young teaches that the host PC/controller 172 generates cutting profiles for the scribe saw and loin pulling assemblies. Based on the cutting profiles, the host PC/ controller communicates with motion controller 180 to coordinate the actions of scribe saw assembly 50 and loin knife assembly 100 to cut away the fat from the meat product as it is conveyed through the apparatus. Ibid., 17:1-8.

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62. As such, the desired thickness of the layer of fat covering can be achieved over the full three dimensional lean/fat interface. For example, Young teaches that a 0.1 inch fat covering may sufficiently keep the loin from drying out but doesn't make the loin look too fat in certain circumstances. But, that other fat thicknesses may be used. *Ibid.*, 20:63-66.

63. Young also teaches certain types of supplemental lighting may enhance the imaging capabilities of the imaging system. For example, mercury vapor lamps can be used as they have been found to possess light wavelengths that accentuate the interface between fat and lean on a pork side. In particular, light wavelengths in the order of 380 to 760 nanometers are preferred (about 550 to 600 nanometers). *Ibid.*, 18:57-67.

64. Further, Young teaches that different lighting can be used to establish the fat/lean separation line which is distinguished by the interface between the loin meat and the fat covering, which is typically much lighter than meat. *Ibid.*, 23:16-23.

E. Norrie (EX1005)

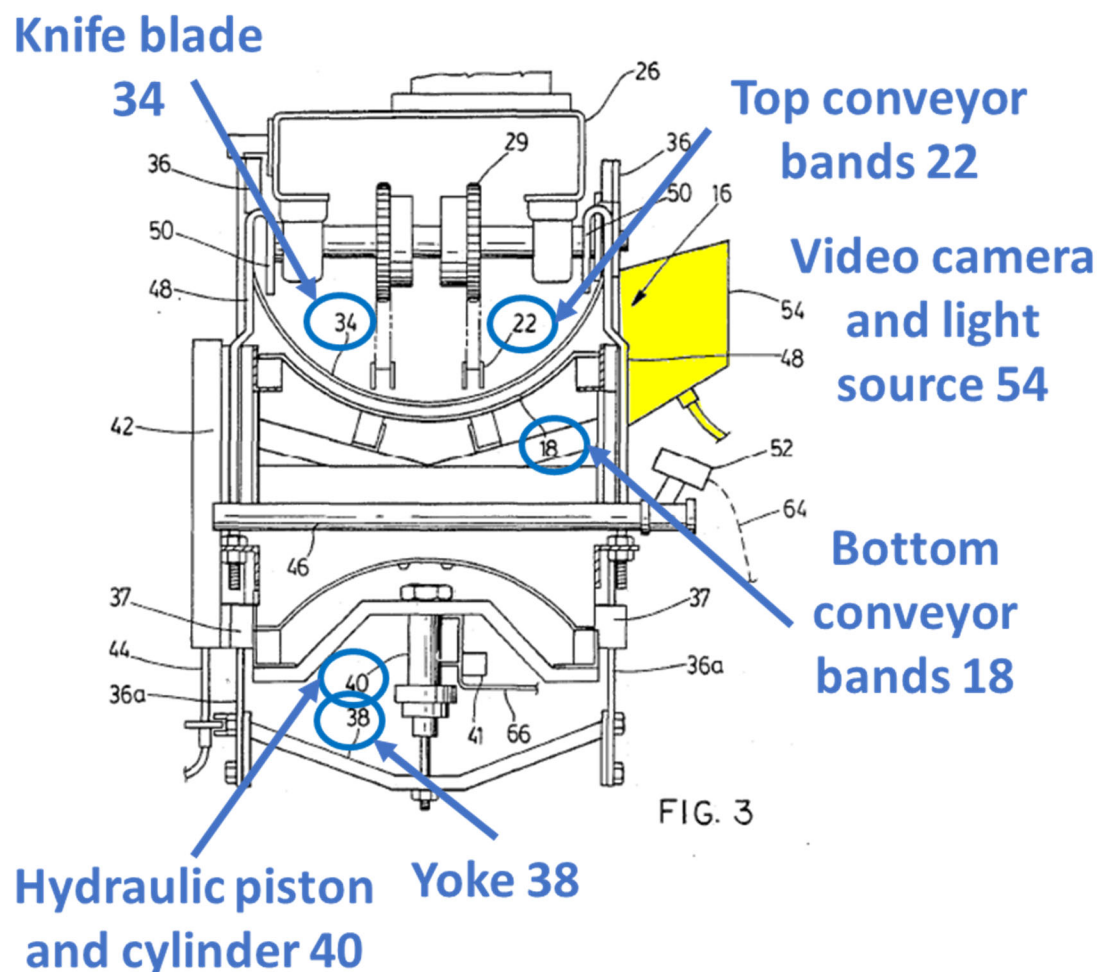
65. Norrie is titled "Method and Apparatus for Separating Back Fat from Loins." It was filed on August 3, 1989 and issued on December 25, 1995. It was not considered by the examiner.

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66. Norrie describes the field of the invention relating to a method and apparatus of dressing (e.g., the removal of unwanted portions of meat carcasses) and, in particular, to a method and apparatus of trimming back fat from loins. *See* Norrie, 1:6-8. [Field of Invention]. As such, it directly relates to the '321.

67. Norrie addresses a problem known in the art that when separating the "back fat" from the loin meat or lean portion of a carcass in an automated system, the height of a cutting blade relative to the conveyor on which it moves must be changed to account for different thickness of fat. Otherwise, the degree of wastage of meat increases (by cutting too deep), or of excess fat being left on the meat (by not cutting deep enough) produces lower quality products. *Ibid.*, 1:36-45.

68. To address this problem, Norrie teaches an apparatus for the separation of back fat from a loin portion of a carcass as shown Norrie Figure 1, with several of its components highlighted in the annotated Figure 3 below, a section view of Figure 1 from Norrie. The apparatus includes a bottom conveyor 16 of closely spaced band portions 18 on which the carcass moves continuously along a predetermined path. The orientation of the carcass is such that the fat portion is at the bottom in contact with the conveyor 16. Pressure is continuously applied to the top surface of the carcass via a plurality of pressure belts or bands 22. *Ibid* 1:58-2:9.



69. The apparatus also has a curved knife blade 34 positioned between the bottom conveyor 16 and top pressure bands 22. As such, the carcass is cut at the height above the bottom conveyor at which the blade is set as it moves with the conveyor 16. The knife blade 34 is supported on the apparatus by a yoke 38 that can be raised or lowered, for example by a hydraulic piston and cylinder 40, to adjust the height of the knife blade 34. *Ibid.*, 3:21-33.

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70. Norrie teaches that the knife blade height relative to the conveyor 16 is adjusted automatically by sensing the thickness of the fat portion with a video camera and light source (collectively 54 and highlighted in yellow in annotated Figure 3 above).

71. In summary, Norrie teaches that in operation as carcasses are drawn into the pressure bands 22, they will be pressed firmly down against the exposed upper surface, i.e., the lean portion of the loin onto the bottom conveyor 16. Camera 54 will observe the thickness of fat on the underside of the loin lying on the conveyor as it moves past. Camera 54 will then send signals to the computer indicating the fat thickness. The computer, in turn, will either signal if blade 34 needs to be adjusted, and if so how much either up or down. Finally, as the loin is forced past blade 34, it will accurately separate the lower fat portion from the upper lean portion, and the two separated portions will then be delivered to the downstream end 14 of the conveyor. *Ibid.*, 4:23-38.

F. Johnson (EX1006)

72. Johnson is titled “Automated Classifier and Meat Cut Fat Trimming Method and Apparatus”. It was filed on May 14, 2004 as a divisional of application No. 10/605,294, filed on September 19, 2003 and published on April 14, 2005. It was not considered by the examiner.

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73. Johnson describes the field of the invention as relating to methods for processing meat cuts and, more particularly, to an apparatus and method for trimming fat from a meat cut. See Johnson at 1:14-16 [Field of Invention]. As such, it directly relates to the '321.

74. Johnson teaches a system that senses the thickness of a layer of fat on a cut of meat as it travels along a conveyor and provides that information to a downstream cutting system that is continually adjusted to trim the fat from the meat. Ibid., 1:50-55.

75. Johnson teaches that a series of probes on the conveyor can be used to generate a continuous three-dimensional (3D) map of the fat/lean interface contour. Ibid., 1:55-58. In one embodiment, a probe can be an elongated instrument with a sharp end that can be inserted and penetrate into and extend past the fat layer to lean meat. Probes include a sensor that can determine when the probe reaches the fat to lean ("fat/lean") interface as well as sensing the fat layer depth. Ibid., 2:15-22.

76. Johnson teaches that sensors which sense the fat/lean interface can do so using optical or other technologies, such as sonar and rf sensing. Ibid., 2:35-36.

77. A probe sends a signal to a controller to indicate the fat thickness at a point. Multiple readings are then used to generate data points to create a continuous 3D map of the fat/lean interface surface over the cut of meat. Ibid., 2:23-27. The

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controller then moves the cutting blades to follow the 3D fat/lean interface map, thus trimming the fat from the meat.

78. Johnson teaches there are many benefits to the invention. In particular, that there are multiple probes which offer a better "mapping" of the fat/lean profile. This is important because there is little consistency or correlation for the fat/lean contour from one beef strip to another beef strip. As such, more accurate trimming can be achieved. *Ibid.*, 2:40-43.

79. Further, that the meat cut is mechanically secured as it is fed through the machine so that the position of the lean/fat interface "map" remains known relative to the machine. This enables controlling blades to follow the three dimensional fat/lean interface map of the meat as it moves through the machine to cut away the fat. *Ibid.*, 2:43-49.

G. Belk (EX1007)

80. Belk is titled "Meat Imaging System for Palatability Yield Prediction". It was filed on Aug. 19th, 1999 and claims priority to U.S. provisional application Ser. No. 60/075,517 filed Feb. 20, 1998, as a continuation of PCT application number PCT/US99/03477 filed Feb. 18, 1999. It was published on April 28, 1994. It was not considered by the examiner.

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81. Belk describes the field of the invention to be prediction of meat palatability and yield by use of image analysis (IA) of the lean and fat portions of a meat carcass or cut. See EX1006, 1:11-17. As such, it directly relates to the '321.

82. As shown in the Belk Fig. 1 reproduced below, the IA system includes a color video camera as an imaging device 12. Optionally, there is an illumination system 26 mounted either on the imaging device and may be any light emitting device or equivalent source of energy to impinge on the sample of meat for measurement in the parts of the energy spectrum corresponding to the sensitivity ranges required by the type of imaging device 12. This includes visible light, infrared light, ultraviolet light, x-rays, gamma rays, electrons, positrons, electrical fields, magnetic fields, sonic wave, ultrasonic wave, infrasonic wave or microwaves. The IA system also includes a data processing unit 16, the data processing unit 16 interfaced with a program storage device 20 by a program storage device interface 18, and at least one output device 24 by an output device interface 22. Ibid., 3:61-4:13.

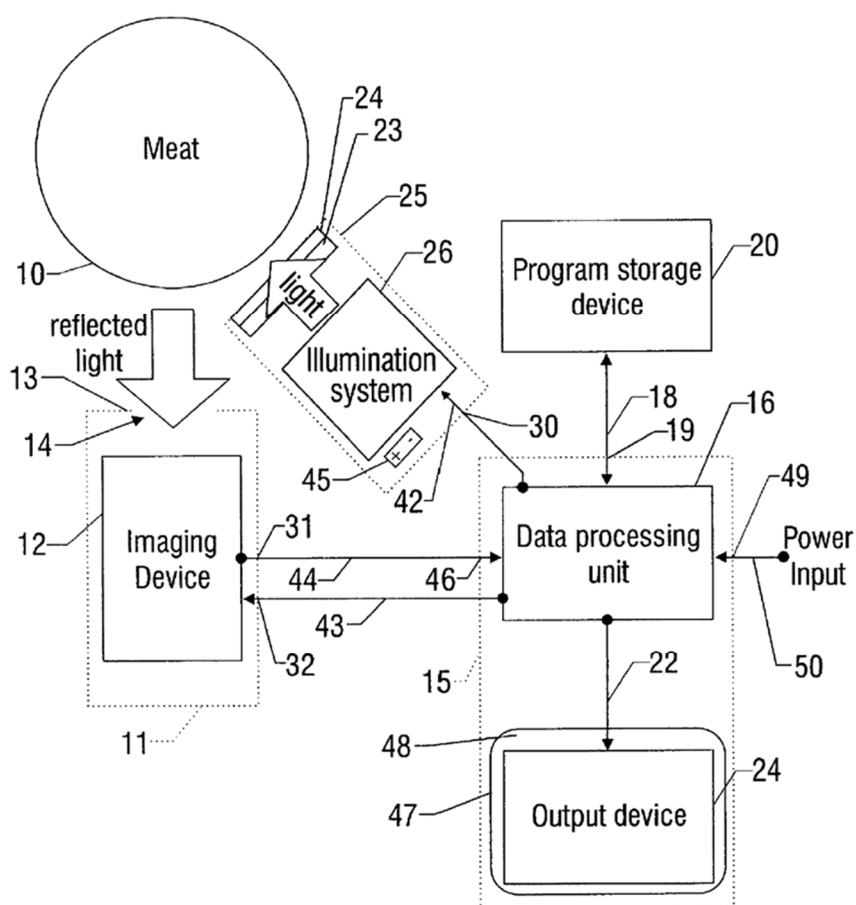


FIG. 1

EX1007, Fig.1.

83. It describes that the parameters used in production to predict Quality Grades and Yield Grades are published by the USDA Agricultural Marketing Service, Livestock and Seed Division, e.g., for beef, the United States Standards for Grades of Carcass Beef. It teaches capturing image data of the meat and analyzing that data to identify and characterize an area of interest of the meat and displaying the results to an operator. One result being a prediction of the palatability of the meat

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based on the characterization. *Ibid.*, 3:17-25. Belk describes characterizing meat by providing “scoring factors predictive of palatability” of a meat carcass or cut that will assist a USDA grader in accurately establishing Quality Grades of meat products. *Ibid.*, 3:55-59.

84. Belk describes many known factors that affect palatability. One is a “marbling” score of a carcass which generally correlates with subsequent palatability of cooked beef, pork, and lamb. Where marbling is known to be the white flecks of intramuscular fat in meat that create a visible marble pattern on the surface of the meat. However, that palatability can vary between carcasses with the same marbling. *Ibid.*, 1:20-25.

85. In addition to characterizing the tissue itself, Belk teaches determining the relative cross-sectional area comprised of fat, bone, and/or connective tissue. *Ibid.*, 10:1-7. This provides information on where a carcass can be cut to separate the lean and fat portions in a subsequent step.

86. Belk also teaches using IA to assist USDA graders to compute Yield Grades, which are intended to estimate the cutability and composition of a carcass. This is possible by determining the subcutaneous fat thickness at the carcass exterior. *Ibid.*, 1:41-48. Belk teaches that subcutaneous fat depth cannot be determined by analyzing surface images alone. *Ibid.* 10:57-64.

87. Examples of IA systems taught by Belk include X-ray tomography and particle beam tomography. They are known to be used in computer axial tomography (CAT) or positron emission tomography (PET). These devices produce non-invasive cross-sectional and three-dimensional images of tissue. *Ibid.*, 5:24-33

88. As such Belk teaches a POSA a non-contact method to measure the thickness of fat that can be cut from meat.

IX. BACKGROUND OF THE '321 PATENT-AT-ISSUE

A. The Specification

89. The '321 patent discloses “a device for separating the layer of fat of a meat product from a premium cut part of a meat product by means of said type of measuring device[.]” EX1001, Abstract. The apparatus uses a “cutting device 10 for the separation of a fat cover from a flesh component of a meat product 12. Such a cutting device 10 is also called a derinding machine or defatting machine. EX1001, 3:64-67. As described in the patent, the fat cover is the outer fat and rind/skin layer that is on top of a piece of meat. EX1001, 1:11-20. The apparatus's cutting device includes “a cutter bar . . . for the separation of the fat cover” where the position of the cutter bar is variable based on the “thickness of the fat cover layer” as measured by “a measurement device 18[.]” The '321 patent claims focus on the operation and construction of cutting device 10 and measurement device 18. EX1001, 6:25-35,

7:8-20. Thus, my overview here will focus on the elements relevant to the '321 patent claims.

90. The '321 patent claims focus on the operation and construction cutting device 10 and measurement device 18. EX1001, 6:25-35, 7:8-20.

B. Representative Claim 1

91. Claim 1 recites:

[1.Pre] An apparatus for separation of a fat cover of a meat product from a flesh component of the meat product

[1.A] a measurement device for automatic determination of the thickness of the fat cover, wherein the determination of the thickness of the fat cover takes place in a contactless manner.

[1.B] cutting device coupled to the measurement device for automatic separation of the fat cover from the flesh component in dependence on the thickness determined by the measurement device

[1.C] a cutting blade whose position is variable relative to a product support

[1.D] a control unit for control of the position of the cutting blade in dependence on the thickness determined by the measurement device

[1.E] wherein at least one travel profile is stored in the control unit in accordance with which the position of the cutting blade relative to the product support is to be set in dependence on a product feed

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92. Claim 14 is similar to claim 1. For example, the evidence cited herein for 1[Pre] 1[A], 1[B], 1[C], 1[E] applies to each of elements 14[Pre], 14[A], 14[B1], 14[C] and 14[B2], respectively. For example, and more specifically, 14[Pre] is nearly identical to the 1[Pre] except for reciting a method rather than an apparatus. 14[A] is nearly identical to [A] in method form with the omission of “a measurement device. 14[B1] is nearly identical to 1[B]. 14[B2]’s elements are all present in Claim 1[E]. 14[C] and 1[E] both claim a “travel profile” according to which the “position” of the “cutting blade” is “set.” 1[E] also recites that (1) the travel profile be stored in the control unit, and that (2) the position of the cutting blade set by the travel profile is “in dependence on a product feed.”

93. Claim 14 also recites:

14[B3] wherein the setting comprises setting the position in a direction transverse to the feed direction.

94. The below chart summarizes the above information re the corresponding limitations of claims 1 and 14.

Claim 1	Claim 14
1. An apparatus for separation of a fat cover of a meat product from a flesh component of the meat product, comprising:	14. A method for separation of a fat cover of a meat product from a flesh component of the meat product, comprising:
[A] a measurement device for automatic determination of the thickness of the fat cover, wherein the determination of the	[A] determining the thickness of the fat cover in a contactless manner;

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Claim 1	Claim 14
thickness of the fat cover takes place in a contactless manner; and	
[B] cutting device coupled to the measurement device for automatic separation of the fat cover from the flesh component in dependence on the thickness determined by the measurement device	[B1] setting a position of a cutting blade in dependence on the determined thickness of the fat cover [B2] in accordance with a preset travel profile and in dependence on a feed of the meat product,
	[B3] wherein the setting comprises setting the position in a direction transverse to the feed direction; and
[C] a cutting blade whose position is variable relative to a product support; and	
[D] a control unit for control of the position of the cutting blade in dependence on the thickness determined by the measurement device,	
[E] wherein at least one travel profile is stored in the control unit in accordance with which the position of the cutting blade relative to the product support is to be set in dependence on a product feed.	[C] with the cutting blade, separating the fat cover from the flesh component, wherein during the separating, the cutting blade is at the set position according to the travel profile.

C. The Prosecution History of the '321 Patent

95. The '321 Patent references a German patent application from which it appears to claim priority. The German patent application was filed on October 24, 2007. EX1001, Cover Page. The Examiner issued one office action during prosecution of the '321 Patent. Ibid.

D. Priority Date

96. The earliest possible priority date that the '321 patent can claim the benefit of is the date of the first German patent application from which the '321 Patent claims priority: October 24, 2007. EX1001, Cover Page.

X. SUMMARY OF GROUNDS

97. The table below summarizes the grounds for unpatentability set forth in this Declaration. Throughout my discussion of the grounds below, I refer to the state of the art discussed in Section VII. The discussion in Section VII is relevant throughout the entirety of this Declaration.

Ground	Claims Challenged	35 U.S.C. §	References
1	1-6, 8, 10, 14-16	102	Young
2	1-6, 8, 10, 14-16	103(a)	Young, Norrie
3	1-6, 8, 10, 14-16	103(a)	Johnson, Belk

XI. GROUND 1: CLAIMS 1-6, 8, 10, AND 14-16 ARE ANTICIPATED BY YOUNG.

98. As I discuss below, Young discloses every limitation of claims 1-6, 8, 10, 14-16 of the '321 patent.

A. Independent Claim 1

99. Independent claim 1 is anticipated by Young. The below chart briefly summarizes exemplary teachings of Young that correspond to the relevant claim limitations in the '321 patent's independent claim 1.

<u>Claim Language</u>	<u>Exemplary Young Disclosures</u>
Apparatus for separation	Loin separation apparatus 10
Measurement device	Imaging system 190 including several cameras such as fat line camera 198
Cutting device/cutting blade	Knife assembly 100 with U-shaped blade 121 and/or scribe saw assembly 50
Control unit	Controller 172, motion controller 180
Variable position relative to product feed	Vertical axes of motion above platen 20
Travel profile	Cutting profile (generated in controller 172)

1. Preamble: “An apparatus for separation of a fat cover of a meat product from a flesh component of the meat product.”

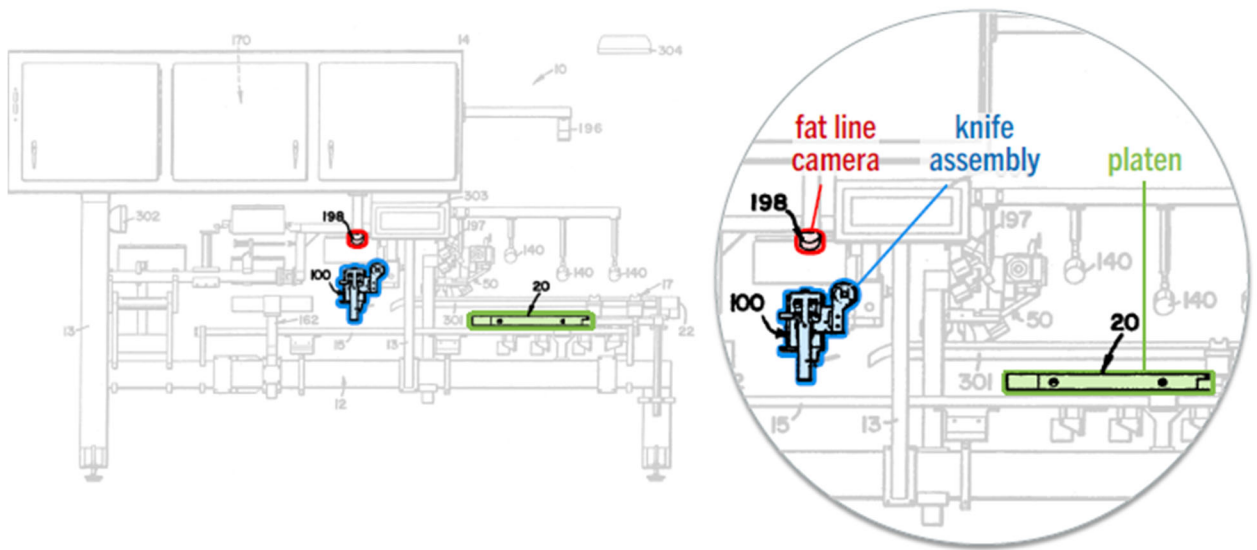
100. Young discloses an apparatus for separation of a fat cover of a meat product from a flesh component of the meat product.

101. For instance, Young discloses “[a] loin separation apparatus and method of operation therefor.” EX1004, Abstract, Cover page. The claimed “apparatus . . .” corresponds to Young’s apparatus. Young states that a meat product is placed along a conveying means, such as a conveyor, and is conveyed through the apparatus. EX1004, 3:11-15. As it is conveyed through the apparatus, the meat product is conveyed through “[a] loin knife assembly 100 is used to separate the pork

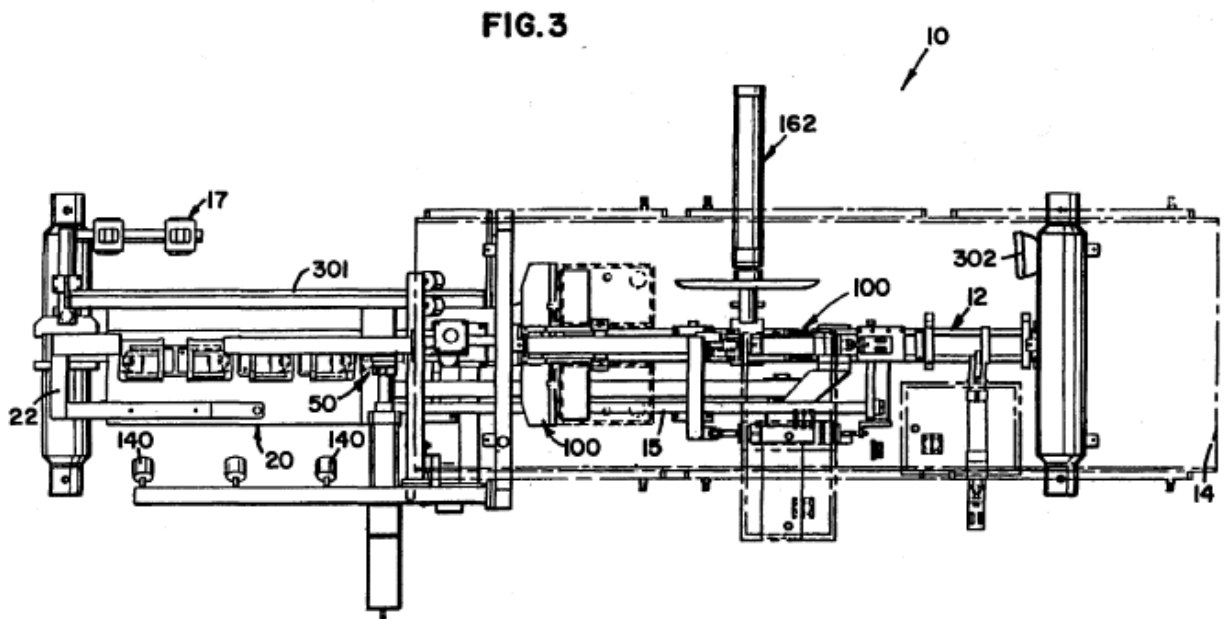
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loin from the pork belly[.]” EX1004 10:35-37. In particular a “loin knife assembly is provided for use in a loin separation apparatus. The assembly includes an arm pivotally coupled to the loin separation apparatus to pivot about lateral and vertical axes . . . including a generally U-shaped knife blade having first and second sides; vertical moving means for moving the arm vertically about the lateral axis; lateral adjustment means for moving the arm laterally about the vertical axis; and width adjustment means for varying the separation between the first and second sides of the knife blade.” EX1004, 3:29-39. Young’s knife assembly cuts to separate the pork loin from pork belly and fat cover to produce an optimum remaining fat layer, which may be none. Young’s knife assembly to “preferably produces an optimum separation[.]” EX1004, 10:41-42. Young’s knife assembly and its controller are part of an apparatus for separation of a fat cover of a meat product from a flesh component of a meat product, as shown by Young’s Figures 2 and 3 (reproduced below). Therefore, Young discloses removal of the outer layer of fat and skin from the meat.

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EX1004, Fig. 2 (annotated).



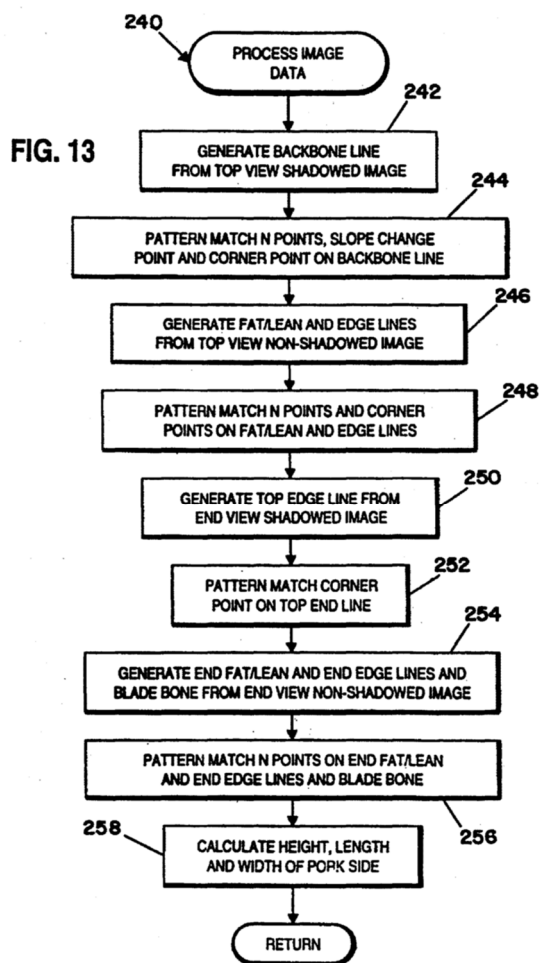
EX1004, Fig. 3.

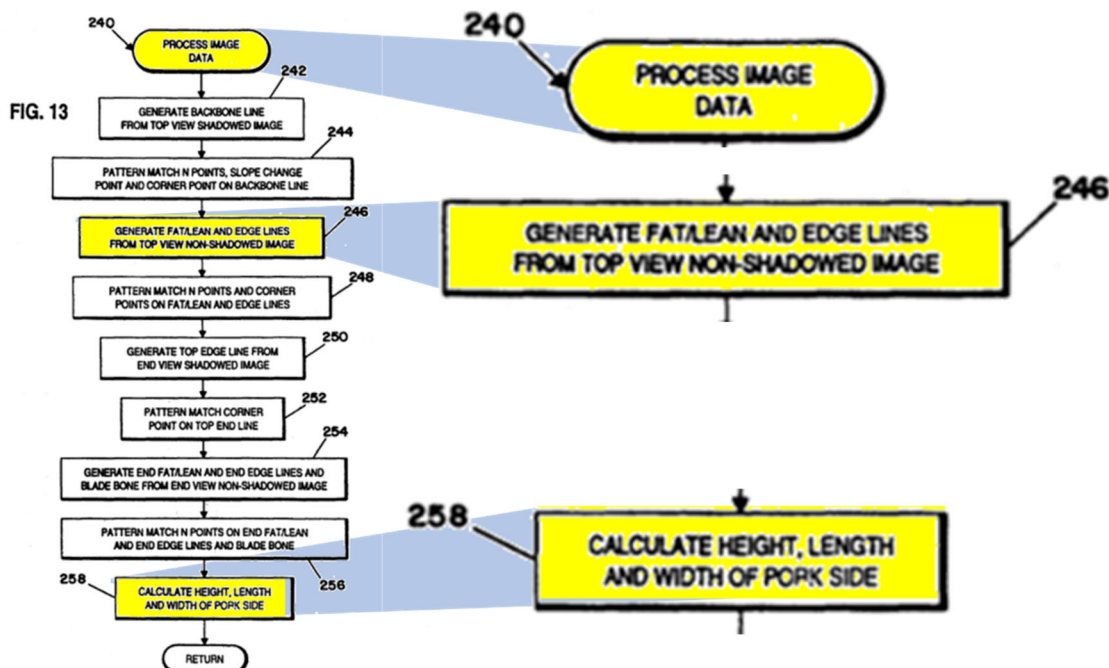
102. Thus, Young discloses the preamble.

2. Element 1[A]: “a measurement device for automatic determination of the thickness of the fat cover, wherein the determination of the thickness of the fat cover takes place in a contactless manner.”

103. Young discloses a measurement device for automatic determination of the thickness of the fat cover, wherein the determination of the thickness of the fat cover takes place in a contactless manner.

104. Specifically, Young discloses imaging system 190 which itself includes multiple cameras, top plan camera 197, end view camera 197, fat line camera 198 and an image processor. As shown by annotated Figure 13 (below). EX1004, 17:55-59, Fig. 13.





EX1004, Fig. 13.

105. Young's imaging system 190 corresponds to the claimed "measurement device . . ." Imaging system collects image data by taking multiple pictures of the meat brought from different angles using different cameras under both high and low light conditions. *See* EX1004, 18:25-32. High intensity lighting systems may be used to increase the contrast. *Ibid.* Under these different light conditions, different light wavelengths accentuate the interface between lean and fat on a meat product. EX1004, 18:61-67. This interface shows the boundary of the fat cover. Young also discloses that supplemental lighting systems may be used to assist imaging system 190. EX1004, 18:57-60. After collecting the image data Young's imaging system 190 generates fat, lean, and edge lines of the meat product and calculates "height[s],

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length[es] and width[s]” of the meat product, during its image processing routine 240. EX1004, 18:33-45, 22:53-24:38. More specifically, Young’s fat/lean separation line camera 198 dynamically captures image data that is processed by real time processor 194. EX1004, 17:48-54, 18:33-36.

106. Young imaging system 190 makes an automatic determination of the thickness of the fat cover through analysis of “a backbone line and a fat/lean separation line on the side of meat.” EX1004, 18:33-45; see also *ibid.* 4:26-30. The fat lean separation line calculated by Young’s imaging system 190 fat line camera 198 shows the interface that between fat and lean on a meat product. EX1004, 23:20-23 (“In general, the fat/lean separation line will be distinguished by the interface between the loin meat and the fat covering, which is typically much light than meat.”). After this line is calculated, Young may calculate the height or width of the fat covering, the lean, and the loin. *See* EX1004, 18:33-45, 23:20-23, 22:53-24:38. In this way, Young optically, that is contactlessly via the use of a camera or cameras, measures the thickness of the fat covering of a meat product.

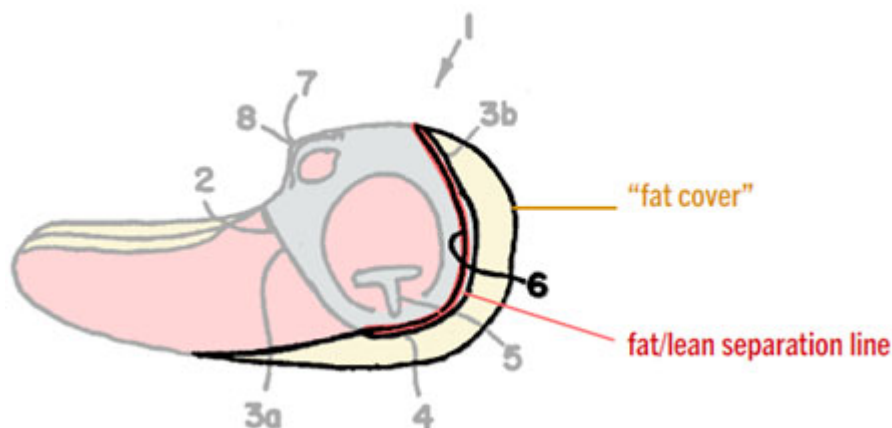
107. Thus, Young discloses element 1[A].

3. Element 1[B]: “cutting device coupled to the measurement device for automatic separation of the fat cover from the flesh component in dependence on the thickness determined by the measurement device.”

108. Young discloses a cutting device coupled to the measurement device for automatic separation of the fat cover from the flesh component in dependence on the thickness determined by the measurement device.

109. For instance, Young includes a knife assembly 100. EX1004, 18:36-39. The claimed “cutting device” corresponds to knife assembly 100 because it is used to separate the fat and belly of a meat product from the loin. EX1004, 10:33-38. Young states that “knife assembly 100 is provided to separate the pork loin from the belly[.]” EX1004, 5:56-59. The claimed “fat cover” corresponds to the belly, while the claimed “flesh component” corresponds to the pork loin, as shown below in Young Figure 10c which shows that knife assembly 100 cuts along the fat/lean separation line 6, to remove the belly and associated fat cover. EX1004, Fig. 10c. Young states “preferably .1 inch [thick] fat covering sufficiently keeps the loin from drying out . . . Other fat thicknesses may be desired in the alternative [such as no fat covering remaining].” EX1004, 10:33-53, 20:60-66, Figs. 1, 4, 7a-c. A POSA would have appreciated that in this preferred example, the fat cover layer thicker than .1 inch is removed. A POSA would have also appreciated from this disclosure that Young can fully remove a fat cover layer of different thicknesses (in ranges from

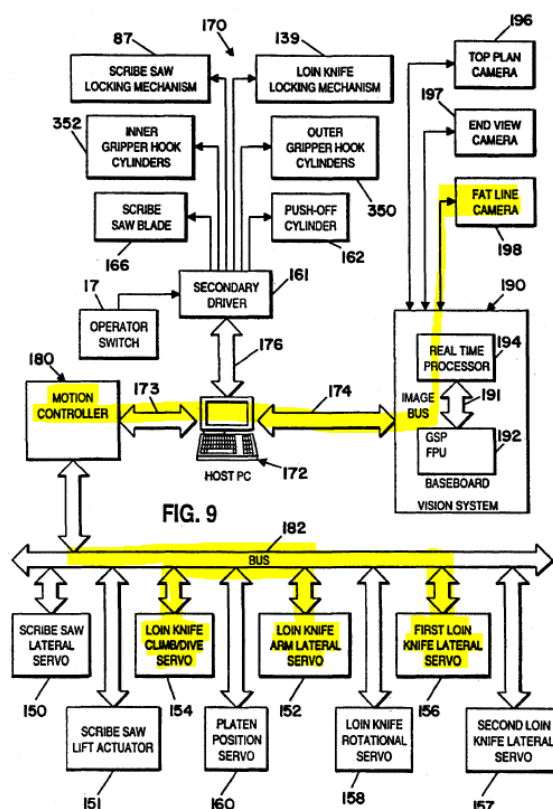
from removing 0.1 inches or more), depending on the application and customer need. For example if an application or customer desired a particularly lean piece of meat more or all of the fat cover would be removed.



EX1004, Fig. 10c.

110. Young includes a controller 172 which acts as a central control unit. EX1004, 17:1-12. Young's knife assembly 100 is controlled by controller 172 which can dynamically modify the path and angle of knife assembly 100 on four axes of motion. EX1004, Fig. 9, 14:21-26, 17:1-12. Specifically, controller 172 alters the position of knife assembly 100 by sending signals to motion controller 180 which actuates knife assembly 100. EX1004, Fig. 9, 14:21-26, 17:1-12. As shown by the below Figure 9, controller 172 is coupled to both imaging system 190, which measures the thickness of the fat cover, and knife assembly 100.

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EX1004, Fig. 9.

111. Controller 172 actuates and adjusts the cutting path of knife assembly 100 based on the image data received from imaging system 190. EX1004, 16:64-17:13. For example “controller 172 coordinates the activities of motion controller 180 and imaging system 190 to actuate apparatus 10 to perform the loin separation process.” EX1004, 17:1-12. Controller 172 receives information about the fat width and fat/lean separation line from imaging system 190 and “uses this information to dynamically modify the cutting profile of loin knife assembly 100 so that the assembly follows a fixed distance from the separation line to provide the optimum fat cover for the loin.” EX1004, 18:36-40. Essentially, imaging system 190 observes

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the meat product and collects image data. EX1004, 17:1-12. Imaging system 190 then sends this data to controller 172. EX1004, 17:1-12. In response, controller 172 determines the fat/lean separation line and the thickness of the fat cover. EX1004, 17:1-12. Based on these determinations controller 172 sends signals to motion controller 180. EX1004, 17:1-12. Motion controller 180 then actuates knife assembly 100 to follow the correct cutting path and accurately separate the fat cover from the meat product. EX1004, 18:36-40.

112. In this way, Young's knife assembly 100 ultimately separates the fat cover from the flesh component in dependence on the thickness measurement obtained from imaging system 190. Young removes the outer layer of fat and skin from the meat based on the thickness of the fat cover as measured by imaging system 190.

113. Thus, Young discloses element 1[B].

4. Element 1[C]: “a cutting blade whose position is variable relative to a product support[.]”

114. Young discloses a cutting blade whose position is variable relative to a product support.

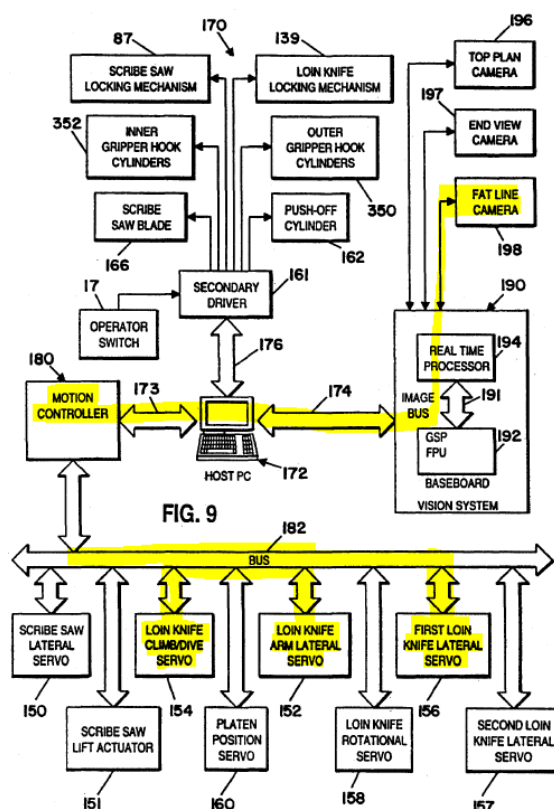
115. For instance, as discussed above, knife assembly 100 can vary its position on four axes of motion for knife blade 121. EX1004, Fig. 9, 14:21-26, 17:1-12. Young's knife assembly 100 corresponds to the claimed cutting blade. Young's

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apparatus also includes a conveying means, platen 20, which may be similar to a conveyor, which acts as a product support by allowing a meat product to rest on top of it and be conveyed through the slicer. *Ibid.*, 6:65-7:4. Platen 20 corresponds to the claimed product support because the meat product rests on platen 20 as it is conveyed through the apparatus, for instance. EX1004, 6:13-16. Young states “apparatus 10 includes a pair of stain steel rails 15 on which platen 20 is supported and allowed to slide upon when transporting a [meat product] between different stations in apparatus 10.” EX1004, 6:13-16 (emphasis added).

116. One of knife assembly 100’s four axes of motion is lateral axis 199b which allows for vertical motion up and down. EX1004, 14:21-26. This allows for knife assembly 100 to move up and down (climb/dive) toward or away from the product support, i.e. platen 20. EX, 1004, 14:21-26. Specifically, Young states “A first or vertical axis of motion is defined by lateral axis 119b and controlled by a first moving means (servo 154) displacing vertical member 114b of arm 114. This axis of motion provides climb/dive or vertical displacement (i.e. to raise or lower the knife blade [toward or away from the product support, i.e. platen 20 or the conveyor].)” *Ibid.*

117. As reproduced below, Figure 9 shows the presence of this climb drive movement and its connection to the knife assembly via controller 172.



EX1004, Fig. 9.

118. In this manner, Young's knife assembly's position is variable relative to platen 20. EX1004, 14:21-26. Therefore, Young discloses that the position of the cutting blade varies up and down above the product conveyor surface.

119. Thus, Young discloses element 1[C].

5. Element 1[D]: “a control unit for control of the position of the cutting blade in dependence on the thickness determined by the measurement device[.]”

120. Young discloses a control unit for control of the position of the cutting blade in dependence on the thickness determined by the measurement device.

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121. For instance, as discussed above, Young includes a controller 172 which is coupled to both the measurement device, imaging system 190, and the cutting blade, knife assembly 100. EX1004, 14:21-26, 17:1-12. Controller 172 corresponds to the claimed “control unit.”

122. A POSA would understand controller 172 coordinates the actions of the various components and ensures that the overall goal of the apparatus, that is separating the lean from the rest of the meat product, is executed. EX1004, 26:49-61. Additionally, Young describes controller 172 as the “Main controller” that is responsible for also controlling peripheral components. Ibid., 19:49-60.

123. Young states that controller 172 causes knife assembly 100, i.e. the cutting blade, to “dynamically modify the cutting profile of [the cutting blade] so that the assembly follows a fixed distance from the [fat to lean] separation line to provide the optimum fat cover for the [meat product].” EX1004, 18:33-40. Controller 172 determines what modifications to make based on the image data received from imaging system 190, i.e. the measurement device, which measures the thickness of the fat cover. EX1004, 17:1-12.

124. Young explains, specifically, that cutting profiles for the knife assembly are generated “in response to image data provided by imaging system 190” and that “controller 172 communicates with imaging system 190 through a dedicated bus 174 . . . to provide imaging data . . . to controller 172 for determining the necessary

modifications to pre-programmed scribe and loin pull profiles[.]” EX1004, 1:1-11, 17:24-33.

125. Therefore, controller 172 controls the position of knife assembly 100 based on the thickness measurements taken by imaging system 190. EX1004, 1:1-11, 17:24-33.

126. Thus, Young discloses element 1[D].

- 6. Element 1[E]: “wherein at least one travel profile is stored in the control unit in accordance with which the position of the cutting blade relative to the product support is to be set in dependence on a product feed.”**

127. Young discloses at least one travel profile is stored in the control unit in accordance with which the position of the cutting blade relative to the product support is to be set in dependence on a product feed.

128. Young discloses travel profiles. For instance, Young discloses cutting “profiles” which the loin knife assembly 100 follows when cutting the meat product. EX1004, 18:36-40. The claimed travel profiles correspond to Young’s cutting profiles. For example, Young states that “the loin separation apparatus generates customized cutting profiles and/or modifies standard profiles for the loin knife assembly.” EX1004, Abstract. The position of the knife assembly as it slices varies according to the determined cutting profile generated by controller 172. EX1004, 17:4-8, 17:1-12

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129. Young discloses a control unit in which travel profiles are stored. For instance, Young discloses that its cutting profiles are generated within a controller 172. EX1004, 17:5-17. Young's "travel profile" includes "profiles" generated in software "routine 230" (also referred to as "block 230") which occurs after the meat product is placed on platen 20. EX1004, Fig. 11, 21:11-13, 21:23-33. The claimed control unit corresponds to Young's controller 172, which both stores the cutting profiles and sets the position of the cutting blade. EX1004, 17:1-12. For example, Young states that controller 172 communicates with motion controller 180 to control the position of knife assembly 100 and cut the meat product. EX1004, 18:36-40. Young states that the knife assembly 100 is capable of "vertical displacement (i.e. to raise or lower the knife blade)" because platen 20 is beneath the blade, this necessarily moves the blade relative to the product support. EX1004, 14:24-26. Young's knife assembly is also capable of lateral, i.e., side to side, movement relative to platen 20. EX1004, 10:43-43.

130. Young discloses setting the position of the cutting blade relative to the product support in accordance with a travel profile. For instance, Young discloses that the position of knife assembly 100 is altered relative to platen 20 in accordance with Young's cutting profiles. EX1004, 18:36-39. The claimed cutting blade corresponds to knife assembly 100. The claimed product support corresponds to platen 20. The claimed travel profile corresponds to the cutting profile. Young

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describes that knife assembly 100 follows the cutting profile in dependence on the fat thickness measurement and varies its position relative to the product support via displacing vertically. EX1004, 18:36-39, 14:24-26.

131. For example, Young states that “[c]ontroller 172 uses this [fat thickness] information to dynamically modify the cutting profile of loin knife assembly 100 so that the assembly follows a fixed distance from the separation line[.]” EX1004, 18:36-39. Therefore, Young discloses storing the contour of the fat trimming blade height over the length of the meat product in controller 172. Therefore, Young discloses least one travel profile is stored in the control unit in accordance with which the position of the cutting blade relative to the product support is to be set in dependence on a product feed.

132. Thus, Young discloses element 1[E].

B. Dependent Claim 2: “wherein the determination of the thickness of the fat cover takes place optically.”

133. Young discloses wherein the determination of the thickness of the fat cover takes place optically.

134. For instance, as discussed above, Young discloses an imaging system 190 which observes the meat product and collects image data, thickness of the fat cover. Imaging system 190 does not contact the meat product during the collection of image data and discloses using cameras to collect the image data. See EX1004,

18:33-45. Cameras are optical devices. Therefore, Young discloses the determination of the thickness of the fat cover takes place optically.

135. Thus, Young discloses claim 2.

C. Dependent Claim 3: “comprising a light detector for the detection of light reflected at the meat product.”

136. Young discloses comprising a light detector for the detection of light reflected at the meat product.

137. For instance, as discussed above, Young discloses an imaging system 190 which observes the meat product and collects image data using multiple cameras. EX1004, 18:33-45. Young discloses that a plurality of lights 140, project a “high intensity light against” the meat product. EX1004, 17:65-18:2. Young’s cameras collect image data of the meat product both with, and without (i.e. shadowed) the high intensity illumination to aid in image processing. EX1004, Fig. 12, 33-41. Because Young’s cameras are capable of taking images using the reflection of light, they are capable of detecting, i.e. they are light detectors. Because the high intensity light projected by lights 140 is directed at the meat product, it is necessarily reflected at the meat product. See EX1004, 18:1-2. Therefore, Young discloses that imaging system, 190 detects the light reflected at the meat product by lights 140.

138. Thus, Young discloses claim 3.

D. Dependent Claim 4: “wherein the light detector comprises a camera”

139. Young discloses a light detector comprising a camera.

140. Young discloses imaging system 190, which “controls several cameras that provide image data regarding [the meat product, including] a top plan camera 196, an end view camera 197 and a fat line camera 198.” EX1004, 17:55-60. Young’s apparatus also includes light sources such as “plurality of lights 140” which illuminates the meat product observed by imaging system 190’s cameras. Ibid., 17:63-18:3. These cameras, top plan camera 196, end view camera 197 and fat line camera 198, correspond to the claimed light detector that comprises a camera.

141. Thus, Young discloses claim 4.

E. Dependent Claim 5: “further comprising a light source configured to illuminate a region of the meat product.”

142. Young discloses further comprising a light source configured to illuminate a region of the meat product.

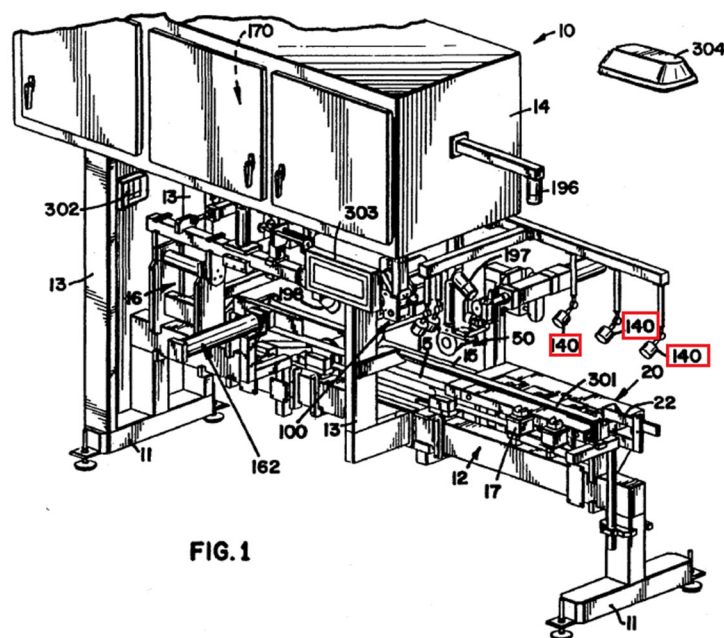
143. For instance, Young’s discloses light sources such as “plurality of lights 140” which illuminates the meat product observed by imaging system 190’s cameras. EX1004, 17:55-60. Young also discloses supplemental lighting systems such as lighting systems 302 and 304. EX1004 18:56-65.

144. Thus, Young discloses claim 5.

F. Dependent Claim 6: “wherein the light source comprises at least one light emitting diode.”

145. Young discloses wherein the light source comprises at least one light emitting diode.

146. For instance, Young discloses a plurality of lights 140. Lights 140 corresponds to the claimed light source. Young states lights 140 is directed at the meat product and “may be used to project high intensity light on the top surface of the pork side to create a clear delineation along the top edge of the end of the pork side. Again, two images may be taken, one with the lighting and one without[.]” EX1004, 18:26-31. The below annotated Figure 1 illustrates the position of the lights 140 relative to Young’s apparatus.



EX1004, Fig. 1.

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147. It is preferred in the '321 patent that lights 140 be a lighting system that “light wavelengths in the order of 380 to 760 nanometers . . . (more preferably about 550 to 600 nanometers), which may be provided by different lighting systems[.]” EX1004, 18:65-19:2. Young’s disclosure does not limit itself to a single type of lighting element, and therefore lights 140 may comprise a light emitting diode. Specifically, light emitting diodes may emit light in wavelengths anywhere from 240nm to 900nm depending on the variety of light emitting diodes. EX1020. Therefore, a light emitting diode lighting system would fall within Young’s preferred light wavelength range. Compare EX1004, 18:65-19:2 with EX1020, 2-3. This is particularly true for a yellow-green to red light emitting diode, which emits light in the range of 565 nm to 645nm, i.e. specifically within the more preferred range of the '321 patent. EX1020. Additionally, light emitting diodes were known well understood in the field of the invention before the priority date of the '321 patent. EX1025, 18; EX1017, 2:31-33; EX2016, 4; EX1027, 2:14-16. See also EX1024. For example, Veldkamp and Veldkamp019 disclose the use of light emitting diodes as part of a sensor of a fat separation apparatus. EX1025, 2:33-35, 6:41-40; EX1027, 2:13-16. Burton814 discloses the use of light emitting diodes as an illumination source for a contactless vision sensor system. EX1026, 4. Further, light emitting diodes have numerous advantageous, such as low cost, and high efficiency. Because light emitting diodes were common knowledge in the art and used in analogous

machinery, a POSA reading Young would understand Young's disclosure to include light emitting diodes as part of its light 140. Therefore, Young discloses that a light source, lights 140, directed at the meat product includes a light emitting diode.

148. Thus, Young discloses claim 6.

G. Dependent Claim 8: “further comprising a transport device configured to transport the meat product through the measurement device.”

149. Young discloses further comprising a transport device configured to transport the meat product through the measurement device.

150. For instance, Young discloses that the meat product rests on top of a platen 20 as it is transported through Young's apparatus. EX1004, 5:52-55. The claimed transport device corresponds to platen 20. Young states that “platen 20 . . . transport[s] a [meat product] between different stations in apparatus 10.” EX1004, 6:13-16. As discussed above in section XI.A.2 the claimed measurement device corresponds to Young's imaging system 190. Young states that the meat product maintains “a fixed position on the platen [while] the image data is calculated by the imaging system[.]” EX1004, 7:3-6. This demonstrates that platen 20 transports the meat product as it is being observed by imaging system 190, i.e. through the measurement device. As another example, Young states that the cameras of imaging system 190 “may be coordinated with the small incremental movements of the

platen[,]” i.e. imaging system measures the meat product as it is being actively transported by platen 20. EX1004, 18:42-46.

151. Thus, Young discloses claim 8.

H. Dependent Claim 10: “wherein the transport device further configured to supply the meat product to the cutting device.”

152. Young discloses wherein the transport device further configured to supply the meat product to the cutting device.

153. As discussed above in Section XI.F the claimed transport device corresponds to Young’s platen 20. Platen 20 transports the meat product through the various stations of Young’s apparatus, including through the knife assembly. EX1004, 6:13-16. As explained above in Section XI.A.3, the claimed cutting device corresponds to Young’s knife assembly. Young states that a meat product “will be passed through the scribe saw and loin knife assemblies on platen 20[.]” Therefore, Young discloses that platen 20 is configured to supply a meat product to the knife assembly.

154. Thus, Young discloses claim 10.

I. Independent Claim 14

155. As discussed above in Section XI.A. Young anticipates the subject matter as a whole of claim 1. Claim 14 is nearly identical to claim 1 with a few omissions and additions and much of the evidence for claim 1 applies to corresponding limitations of claim 14.

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156. Specifically, as stated above, the claim 14 preamble corresponds to the claim 1 preamble except for reciting a method rather than an apparatus. 14[A] is nearly identical to 1[A] but is recited in method form and omits “a measurement device.” 14[B] corresponds to 1[B]. All of 14[B2]’s elements are present within 1[E] and therefore the evidence is equally applicable. 14[C] and 1[E] both claim a “travel profile” according to which the “position” of the “cutting blade” is “set.” Claim 1[E] also adds the requirements that (1) the travel profile be stored in the control unit, and that (2) the position of the cutting blade set by the travel profile is “in dependence on a product feed.” Therefore, for these elements please refer to the analysis and evidence of the corresponding section of claim 1.

157. 14[B3] is addressed separately below.

1. Element 14[B3]: “wherein the setting comprises setting the position in a direction transverse to the feed direction.”

158. Young discloses wherein the setting comprises setting the position in a direction transverse to the feed direction.

159. For instance, as discussed above, Young’s platen 20 transports the meat product through Young’s apparatus. EX1004, 5:52-55. Young’s platen 20 corresponds to the claimed product support. The direction platen 20 transports the meat product corresponds to the claimed “feed direction.” Young’s “cutting” blade corresponds to knife assembly 100. EX1004, 10:33-53. Knife assembly 100 is

capable of moving on four axes of motion, including vertical (climb/dive) movement and lateral movement. EX1004, 14:21-45. Knife assembly 100 is displaced above platen 20, and due to its four actions of movement, may move: (1) up away from platen 20; (2) down toward platen 20; (3) laterally to the right of platen 20; and (4) laterally to the left of platen 20. See EX1004, Fig. 2, 14:21-45. Therefore, Young discloses that knife assembly 100 may set its position in any direction relative to platen 20's direction of transport through Young's apparatus.

160. Thus, Young discloses element 14[B3], as well as the other limitations of claim 14.

J. Dependent Claim 15 “wherein determining the thickness of the fat cover comprises an optical measurement.”

161. Young discloses wherein determining the thickness of the fat cover comprises an optical measurement.

162. As discussed above, the claimed measurement device corresponds to Young's imaging system 190. EX1004, 17:55-59, Fig. 13. Young's imaging system contactlessly observes and measures the meat product, and therefore is measuring the thickness optically. EX1004, 17:55-62, 18:46-56, 17:34-46

163. Thus, Young discloses claim 15.

K. Dependent Claim 16: “determining the thickness of the fat cover during a transport movement of the meat product.”

164. Young discloses determining the thickness of the fat cover during a transport movement of the meat product.

165. For example, Young discloses a conveying means (also called a conveying mechanism) which conveys a meat product through the apparatus and “past the loin knife assembly.” EX1004, 4:23-25, 4:38-39. This conveying means may take the form of gripper platen 20. EX1004, 5:51-54. The gripper platen 20’s movement of the meat product through the apparatus corresponds to a transport movement of the meat product. Gripper platen 20 transports the meat product “between the different stations in [the] apparatus” including through imaging system 190 which determines the thickness of the fat cover. EX1004, 6:13-17, 6:1-7:2, Fig. 5. During this transport movement, Young’s imaging system 190 captures image data of the meat product using top plain camera 196, end view camera 197, and fat line camera 198. EX1004, 17:55-57. Therefore, Young discloses determining the thickness of the fat cover during a transport movement of the meat product.

166. Thus, Young discloses claim 16.

XII. GROUND 2: CLAIMS 1-6, 8, 10, AND 14-16 WOULD HAVE BEEN OBVIOUS OVER YOUNG AND NORRIE.

167. As shown above in Ground 1 Young teaches all the elements of claims 1-6, 8, 10, and 14-16 of the ’321 patent. However, to the extent there is any doubt

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that Young teaches all the claimed elements, the claims would nonetheless be obvious based on Young in light of Norrie (EX1005) and the knowledge in the art.

168. As I discuss in greater detail below, Norrie explicitly teaches many of the elements of the '321 patent and explicitly discloses determining the “thickness” of a fat cover and the related limitations. A POSA would have been motivated to combine Norrie’s disclosures with Young’s apparatus to achieve greater control, functionality and consistency as well as to reduce waste and optimize yield. Additionally, a POSA would be motivated to specifically look toward Norrie for incorporation into Young’s apparatus as Young on its face cites to Norrie as an “automated loin separation system” that addresses “problems associated with manual loin separation processes.”

169. Finally, A POSA would have a reasonable expectation of success when incorporating Norrie’s functionality into Young’s apparatus. First because Young could not have been more clear that it could be combined with Norrie’s teachings as it cites Norrie as a compatible and similar apparatus. Second, Norrie discloses a machine in the same field of art, with a similar manner of operation, and similar components.

A. The Prior Art Teaches All Elements of the '321 Patent.

170. As discussed in detail in Ground 1, Young teaches all the elements of claims 1-6, 8, 10 and 14-16 of the '321 patent. However, to the extent there is any

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doubt whether all elements are disclosed by Young, such as the automatic sensing of thickness of the fat cover, those elements would have been obvious in view of Norrie.

171. Norrie explicitly teaches many of the elements of claims 1-6, 8, 10, and 14-16 of the '321 patent."

172. Specifically, Norrie discloses: [Pre] a back fat separation apparatus which corresponds to the claimed apparatus; [A] a camera 54 that automatically determines the thickness of a fat cover which corresponds to the claimed measurement device, [B] a blade 54 which corresponds to the claimed cutting blade; and [C] a computer 62 which corresponds to the claimed controller. See Appendix A; EX1005, Abstract, Title, Fig. 1, Fig. 3, Fig. 4 2:58-60, 3:21-22, 4:23-28, 4:27-35, 4:48-53.

173. The below chart summarizes the teachings of Norrie that correspond to the relevant claim limitations of claims 1 and 14.

<u>Claim Language</u>	<u>Exemplary Norrie Disclosures</u>
Apparatus for separation	apparatus for the separation of back fat from a loin portion of a carcass
Measurement device	camera 54
Cutting device/cutting blade	blade 34
Control unit	computer 62
Variable position relative to product feed	blade solenoid 41 causes movement of blade 34 above conveyor 16

174. Additionally, Norrie is explicit in its disclosure that it measures the thickness of fat cover and alters the positions of a cutting blade based on that

measurement. For instance, Norrie states “camera 54 will observe the thickness of fat [and] send appropriate fat signals to the computer. The computer in turn, will either signal the blade solenoid 41 that no adjustment is necessary, or alternatively will signal the blade solenoid so as to adjust the position of the blade 34 by operating the cylinder 40.” EX1005, 4:28-34.

B. A POSA Would Have Been Motivated to Combine Norrie’s Thickness Sensing with Young’s Fat Removal Apparatus.

175. To the extent Weber argues that Young does not disclose determining the “thickness” of a fat cover, a POSA would have been strongly motivated to combine Norrie’s thickness sensing into Young’s apparatus.

176. Young explicitly cites to Norrie as an “automated loin separation system” and explains that such machines “often result[] in more efficiency and more repeatable results.” EX1004, 2:18-29. Young also foresaw the potential utility of modifying its imaging system to grant increased functionality. Young explains “Various modifications and changes may be made . . . consistent with the invention. For example, additional imaging and motion functionality may be included to provide more sophisticated profiles.” EX1004, 20:17-24. Along the same rationale, Norrie states that the purposes of measuring fat thickness is to “optimize the separation of said back fat from [the meat product].” EX1005, 2:3-9. Young also emphasizes the general needs in the art to achieve greater control, customization,

and consistency, as well as to optimize yield and reduce waste. EX1004, 2:43-51. Therefore, a POSA looking at Young would have been directed immediately to Norrie for increased imaging functionality. EX1004, 2:18-29. Norrie itself would have shown that thickness sensing would “optimize the separation of said back fat,” in line with Young’s stated goal of “customized processing of individual sides of meat to optimize the various operations[.]” EX1004, 2:47-51.

C. A POSA Would Have Had A Reasonable Expectation of Success in Combining Norrie’s Thickness Sensing with Young’s Fat Removal Apparatus.

177. A POSA would have had a reasonable expectation of success in combining Young and Norrie as described. As discussed above, Young explicitly cites to Norrie as an analogous machine with similar teachings. A POSA would have been able to apply Norrie’s teaching of determination of thickness by a camera and controller in Young’s apparatus. As an example a POSA could modify Young’s controller 172’s processing to determine thickness as in as Norrie’s computer 64. This would be a routine software modification within the level of skill of a POSA. As another example, a POSA could implement Norrie’s camera 54 and computer 64 into Young’s apparatus as routine change of components. This would be a routine modification and only involve a change of components and a connection of the new components to the apparatus. For example, a POSA would have known how to select the appropriate location, mounting, hardware connections, and electrical

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connections using readily available components like screws, brackets, cables, and power cords. Indeed, Young even states “Various modifications and changes may be made to control system 170 consistent with the invention... [T]he design of control system 170 may be modified to incorporate different accessory components on apparatus 10. Other modifications will be appreciated by one skilled in the art.” EX1004, 20:17-24.

D. Other Limitations

178. To the extent Weber argues that Young fails to disclose any other limitations of the ’321 patent, these features could be found in Norrie and combined with Young for the same reasons as stated above. *See also* Appendix A.

179. Regarding dependent claims, see below chart summarizing the teachings of Norrie that disclose the challenged dependent claims. See also Appendix A.

<u>Claim Language</u>	<u>Exemplary Norrie Disclosures</u>
Light detector that comprises a camera	Camera 54
Light source that comprises at least one light emitting diode	Light source included with camera 54
Transport device	Conveyor 16

XIII. GROUND 3: CLAIMS 1-6, 8, 10 AND 14-16 WOULD HAVE BEEN OBVIOUS OVER JOHNSON AND BELK.

180. Below, I explain how claims 1-6, 8, 10, and 14-16 would have been obvious over Johnson and Belk in light of the knowledge of a POSA.

A. Independent Claim 1

181. Independent claim 1 would have been obvious in view of Johnson and Belk. The below chart briefly summarizes the teachings of Johnson that correspond to the relevant claim limitations in the ' 321 patent's independent claim 1, and below that is a chart the briefly summarizes the Belk teachings that correspond to the relevant claim limitations of claim 1:

Claim Element	Johnson Exemplary Disclosures
Apparatus for separation	separation apparatus 10
Cutting device/cutting blade	Blade assembly 502
Control unit	Controller
Travel profile	Fat/lean interface

Claim Element	Belk Exemplary Disclosures
Measurement device	Imaging device 12

1. Preamble: “An apparatus for separation of a fat cover of a meat product from a flesh component of the meat product.”

182. Johnson discloses independent claim 1's preamble. Independent claim 1's preamble recites: an apparatus for separation of a fat cover of a meat product from a flesh component of the meat product.

183. Johnson states that its disclosure is related to meat trimming systems which remove fat from a flesh component of a meat product. Johnson states “This invention relates generally to methods for processing meat cuts and, more particularly, to an apparatus and method for trimming fat from a meat cut.” EX1006, 1:14-16. Johnson's background of the invention also discusses “fat trimming

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devices” that remove fat from meat products. EX1006, 1:30-41. Specifically, the claimed “fat cover” corresponds to Johnson’s “fat” that is removed and the claimed “flesh component of the meat product” corresponds to what Johnson refers to as “lean” or the “meat cut.” Johnson states: “As the meat cut travels over the blade, thereby trimming the fat from the lean, the meat cut is then grabbed.” EX1005, 5:42-45. Therefore, Johnson discloses removal of the outer layer of fat and skin from the meat.

184. Thus, Johnson discloses the preamble.

2. Element 1[A]: “a measurement device for automatic determination of the thickness of the fat cover, wherein the determination of the thickness of the fat cover takes place in a contactless manner.”

185. Johnson in view of Belk renders obvious a measurement device for automatic determination of the thickness of the fat cover wherein the determination of the thickness of the fat cover takes place in a contactless manner.

186. For instance, Belk discloses imaging device 12. EX1007, 4:55-65. The claimed “measurement device . . . ” corresponds to Belk’s imaging device 12. Imaging device 12 observes a meat product and collects image data. EX1007, 4:65-67. Imaging device 12 is preferably a color camera. EX1007, 5:50-52. Belk states “It is preferable for the imaging device 12 to be a color video camera . . . it is also preferred that the imaging device 12 be small and lightweight[.]” EX1007, 5:49-54.

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187. Belk also discloses a data processing unit 16, which processes the image data collected by imaging device 12. EX1007, 7:19-21. Belk states “After image data is captured by the imaging device 12, it is transferred in real-time to the data processing unit 16.” EX1007, 7:19-21, 8:25-49.

188. Data processing unit 16 processes the image data captured by imaging device 12 and analyzes an “area of interest” for “characteristic[s] of interest.” EX1007, 4:14-38, 9:59-10:11. Characteristics of interest that Belk may analyze and/or measure include e.g. marbling quality, firmness, surface area, lengths, and widths of areas of interest, density of lean tissue, and density of fat tissue in addition to measuring the thickness of the fat cover. EX1007, Abstract, 2:12-24, 4:26-36, 4:39-45, 9:7-18, 5:9-19, Fig. 3. Data processing unit 16 then may measure the length, width and surface area or an area of interest. EX1007, 15:22-31. By determining the location of fat in an area of interest Belk’s data processing unit 16 may then analyze that fat to measure its height, width, and length. EX1007, 15:22-31. Therefore, Belk discloses that imaging device 12 contactlessly takes image data of a meat product and said data is then analyzed to determine the thickness of the fat cover. EX1007, 2:12-24, 4:26-36, 4:39-45, 9:7-18, 5:9-19, Fig. 3.

189. Thus, Johnson in view of Belk renders obvious element A.

3. Element 1[B]: “cutting device coupled to the measurement device for automatic separation of the fat cover from the flesh component in dependence on the thickness determined by the measurement device.”

190. Johnson discloses a cutting device coupled to the measurement device for automatic separation of the fat cover from the flesh component in dependence on the thickness determined by the measurement device.

191. To start, Johnson discloses a blade assembly 502. Johnson explains that blade assembly 502 removes, or “trims,” the fat cover from a meat product as the meat product is fed through Johnson’s apparatus. See EX1006, 5:20-25. Johnson’s blade assembly 502 corresponds to the claimed cutting device. Blade assembly 502 is mounted on an articulating arm which has a wide range of motion, including climb/dive (i.e. up down) motion. EX1006, 5:32-35. Blade assembly 502 is also coupled to a controller. EX1006, 5:20-23. The controller is also coupled to Johnson’s probe assembly, which corresponds to the claimed measurement device. EX1006, 4:53-59.

192. The controller receives signals from the probe assembly based on measurements of the thickness of the fat cover. EX1006, 4:53-59. Based on the signals received from the probe assembly, the controller sends control signals representative of the fat to lean interface to blade assembly 502. EX1006, 5:20-26 Johnson explains “The controller sends a signal representative of the fat to lean

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interface which will control the blade assembly to variably position the blade to follow the contour of the lean to fat interface. . . . multiple blade can be utilized in order to conform more closely to the three dimensional path or contour described by the fat/lean interface map.” EX1006, 5:20-26.

193. Blade assembly 502 varies its position in dependence on these control signals, which are themselves based off the measurements of thickness taken by the probe assembly, to accurately remove the fat cover as its contour over the meat product varies. EX1006, 5:20-26 In this way, blade assembly 502 separates the fat cover from the meat product based on, i.e. in dependence on, thickness measurements made by the probe assembly.

194. Thus, Johnson in view of Belk renders obvious element 1[B].

4. Element 1[C]: “a cutting blade whose position is variable relative to a product support[.]”

195. Johnson discloses a cutting blade whose position is variable relative to a product support.

196. As discussed above in section XII.A.3 Johnson discloses a cutting blade in the form of blade assembly 502 which can vary its position, including climb/dive (i.e. up and down) motion). EX1006, 5:32-35. Johnson also discloses a conveyor assembly 108. EX1006, 4:9-19. Meat product rests on the conveyor assembly 108 as it is conveyed through Johnson’s apparatus. Johnson discloses that the position of

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the cutting blade varies up and down above the product conveyor surface. EX1006, 5:20-26. Therefore, conveyor assembly 108 corresponds to the claimed product support. EX1006, 4:9-19. As Johnson's blade assembly 502 varies its position up and down, it necessarily varies its position relative to conveyor assembly 108. See EX1006, 5:20-26, 5:30-35. Therefore, Johnson's discloses that blade assembly 502's position is variable relative to a product support.

197. Thus, Johnson in view of Belk renders obvious 1[C].

5. Element 1[D]: "a control unit for control of the position of the cutting blade in dependence on the thickness determined by the measurement device[.]"

198. Johnson discloses a control unit for control of the position of the cutting blade in dependence on the thickness determined by the measurement device.

199. Johnson discloses a controller, which is coupled to both blade assembly 502 and the probe assembly. EX1006, 4:53-59, 5:20-25. Blade assembly 502 corresponds to the claimed cutting unit and the probe assembly corresponds to the claimed measurement device. Johnson's controller corresponds to the claimed control unit.

200. Johnson's controller sends signals to blade assembly 502 to vary its position based on the fat thickness measurement data received from the probe assembly. EX1006, 4:53-59, 5:20-26.

201. Thus, Johnson in view of Belk renders obvious element 1[D].

6. Element 1[E]: “wherein at least one travel profile is stored in the control unit in accordance with which the position of the cutting blade relative to the product support is to be set in dependence on a product feed.”

202. Johnson discloses at least one travel profile is stored in the control unit in accordance with which the position of the cutting blade relative to the product support is to be set in dependence on a product feed.

203. For instance, Johnson describes that conveyor assembly 108 conveys a meat product through the apparatus. EX1006, 3:46-66. Conveyor 108 corresponds to the claimed “product feed.”

204. Johnson describes that its probe assembly determines the “fat/lean interface” along the length of a meat product. EX1006, 4:48-53. This fat/lean interface corresponds to the claimed “travel profile.” Johnson describes the fat/lean interface as the “contour” of the fat layer over the meat product. EX1006, 4:52-53. Johnson explains that the probe assembly takes multiple measurements and “maps” the fat/lean interface along the length of the meat product. EX1006, 1:56-58, 4:51-53. This fat/lean interface is stored within Johnson’s controller. EX1006, 4:53-56. The controller then transmits control signals based off the fat lean interface to blade assembly 502. EX1006, 5:30-42. These signals change the position of blade assembly 502 relative to conveyor assembly 108 as it cuts the meat product. EX1006, 5:20-26. As shown in the annotated Figures 5 and 8, blade 406 of blade

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assembly 502, is disposed perpendicularly to the product feed. EX1006, Figs. 5, 8. As blade assembly 502's position changes, it does so relative to the product feed and based on the fat/lean interface determined by the probe assembly. EX1006, 5:20-26. Therefore, Johnson discloses storing the contour of the fat trimming blade height over the length of the meat product in the controller.

205. Therefore, the fat/lean interface is stored in the controller, and causes blade assembly 502 to set its position based on the fat/lean interface over the product feed.

206. Thus, Johnson in view of Belk renders obvious 1[E].

B. Dependent Claim 2: “wherein the determination of the thickness of the fat cover takes place optically.”

207. Belk discloses “wherein the determination of the thickness of the fat cover takes place optically.”

208. For instance, Belk discloses an imaging device 12, which can be any imaging device known to a POSA, such as a camera. EX1007, 5:10-12. A camera does not contact a meat product it is observing and is an optical device.

209. As discussed above Belk's imaging device 12 observes an area of interest on a meat product and collects image data with real time data output within 5-15 seconds. EX1007, 4:14-38, 5:40-44. Belk's processing unit 16 then processes and analyzes the image data to calculate desired characteristics, such as the presence

and size of fat in the area of interest. EX1007, 4:14-38, 9:59-10:11. Image processing unit 16 then is capable of measuring the length, width and surface areas of these characteristics of interest. EX1007, 15:22-31, Fig. 3. Belk uses this process to measure the length, width and surface area of fat within a meat product. EX1007, 15:22-31.

210. Thus, Johnson in view of Belk renders obvious claim 2.

C. Dependent Claim 3: “comprising a light detector for the detection of light reflected at the meat product.”

211. Belk discloses comprising a light detector for the detection of light reflected at the meat product.

212. For instance, as discussed above, Belk discloses an imaging device 12, which may be any imaging device known to a POSA, including a camera. EX1006, 6:2-7. Belk also discloses illumination system 26, which projects light at a meat product. EX1007, 3:64-67, 5:61-66. Imaging device 12 observes and measures a meat products characteristics when illumination system 26 is projecting light, imaging device 12 then captures image data and is therefore capable of detecting the light reflected by the meat product. EX1007, 6:11-17.

213. Thus, Johnson, in view of Belk renders obvious claim 3.

D. Dependent Claim 4: “wherein the light detector comprises a camera”

214. Belk discloses wherein the light detector comprises a camera.

215. For instance, Belk includes “an imaging device 12” which “can be any such imaging device known to those of skill in the art, such as a camera[.]” EX1007, 5:9-12. Belk’s imaging device 12 corresponds to the claimed “light detector [which] comprises a camera.” Belk explains that if imaging device 12 is a camera, “[t]he camera responds to light in at least one portion of the light spectrum” and therefore is able to function as a light detector. *Ibid.*, 5:16-19.

216. Thus, Johnson in view of Belk renders obvious claim 4.

E. Dependent Claim 5: “further comprising a light source configured to illuminate a region of the meat product”

217. Belk discloses further comprising a light source configured to illuminate a region of the meat product.

218. For instance, as discussed above Belk discloses illumination system 26. EX1007, 3:63-65. The claimed light source corresponds to illumination system 26. Belk states that illumination system 26 “illuminate[s] the meat with energy in the useful spectrum of the imaging device.” EX1007, 5:61-63. Because illumination system 26 projects light at a meat product, Belk discloses a light source configured to illuminate a region of the meat product. EX1007, 3:64-67, 5:61-66.

219. Thus Johnson in view of Belk discloses claim 5.

F. Dependent Claim 6: “wherein the light source comprises at least one light emitting diode.”

220. Belk discloses wherein the light source comprises at least one light emitting diode.

221. For instance, Belk discloses illumination system 26. EX1007, 3:63-65. The claimed light source corresponds to illumination system 26. Belk states that illumination system 26 “illuminate[s] the meat with energy in the useful spectrum of the imaging device.” EX1007, 5:61-63. Illumination system 26 can be “any known or future developed illumination system . . . e.g. a lamp (incandescent, fluorescent, etc.), a laser, etc.” EX1007, 6:2-7. Therefore, Belk discloses the use of a light emitting diode as a light source. Additionally, LEDs were known well understood in the field of the invention before the priority date of the ’321 patent. EX1025, 18; EX1017, 2:31-33; EX1027, 2:14-16. See also EX1020, 2-3; EX1024, 1-2. For example, Veldkamp and Veldkamp019 disclose the use of light emitting diodes as part of a sensor of a fat separation apparatus. EX1017, 2:32-35, 6:41-40; EX1027, 2:13-16. Burton814 discloses the use of light emitting diodes as an illumination source for a contactless vision sensor system. EX1026, 4. Further, light emitting diodes have numerous advantageous, such as low cost, and high efficiency. Because light emitting diodes were common knowledge in the art and used in analogous

machinery, a POSA reading Belk would understand Belk's disclosure to include light emitting diodes as part of its illumination system 26.

222. Thus, Johnson in view of Belk renders obvious claim 4.

G. Dependent Claim 8: “further comprising a transport device configured to transport the meat product through the measurement device.”

223. Johnson discloses further comprising a transport device configured to transport the meat product through the measurement device.

224. For instance, Johnson discloses a conveyor assembly 108. EX1006, 3:36-37. The claimed transport device corresponds to Johnson's conveyor assembly 108. Johnson states that conveyor assembly 108 “convey[s] the meat cut through the classification system and a multi-probe mechanism assembly . . . for measuring the fat thickness.” EX1006, 3:51-55. As discussed previously, the probe assembly corresponds to the claimed measurement device. Therefore, Johnson discloses that conveyor assembly 108 transports the meat product through the probe assembly.

225. Thus, Johnson in view of Belk renders obvious claim 8.

H. Dependent Claim 10: “wherein the transport device further configured to supply the meat product to the cutting device.”

226. Johnson discloses wherein the transport device further configured to supply the meat product to the cutting device.

227. For instance, Johnson discloses a conveyor assembly 108. EX1006, 3:36-37. The claimed transport device corresponds to Johnson's conveyor assembly

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108. As discussed above, the claimed cutting device corresponds to Johnson's blade assembly. Johnson states that "the conveyor assembly 108 . . . is designed to grab the meat cut and pull it underneath the hold down assembly 112 downstream toward and into contact with the blades of the blade assembly." EX1006, 4:14-19. Therefore, Johnson discloses that conveyor assembly 108 is configured to supply the meat product to the blade assembly.

228. Thus, Johnson in view of Belk renders obvious claim 10.

I. Independent Claim 14

229. As discussed above in Section XIII.A. Johnson in combination with Belk renders obvious the subject matter as a whole of claim 1. As described above, claim 14 is nearly identical to claim 1 and much of the evidence for claim 1 applies to corresponding limitations of claim 14.

230. Specifically, the claim 14 preamble corresponds to the claim 1 preamble except for reciting a method rather than an apparatus. 14[A] is nearly identical to 1[A] but is recited in method form and omits "a measurement device." 14[B] corresponds to 1[B]. All of 14[B2]'s elements are present within 1[E] and therefore the evidence is equally applicable. 14[C] and 1[E] both claim a "travel profile" according to which the "position" of the "cutting blade" is "set." Claim 1[E] also adds the requirements that (1) the travel profile be stored in the control unit, and that (2) the position of the cutting blade set by the travel profile is "in dependence on a

product feed.” Therefore, for these elements please refer to the analysis and evidence of the corresponding section of claim 1.

231. 14[B3] is addressed separately below.

1. Element 14[B3]: “wherein the setting comprises setting the position in a direction transverse to the feed direction.”

232. Johnson discloses wherein the setting comprises setting the position in a direction transverse to the feed direction.

233. As discussed above Johnson discloses a conveyor assembly 108 which transports the meat cut through Johnson’s apparatus. EX1006, 3:35-37, 4:4-5. Young states that the path the meat product takes through the apparatus is the “path of conveyance.” See EX1006, 4:4-5. The claimed “feed direction” corresponds to Johnson’s path of conveyance. As discussed above, Johnson discloses a cutting device in the form of blade assembly 502. EX1006, 9:64-65. Blade assembly 502 is attached to an articulating arm capable of dive and climb (i.e. up and down) movement and is capable of altering its pitch. EX1007, 5:34-39. As blade assembly 502 moves up or down, or changes its pitch, it necessarily gets closer or further away from conveyor assembly 108 and the path of conveyance. Therefore, Johnson discloses that blade assembly 502 may change its position in a direction transverse to the path of conveyance.

234. Thus, Johnson discloses element 14[b3].

J. Dependent Claim 15: “wherein determining the thickness of the fat cover comprises an optical measurement.”

235. Belk discloses wherein determining the thickness of the fat cover comprises an optical measurement.

236. As discussed above, the claimed measurement device corresponds to Belk’s imaging device 12. Belk’s imaging device 12 may be a camera. EX1007, 5:49-52. Belk’s imaging device 12 measures the thickness of the fat cover. EX1004, 17:55-62, 18:46-56, 17:34-46. Belk’s imaging device 12 does not contact the meat product as it measures and a camera is an optical device. EX1007, 2:12-24, 4:26-36, 4:39-45, 9:7-18, 5:9-19, Fig. 3. Therefore, imaging device 12 measures the meat product optically.

237. Thus, Johnson in view of Belk renders claim 15 obvious.

K. Dependent Claim 16: “determining the thickness of the fat cover during a transport movement of the meat product.”

238. Johnson, in combination with Belk, discloses determining the thickness of the fat cover during a transport movement of the meat product.

239. Johnson discloses a transport device in the form of conveyor assembly 108 and a measurement device in the form of a probe assembly. EX1006, 3:51-55, 4:27-34. Conveyor assembly 108 transports a meat product through Johnson’s apparatus. EX1006, 3:51-55. This transportation through the apparatus corresponds to the claimed transport movement.

240. Specifically, conveyor assembly 108 transports a meat product through Johnson's probe assembly. Johnson states Johnson states that conveyor assembly 108 "convey[s] the meat cut through the classification system and a multi-probe mechanism assembly . . . for measuring the fat thickness." EX1006, 3:51-55. The probe assembly measures the thickness of the fat cover. EX1006, 3:51-55. If incorporated into Johnson's apparatus, Belk's imaging system 190 would measure the thickness of the fat cover with its camera at the same time as Johnson's probe assembly measured the thickness, i.e. during the transport movement. Therefore, Johnson discloses determining the thickness of the fat cover with the probe assembly during a transport movement made by conveyor assembly 108.

241. Thus, Johnson discloses claim 16.

L. A POSA Would Have Been Motivated to Combine Belk's Image Analysis System with Johnson's Fat Separation Apparatus

242. A POSA would have been motivated to improve Johnson's fat separation apparatus by combining it with the concept of Belk's advanced meat imaging and analysis system. A POSA would have been motivated to make such a combination to improve hygiene, meat quality, processing accuracy, and functionality.

243. The prior art widely recognized a general need for accuracy when using measurement devices to analyze meat for processing. For example, Sigurdsson,

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states “Modern food processing demands high levels of productivity and precision. It is the aim of the producer and requests of the buyer to obtain as accurate portion size as possible. It is also an important factor that the object in this case, fish or meat portions, have certain configurations and/or thickness due to the end buyer’s request.” EX1012, [0007].

244. Belk similarly recognizes the need for fast and accurate measurement and evaluation of meat product. Specifically, Belk is motivated by accurately and automatically meeting USDA regulations for grading of meat and to increase “economic benefit to those at all segments of the meat production system” as well as scientific research purposes. EX1007, 1:57-66. Belk’s image analysis system is also preferably “portable, e.g. small and lightweight” and would therefore be simple to implement in Johnson’s apparatus via the removal of the probe assembly and the installation of the image analysis system in a location where it could observe the meat product. EX1007, 3:11-14, 5:51-55.

245. Additionally, it was known in the prior art that probe measurement systems that physically penetrate a meat product pose (1) hygiene risks as they introduce more points of physical contact with the meat and (2) decrease meat quality via repeated penetrations of the product. EX1022, 1:29-31 2:36-47. For example, it was known in the prior art that “a distinct disadvantage of these probes

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is that they puncture the product to be trimmed and cause damage to the product.” EX1014, 1:32-41.

246. Johnson itself also points a POSA toward considering the use of other sensor technology. Johnson states that “optical technology or infrared sensor technology can be utilized or any other appropriate sensor technology.” EX1006, 7:65-67. While this does not explicitly disclose modifying Johnson to include contactless sensors, a POSA would be motivated to do so given the known disadvantages of probe sensors. By incorporating Belk’s image analysis system into Johnson’s apparatus a POSA would remove the negative elements of Johnson’s apparatus, namely (1) multiple penetrations by probes reducing meat quality and hygiene and (2) lower accuracy of measurement. This combination would have included nothing more than using a known device, Belk’s improved imaging camera and processor, into a machine with similar components, i.e. Johnson’s probes, to achieve known advantages.

247. Incorporating Belk’s image analysis system into Johnson’s apparatus would have the further benefit of improving the sensing functionality of Johnson’s apparatus. Johnson discloses that its probe assembly is only capable of sensing fat thickness and the position of the lean to fat interface and measures the entire meat product as a whole. EX1006, 41-53. Belk’s image analysis system is capable of much greater functionality such as measuring, e.g. marbling quality, firmness,

surface area, lengths, and widths of areas of interest, density of lean tissue, and density of fat tissue in addition to measuring the thickness of the fat cover. EX1007, Abstract, 12:24, 4:26-36, 4:39-45, 9:7-18, 5:9-19, Fig. 3. Additionally, if desired Belk's image analysis system is capable of measuring specific characteristics in only a specific "area of interest" rather than throughout the entire meat product. EX1007, 8:59-66, 15:22-31, Fig. 2. This allows Belk to take specific height, width, length measurements of various different parts of a meat product, unlike Johnson's probe assembly. *See* EX1007, 15:22-31.

248. Therefore, a POSA would have been motivated to combine Belk's image analysis system with Johnson's fat separation apparatus and improve the accuracy, hygiene, and meat quality of Johnson's apparatus.

M. A POSA Would Have Had a Reasonable Expectation of Success in Combining Belk's Image Analysis System with Johnson's Fat Separation Apparatus

249. A POSA would have had a reasonable expectation in combining Belk's image analysis system with Johnson's fat separation apparatus as described.

250. Specifically, Belk's image analysis system is within the same field, food processing, as Johnson's apparatus, and would be familiar to a POSA in this industry. EX1007, Abstract, 2:46-51. Additionally, Belk's image analysis system is portable, small, and lightweight, and would therefore be simple to physically

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accommodate within Johnson's apparatus and place in a location where Belk's cameras had a clear view to capture image data. EX1007, 3:11-14, 5:51-55.

251. As discussed above, Johnson also foresaw the potential need to replace its sensor system, and a POSA would expect success in incorporating a new sensor system from the same field within Johnson's apparatus because of this disclosure. EX1006, 7:65-67. A POSA could connect Belk's image analysis to Johnson's controller where it would send signals similar to those previously sent by Johnson's probe assembly. The newly installed imaging system would be coupled to Johnson's controller, and send data analogous to Johnson's probe assembly's signals. In addition, a POSA would have known how to select the appropriate location, mounting, hardware connections, and electrical connections using readily available components like screws, brackets, cables, and power cords. This combination would only require routine modifications, like attaching the cameras and connecting the components to a controller.

252. Therefore, a POSA would have a reasonable expectation of success in combining Belk's image analysis system into Belk's fat separator apparatus.

XIV. THERE ARE NO OBJECTIVE INDICIA OF NONOBVIOUSNESS.

253. I considered whether there were any objective indicia of nonobviousness when I was drawing my conclusions regarding obviousness in this declaration.

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254. I understand that any objective indicia of nonobviousness must have a connection to the allegedly novel aspects of the claimed device. I understand that the objective indicia of nonobviousness include the following: commercial success, long-felt but unmet need, failure by others, copying by others, praise in the industry, and unexpected results.

255. Considering the information I have reviewed, my general knowledge of the field of food processing equipment, general automation equipment, and publications within that and related fields, I am not aware of any objective evidence that would support the patentability of the challenged claims of the '321 patent. Further, from my review of the prosecution history of the '321 patent, I did not see any objective indicia raised during the prosecution of the patent. I am also not otherwise aware of publicly available evidence of objective indicia of nonobviousness that would support the patentability of the '321 patent. Therefore, in my opinion, no objective indicia of nonobviousness support the patentability of the challenged claims of the '321 patent.

XV. CONCLUSION

256. By signing this declaration, I recognize that my declaration will be filed as evidence in a contested case before the United States Patent and Trademark Office's Patent Trial and Appeal Board. I also recognize that I may be subject to

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cross-examination in the case. If cross-examination is required of me, I will appear for cross-examination within the United States during the allotted time.

257. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine of imprisonment, or both, under Section 1001 of Title 18 of the United States Code. I am over the age of eighteen years old, and I am competent to make this Declaration.

DocuSigned by:

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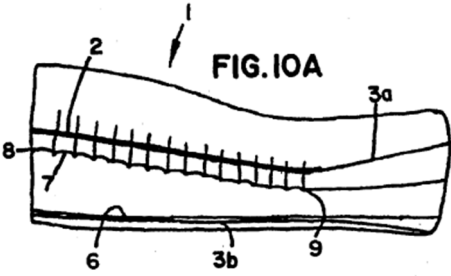
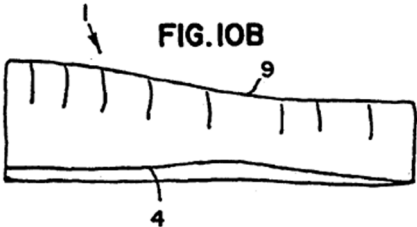
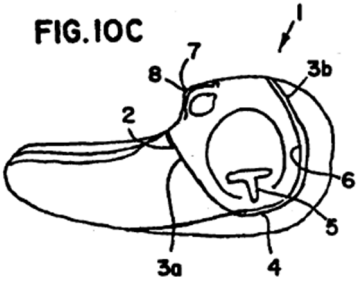
John M. Collins, Ph.D.

XVI. APPENDIX A – YOUNG CLAIM CHART FOR INDEPENDENT CLAIMS 1 AND 14

Claim	U.S. Patent No. 5,514,032 to Young (EX1004) and Combination
1[Preamble] An apparatus for separation of a fat cover of a meat product from a flesh component of the meat product, comprising:	“[54] LOIN SEPARATION APPARATUS AND METHOD OF OPERATION THEREFOR.” EX1004, Cover Page. “FIGS. 1-4 show a preferred loin separation apparatus 10 consistent with the principles of the invention. Apparatus 10 generally includes a number of primary electromechanical systems which handle various functions in the loin separation process. A gripper platen 20 is provided which supports a pork side and transports it throughout the different operations in the loin separation process.” EX1004, 5:47-55. “The pork side is next transferred to a second station where another operator pulls a U-shaped Join pulling knife through the pork side generally along the backbone to manually separate the loin from the pork belly. In this operation, one side of blade follows the scribe cut through the ribs, while the other side of the blade is maintained as close as possible to the junction between the fat back and the meat of the loin, known as the fat/lean separation line. Several modifications of this general operation are learned by experience operators to obtain higher yields. For instance, an operator must make sure the bottom of the loin pulling knife clears the "T"-shaped blade bone at the beginning of the cut, as well as the aitch bone at the end of the cut. In addition, the knife may be flared at the end of the cut to maximize the amount of ham kept with the loin. Other subtle movements such as rotating, widening, and tilting the knife blade are learned by more experienced operators to improve the finished product. A third step of trimming fat from the separated pork loin is also typically required regardless of the experience of the operators, as some excess fat will typically be left on a pulled loin. Some fat is preferred on a loin to keep it from drying out during storage. However, any amount of fat is Typically not appealing to consumers, so most of the fat needs to be removed to leave the

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Claim	U.S. Patent No. 5,514,032 to Young (EX1004) and Combination
	minimum amount necessary to keep the Join from drying out. It has been found that a fat covering of about 0.1 inch is preferred on a loin, although other thicknesses may also be desired in different circumstances. The fat trimming operation necessary to 65 provide the optimum fat cover is typically manually performed by a separate operator at another station.” EX1004, 1:38-67. “The preferred loin separation apparatus 10 is preferably for use in separating the loin and belly portions from a side of pork. However, it will be appreciated by one skilled in the art that the principles of the invention will apply to other butchering operations, as well as to other forms of meat including beef, lamb, veal, etc., and therefore the invention should not be limited as such.” EX1004, 6:53-60. “FIGS. 1a, 1b and 7c show loin knife assembly 100 in greater detail. Loin knife assembly 100 is used to separate the pork loin from the pork belly once the scribe cut has been made through the ribs. The separation is made by a loin knife which has an arcuate U-shaped blade, similar to the type of hand-held knife used by human operators. Through control of the knife blade along several axes, assembly 100 preferably produces an optimum separation between loin and belly, with a desired fat covering left on the loin.” EX1004, 10:35-43.

Claim	U.S. Patent No. 5,514,032 to Young (EX1004) and Combination
	 FIG. 10A  FIG. 10B  FIG. 10C EX1004, Figs. 10a-c. In addition, Norrie also teaches this preamble: “Apparatus for the separation of back fat from a loin portion of a carcass and having a conveyor for supporting and moving a loin portion with the back fat lowermost, a pressure device for applying pressure to the upper surface of a loin portion, a generally arcuate blade interposed between the conveyor and the pressure device, the blade being moveable relative to the conveyor, a device for sensing the thickness of back fat

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	on the loin portion between the conveyor and the lean portion of the loin, and generating measurement signals, and thereby moving the blade, and a method of separating back fat from loins by the use of such apparatus.” EX1005, Abstract, Figs. 1-4.
1[A] a measurement device for automatic determination of the thickness of the fat cover, wherein the determination of the thickness of the fat cover takes place in a contactless manner; and	“The control system includes an <i>imaging system</i>, the imaging system including means for generating a top plan image of the side of meat and means for processing the top plan image to locate a backbone line and a fat/lean separation line on the side of meat[.]” EX1004, 4:25-30. “<i>Imaging system 190</i> includes a visioning processor, preferably a Matrox Visioning System Model IM-640, manufactured by Matrox Electronic Systems, Ltd. of Quebec, Canada. Other commercially available imaging systems may be used in the alternative. In the Matrox system, a baseboard 192 includes a pair of processors. The first, a graphics signal processor, handles information exchange with controller 172, controls the overall visioning processor system, supervises the parallel processing functions for the system, and controls the imaging cameras which provide the images of each side of pork. The second, a floating point unit, performs specialized and processor-intensive numerical operations to support the graphics signal processor. An internal proprietary image bus 191 in the Matrox system handles information exchange between baseboard 192 and a real time processor 194. Real time processor 194 50 provides several standard image processing routines, including routines for neighborhood processing (e.g., edge detection, filters and convolutions), spatial filters, pattern matching convolutions and thresholding, among others.” EX1004, 17:45-54. “As discussed above, baseboard 192 of imaging system 190 controls several cameras that provide image data regarding each side of pork processed by apparatus 10: a top plan camera 196, an end view camera 197 and a fat line camera 198. The first, top plan camera 196, is primarily used to determine the

Claim	U.S. Patent No. 5,514,032 to Young (EX1004) and Combination
	primary physical dimensions and characteristics of a side for generating the profiles for the scribe saw and loin knife assemblies.” EX1004, 17:55-62. “The third imaging camera, fat/lean separation line camera 198, is primarily used to provide dynamic (real-time) image data of the fat/lean separation line for the pork side proximate the backbone. Controller 172 uses this information to dynamically modify the cutting profile of loin knife assembly 100 so that the assembly follows a fixed distance from the separation line to provide the optimum fat cover for the loin. As shown in FIG. 1, camera 198 is preferably positioned proximate loin knife assembly 100 facing inwardly. Preferably, the field of view of camera 198 is adjusted to focus on the positioning of the fat/lean separation line within a relatively small area so that the image data may be coordinated with the small incremental movements of the platen. Cameras 196, 197 and 198 are preferably GP-MS112 cameras manufactured by Panasonic, although other cameras suitable for this purpose are available. The magnification, focus and sensitivity of each may be optimized for the different applications of the cameras, e.g., for camera 196, the field of view is preferably the entire top surface of the pork side, for camera 197, the field of view is preferably just the end surface of the pork side, and for camera 198, the field of view is preferably a small area of the fat/lean separation line which is a known distance from the loin knife assembly.” EX1004, 18:33-56. “Routine 210 provides a set of data points on a periodic basis to motion controller 180, preferably about every 0.5 inches of movement of platen 20. With the movement of platen 20 separated into 133 datapoints, this preferably enables the platen to be cycled through apparatus 10 in about 7 seconds. Including the time for activating, returning and releasing the platen, initial imaging, and final loin ejection, 15 as well as the operator time for loading a pork side on the platen, it is

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	anticipated that the preferred apparatus 10 should be able to process about 450 pork sides per hour.” EX1004, 22:10-22. “In block 234, similar non-shadowed top and end view images are taken using cameras 196 and 197 without the high intensity lighting of lights 140. These images provide comparatively more detail of the top and end views of the pork side than their shadowed counterparts, and are used to supplement the image data which may be obtained about the pork side. In the alternative, all of the necessary image data may be obtained from non-shadowed images; however, it is believed that the stark contrasts provided by the shadowed images result in simpler and more reliable detection of some dimensional aspects of the pork sides. <i>Once the images are taken in blocks 232 and 234, the images are then processed in a image processing routine 240, which is shown in greater detail in FIG. 13.</i> The first step in routine 240 is to generate a backbone line from the top view shadowed image taken by camera 196 in block 242. Block 242 operates via known image processing techniques, primarily by performing noise reduction, then performing a thresholding operation to binarize the image (i.e., to turn all of the pixels therein to black or white, based upon a comparison with a predetermined median value), and the performing a convolution operation to detect the boundary formed by the backbone. The resulting processed image will include a line which follows the backbone of the pork side.” EX1004, 22:41-65. “Next, in block 246, routine 240 generates a fat/lean separation line and an edge line from the non-shadowed top view image. Similar to block 242, noise reduction, thresholding and convolution are performed on the non-shadowed image to generate both lines. However, it will be appreciated that due to the different lighting, different control variables, e.g., the threshold variable, from the variables used on the shadowed image will be required to generate the fat/lean separation and edge lines from the non-shadowed

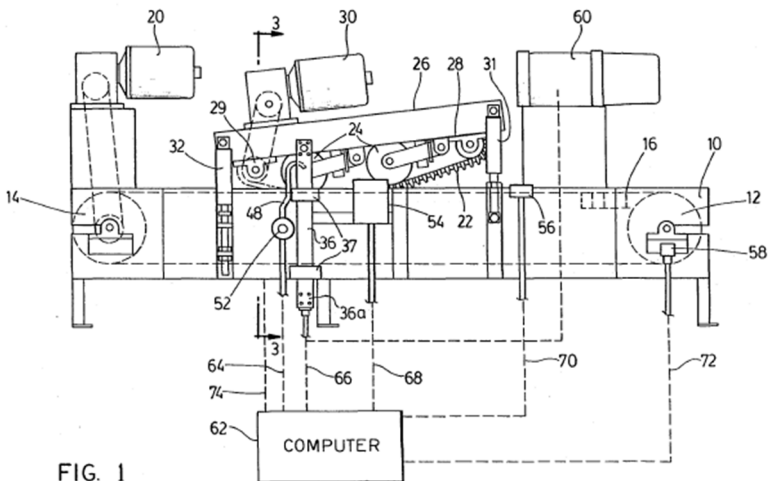
Claim	U.S. Patent No. 5,514,032 to Young (EX1004) and Combination
	image. In general, the fat/lean separation line will be distinguished by the interface between the loin meat and the fat covering, which is typically much lighter than meat. Similarly, the edge line (representing the outer surface of the pork side proximate the fat/lean line) will be distinguished by the interface between the fat covering and the platen or other supporting structure proximate the edge of the pork side.” EX1004, 23:11-27. “In block 258, it may also be preferable to calculate a 35 separate height for the ribs in addition to the height of the backbone. This information may also be obtained by pattern matching the shadowed end view image to find the desired point along the ribs to take the height. EX1004, 24:34-39.
	EX1004, Fig.2 (annotated).
	EX, 1004, Fig. 13.

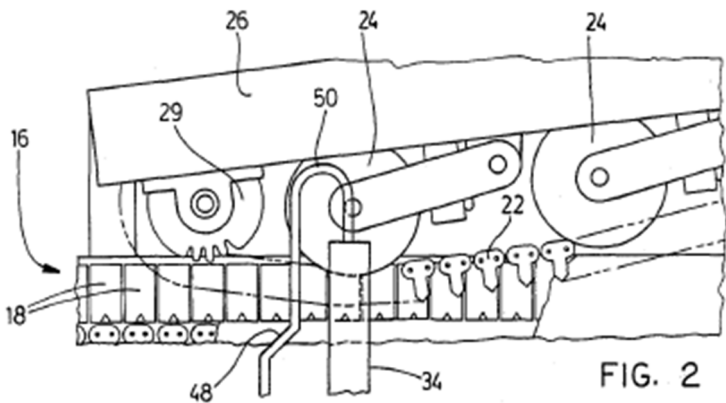
Claim	U.S. Patent No. 5,514,032 to Young (EX1004) and Combination
	In addition, Norrie also teaches this element: “Referring now to FIG1, it will be observed that a computer 62 is coupled by connection 64, to solenoid 52 and by connection 66 to blade solenoid 41, and by connection 68 to camera 54, and by connection 70 to fibre optic sensor 56, and by connection 72 to conveyor encoder 58, and by connection 74 to blade encoder 42.” EX1005, 4:3-10. “In order to position the blade 34 as accurately as possible, a video camera and light source indicated generally as 54 is provided alongside conveyor 16, more or less adjacent or slightly downstream of the position of the first of the two pressure rolls 24. <i>The camera functions to observe and sense the thickness of the portion of fat</i> the loin lying lowermost on the conveyor as it approaches the knife blade. The knife blade is then adjusted automatically in a manner described below.” EX1005, 3:51-59. “As it is drawn into the pressure bands 22, it will force the frame 26 against the struts 31 and 32 and, in tum, the bands 22 will thus be pressed firmly against the exposed upper surface, i.e., the lean portion of the loin. At this time, <i>the camera 54 will observe the thickness of fat on the underside of the loin</i> lying on the conveyor. It will then send appropriate fat signals to the computer. The computer, in tum, will either signal the blade solenoid 41 that no adjustment is necessary, or alternatively will signal the blade solenoid 41 so as to adjust the position of the blade 34 by operating the cylinder 40. As the loin is forced past the blade 34, the blade 34 will separate the lower fat portion from the upper lean portion, and the two separated portions will then be delivered to the downstream end 14 of the conveyor. Depending upon the intervals between the loins on the conveyor, the computer will then signal the water solenoid 52 to supply hot wash water up the branch conduits 48 to the bend portions 50. Hot wash water will then stream down over the blade 34, cleaning from it any

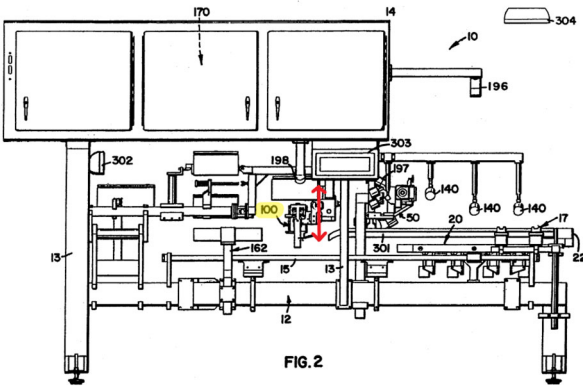
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	accumulated fat. The computer will then signal the solenoid 52 to terminate water supply, and the next loin will then be engaged by the bands 22 and processed in the same way. In the event that the fat portion of the next loin is thicker, then the camera 54 will sense this and the computer will then signal the blade solenoid 41, to cause movement of blade 34 upwardly away from conveyor 16. In the event that the fat portion detected by the camera is thinner, then the blade 34 will be moved closer to the conveyor 16.” EX1005, 4:23-53.
1[B] cutting device coupled to the measurement device for automatic separation of the fat cover from the flesh component in dependence on the thickness determined by the measurement device	“FIGS. 1a, 1b and 7c show loin <i>knife assembly 100</i> in greater detail. Loin knife assembly 100 is used to separate the pork loin from the pork belly once the scribe cut has been made through the ribs. The separation is made by a loin knife which has an arcuate U-shaped blade, similar to the type of hand-held knife used by human operators. Through control of the knife blade along several axes, assembly 100 preferably produces an optimum separation between loin and belly, with a desired fat covering left on the loin.” EX1004, 10:33-53. “The third imaging camera, fat/lean separation line camera 198, is primarily used to provide dynamic (real-time) image data of the fat/lean separation line for the pork side proximate the backbone. Controller 172 uses this information to dynamically modify the cutting profile of loin knife assembly 100 so that the assembly follows a fixed distance from the separation line to provide the optimum fat cover for the loin. As shown in FIG. 1, camera 198 is preferably positioned proximate loin knife assembly 100 facing inwardly. Preferably, the field of view of camera 198 is adjusted to focus on the positioning of the fat/lean separation line within a relatively small area so that the image data may be coordinated with the small incremental movements of the platen.” EX1004, 18:33-46. “The desired loin pull cut is shown by lines 3a, 3b and 4, which respectively show the preferred paths for the right side, the left side and bottom of knife blade 121 (when facing the

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	sharpened edge of blade 121). The right side 121a of knife blade 121 preferably follows scribe cut 2 along line 3a. The left side 121b of knife blade 121 preferably follows line 3b, which is a fixed distance (preferably 0.1 inch) from fat/lean separation line 6, and which generally follows the contour thereof. As discussed above, a 0.1 inch fat covering sufficiently keeps the loin from drying out, but doesn't make the loin look too fat. Other fat thicknesses may be desired in the alternative. The bottom of knife blade 121 also generally follows line 4 (shown in FIG. 10b), which generally travels below blade bone 5 proximate the fat/lean separation area along the bottom of the pork side.” EX1004, 20:55-21:2. EX1004, Figs. 9, 13. In addition, Norrie also teaches this element: “The camera 55 functions to observe and sense the thickness of the portion of fat the loin lying lowermost on the conveyor as it approaches the knife blade. The knife blade is then adjusted automatically in a manner described below.” EX1005, 3:55-59. “means for sensing the thickness of said back fat between said conveyor means and said lean portion of a said continuously

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	moving loin portion, and operable to generate a fat thickness signal, and, means response to said fat thickness signal, to move said blade means to optimize separation of said back fat from said lean portion.” EX1005. 2:3-9. “At this time, the camera 54 will observe the thickness of fat on the underside of the loin lying on the conveyor. It will then send appropriate fat signals to the computer. The computer, in turn, will either signal the blade solenoid 41 that no adjustment is necessary, or alternatively will signal the blade solenoid 41 so as to adjust the position of the blade 34 by operating the cylinder 40. As the loin is forced past the blade 34, the blade 34 will separate the lower fat portion from the upper lean portion, and the two separated portions will then be delivered to the downstream end 14 of the conveyor.” EX1005, 4:27-38.  FIG. 1

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	 FIG. 2 EX1005, Figs. 1, 2.
1[C] a cutting blade whose position is variable relative to a product support; and	“In operation, <i>loin knife assembly 100</i> provides <i>four axes of motion for knife blade 121</i>. A first or vertical axis of motion is defined by lateral axis 119b and controlled by a first moving means (servo 154) displacing vertical member 11b of arm 114. This axis of motion provides climb/dive or vertical displacement (i.e. to raise or lower the knife blade). EX1004, 14:21-26. “a motion control system for controlling the first and second lateral moving means, the vertical moving means and the conveying means to each follow the profiles generated by the host controller.” EX1004, 4:39-42. “A gripper platen 20 is provided which supports a pork side and transports it throughout the different operations in the loin separation process.” EX1004, 5:52-55. “An electronic control system 170 is also provided to control the different electromechanical systems of apparatus 10. Controller 170 includes a motion controller which drives a plurality of servos that activate and control platen 20, scribe saw assembly 50, and loin knife assembly 100.’ EX1004, 5:62-66. “Further, the frame of apparatus 10 includes a pair of stainless steel rails 15 on which platen 20 is supported and allowed to

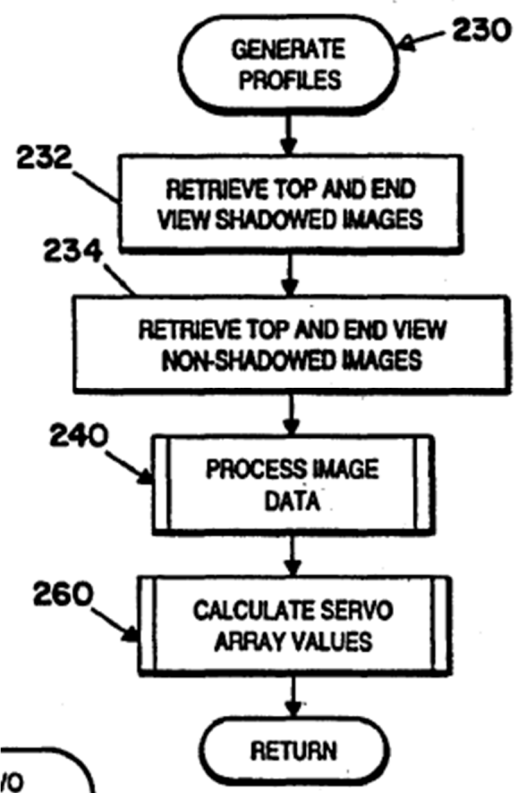
Claim	U.S. Patent No. 5,514,032 to Young (EX1004) and Combination
	slide upon when transporting a side of pork between the different stations in apparatus 10.” EX1004, 6:13-17. “FIG. 11 shows a flowchart for the software control of a preferred operating cycle 210 for apparatus 10. The preferred cycle is initiated in block 211 by an operator activating switch 17 when the operator has properly positioned a pork side on the platen. It will be appreciated that a pork side may alternatively be placed on the platen by automated devices such as conveyors, robotic arms, etc.” EX1004, 21:11-17.  FIG. 2 EX1004, Fig 2. In addition, Norrie also teaches this element: “In order to separate the back fat from the loin meat, an arcuate generally semi-conductor knife blade 34 is positioned between conveyor 16, and bands 22. Knife blade 34 is supported at each end on upright slide bars 36. Slide bars 36 are mounted on the frame 10, on either side thereof in, for example, supports 37 whereby they may be moved upwardly and downwardly in a manner described below. the slide bars 36 have lower ends 36a which are connected to a transverse yoke 38. Yoke 38 is connected to a motive power source such as hydraulic 30 piston and cylinder 40, controlled by blade solenoid 41. By the operation of the cylinder 40, the knife blade 34 can be raised and lowered.” EX1005, 3:21-33.

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1[D] a control unit for control of the position of the cutting blade in dependence on the thickness determined by the measurement device,	<i>“Main controller (host PC) 172 provides the primary control over control system 170.</i> In particular, controller 172 coordinates the activities of motion controller 180 and imaging system 190 to actuate apparatus 10 to perform the loin separation processes. Cutting profiles for the scribe saw and loin pulling assemblies are preferably generated in controller 172 in response to image data provided by imaging system 190. Then, after profiles are calculated, controller 172 also communicates with motion controller 180 to coordinate the actions of scribe saw assembly 50 and loin knife assembly 100 as a side is conveyed through the apparatus. Moreover, controller 172 controls a number of secondary components through a secondary driver 161.” EX1004, 17:1-12. “Controller 172 uses this information to dynamically modify the cutting profile of loin knife assembly 100 so that the assembly follows a fixed distance from the separation line to provide the optimum fat cover for the loin. As shown in FIG. 1, camera 198 is preferably positioned proximate loin knife assembly 100 facing inwardly. Preferably, the field of view of camera 198 is adjusted to focus on the positioning of the fat/lean separation line within a relatively small area so that the image data may be coordinated with the small incremental movements of the platen.” EX1004, 18:36-46. In addition, Norrie also teaches this element: “Referring now to FIG. 4, the layout of the controls is shown in block diagram form. As will be seen, the control system further incorporates a power supply 76 with filter 78, in a manner known per se and requiring no description, and also with relays 80 and for solenoid 52 and also with a water solenoid button 82, which may be used to override the automatic operation of the water solenoid 52.” EX1005, 4:9-16, Fig. 4.
1[E] wherein at least one travel profile is stored in the control	“Main controller (host PC) 172 provides the primary control over control system 170. In particular, controller 172 coordinates the activities of motion controller 180 and imaging system 190 to actuate apparatus 10 to perform the loin

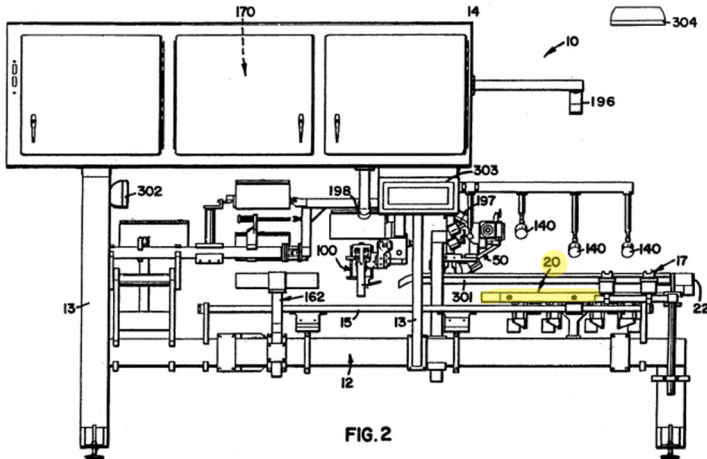
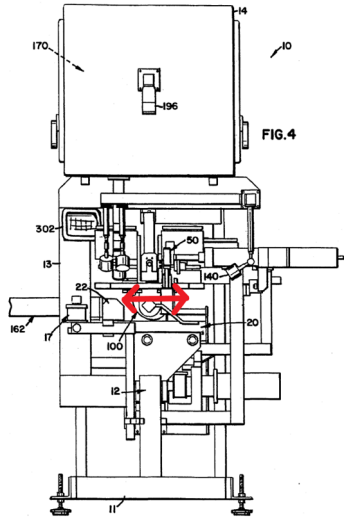
Claim	U.S. Patent No. 5,514,032 to Young (EX1004) and Combination
unit in accordance with which the position of the cutting blade relative to the product support is to be set in dependence on a product feed.	separation processes. <i>Cutting profiles</i> for the scribe saw and loin pulling assemblies are preferably generated in controller 172 in response to image data provided by imaging system 190. Then, after profiles are calculated, controller 172 also communicates with motion controller 180 to coordinate the actions of scribe saw assembly 50 and loin knife assembly 100 as a side is conveyed through the apparatus. Moreover, controller 172 controls a number of secondary components through a secondary driver 161.” EX1004, 17:1-14. “The controller includes image processing means for determining backbone and fat/lean separation lines from the top plan image, <i>profile calculating means for generating profiles for the vertical moving means and the first and second lateral moving means to control the first side of the U-shaped knife blade to follow a preset distance from the backbone line</i>, and the second side of the U-shaped knife blade to follow a preset distance from the fat/lean separation line, and activating means for activating the vertical moving means, the first and second lateral moving means and the conveying means to follow the profiles generated by the profile calculating means.” EX1004, 4:5-16. “In the preferred control system 170, imaging system 190 provides both static and dynamic information about pork sides to assist in optimizing the scribe and loin pulling operations.” EX1004, 17:30-35. “FIG. 11 shows a flowchart for the software control of a preferred operating cycle 210 for apparatus 10. The preferred cycle is initiated in block 211 by an operator activating switch 17 when the operator has properly positioned a pork side on the platen. It will be appreciated that a pork side may alternatively be placed on the platen by automated devices such as conveyors, robotic arms, etc.” EX1004, 21:11-17.

Claim	U.S. Patent No. 5,514,032 to Young (EX1004) and Combination
	“Once the pork side has been secured to the platen, control passes to block 230 to determine the preferred profiles for scribe saw assembly 50 and loin knife assembly 100. The profiles for the assemblies are stored as separate arrays of data points. Each array corresponds to one of the servos, and preferably includes 133 data points indexed by a common position index variable which may correspond to the position of platen 20 (e.g., where there are 133 evenly spaced positions for the platen along the rails). The profile generating routine is discussed in greater detail below with respect to FIGS. 12, 13 and 14.” EX1004, 21:23-41. <pre> graph TD 210([MAIN ROUTINE]) --> 212[ACTIVATE GRIPPER PLATEN] 212 --> 230[GENERATE SCRIBE SAW AND LOIN KNIFE PROFILES] 230 --> 218[INCREMENT POSITION INDEX] 230 --> 220[DETERMINE LOIN KNIFE PROFILE MODIFICATIONS] 218 --> 216[SEND MOTION DATA TO PLATEN, SCRIBE SAW AND LOIN KNIFE SERVOS] 220 --> 216 216 --> 222{DONE?} 222 -- NO --> 218 222 -- YES --> 224[RELEASE PLATEN] 224 --> 226[EJECT SEPARATED SIDE] 226 --> 228[RETURN PLATEN] 228 --> DONE([DONE]) </pre> FIG. 11 EX1004, Fig. 11.

Claim	U.S. Patent No. 5,514,032 to Young (EX1004) and Combination
	 <pre> graph TD 230([GENERATE PROFILES]) --> 232[RETRIEVE TOP AND END VIEW SHADOWED IMAGES] 232 --> 234[RETRIEVE TOP AND END VIEW NON-SHADOWED IMAGES] 234 --> 240[PROCESS IMAGE DATA] 240 --> 260[CALCULATE SERVO ARRAY VALUES] 260 --> RETURN([RETURN]) </pre> EX1004, Fig. 12.
14[Preamble] A method for separation of a fat cover of a meat product from a flesh component of the meat product, comprising:	See 1[Preamble].
14[A] determining the thickness of the fat cover in a contactless manner;	See 1[A].

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14[B1] setting a position of a cutting blade in dependence on the determined thickness of the fat cover	<i>See 1[B].</i>
14[B2] in accordance with a preset travel profile and in dependence on a feed of the meat product,	<i>See 1[B].</i>
14[B3] wherein the setting comprises setting the position in a direction transverse to the feed direction; and	“In operation, loin knife assembly 100 provides four axes of motion for knife blade 121. A first or vertical axis of motion is defined by lateral axis 119b and controlled by a first moving means (servo 154) displacing vertical member 11b of arm 114. This axis of motion provides climb/dive or vertical displacement (i.e. to raise or lower the knife blade). EX1004, 14:21-31. “Turning to the Drawing, wherein like numbers denote like parts throughout the several views, FIGS. 1-4 show a preferred loin separation apparatus 10 consistent with the principles of the invention. Apparatus 10 generally includes a number of primary electromechanical systems which handle various functions in the loin separation process. A gripper platen 20 is provided which supports a pork side and transports it throughout the different operations in the loin separation process.” EX1004, 5:46-55. “FIG. 11 shows a flowchart for the software control of a preferred operating cycle 210 for apparatus 10. The preferred cycle is initiated in block 211 by an operator activating switch 17 when the operator has properly positioned a pork side on the platen. It will be appreciated that a pork side may

Claim	U.S. Patent No. 5,514,032 to Young (EX1004) and Combination
	alternatively be placed on the platen by automated devices such as conveyors, robotic arms, etc.” EX1004, 21:11-17.  FIG. 2 EX1004, Fig. 2.  FIG. 4 EX1004, Fig. 4.
14[C] with the cutting blade, separating the fat cover from	See 1[E].

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the flesh component, wherein during the separating, the cutting blade is at the set position according to the travel profile.	

XVII. APPENDIX B – JOHNSON CLAIM CHART FOR INDEPENDENT CLAIMS 1 AND 14

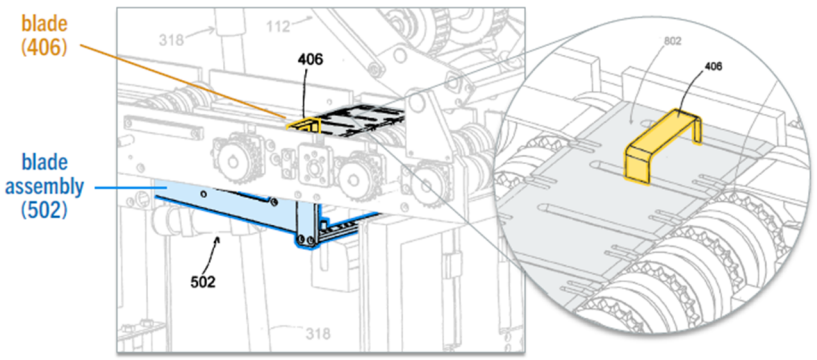
Claim	U.S. Patent No. 6,929,540 to Johnson (EX1006) and Combination
1[Preamble] An apparatus for separation of a fat cover of a meat product from a flesh component of the meat product, comprising:	“AUTOMATED CLASSIFIER AND MEAT CUT FAT TRIMMING METHOD AND APPARATUS.” EX1006, Cover Page Title. “Apparatus and method for a meat cut classification and fat trimming for sensing the thickness of a layer of fat of a cut of meat and the various contours thereof as it travels along a conveyance and providing the fat thickness or classification information to a downstream system for performing a fat trimming operation. The meat cut classification system comprises a split/multi-belt conveyor having split/multibelts proximately spaced apart extending in the same direction and having a uniform equidistant gap there between and said conveyor having a drive for conveying the meat cut through the classification system and a multi-probe mechanism assembly.” EX1006, Abstract. “The details of the invention and various embodiments can be better understood by referring to the figures of the drawing. Referring to FIG. 1 a right side isometric view of the meat cut classification and trimming system 102 is shown.” EX1006, 3:29-33. “The probes can then communicate the data representative of the lean to fat interface to a controller which is operable to interpret the information and generate a signal responsive to the data or map of the contour that will vary the attack angle or angle of approach of the cutting blade to follow the contour of the lean to fat interface. Just prior to probing, the meat cut is engaged by a pulling chain having a plurality of teeth for grabbing the meat cut and pulling it along the path of conveyance while stabilizing the meat cut during the probing process. The controller can be operable to vary the position of

Claim	U.S. Patent No. 6,929,540 to Johnson (EX1006) and Combination
	a single blade element to follow the contour or can be operable to vary the position of multiple blade elements that are laterally aligned.” EX1006, 4:54-66. “As the meat cut travels over the blade, thereby trimming the fat from the lean, the meat cut is then grabbed and conveyed by the secondary conveyor, and secondary grabbing chain and conveyed and pulled downstream on the downstream side of the blade. Once trimming is complete, the meat cut is conveyed off the exit end of the meat cut fat trimming system.” EX1006, 5:42-48.
1[A] a measurement device for automatic determination of the thickness of the fat cover, wherein the determination of the thickness of the fat cover takes place in a contactless manner; and	“The present invention is related to a method for predicting the palatability of meat, comprising: <i>providing image data related to at least a portion of the meat</i>; analyzing the image data to distinguish at least one area of interest of the meat; analyzing the image data corresponding to each area of interest to measure at least one characteristic of the area of interest based on the image data, predicting the palatability of the meat based on the characteristic.” EX1007, 3:17-35. “An apparatus for use in the present invention comprises an <i>imaging device 12</i> and a data processing unit 16. The imaging device 12 can be any Such imaging device known to those of skill in the art, Such as a camera, tomographic imaging (i.e. CAT, PET) device, magnetic resonance imaging (MRI) device, Sound wave imaging device, radio wave imaging device, microwave imaging device, or particle beam imaging device. If the imaging device is a camera, the camera is at least one of a photographic camera, a digital Still camera, and a Video camera. The camera responds to light in at least one portion of the light spectrum, each Such portion consisting of a band of, Such as a Segment of ultraviolet wavelengths (200 nm to 400 nm), visible wavelengths (400 nm to 700 nm), infrared wavelengths (700 nm to 10 m), or portions thereof.” EX1007, 5:9-23.

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	“In the preferred embodiment, after determination of L^*, a^*, and b^* for each area of interest, a program then calculates Several parameters of the image for each frame. First, the program outlines the muscle of interest by choosing areas that have tolerances of b^* compatible with muscle.” EX1007, 8:59-63. “To Summarize, characteristics of the area of interest of the meat 10 that can be measured include, but are not limited to, the color of the lean tissue, the color variation of the lean tissue, the color of fat tissue, the color variation of the fat tissue, a marbling quantity, a marbling distribution, a marbling dispersion, a marbling texture, a marbling fineness, an average texture of the lean tissue, a firmness of the lean tissue, a Surface area of the lean Section, the density of the lean tissue, the density of the fat tissue and the density of the connective tissue. Quantities of the non-lean Section of the meat 10, including but not limited to the color of fat, the density of the lean tissue, the density of the fat tissue, the density of the connective tissue and the relative areas of cross-Section Surfaces comprised of fat, bone, and/or connective tissue, may be calculated as well.” EX1007, 9:59-10:6. “In addition, because a specific muscle of interest has been isolated in a cross-sectional image, and the geometry and distance of the apparatus relative to the meat 10 can be known, the area of the cross-Sectional Surface of the muscle portion of the meat 10 can be calculated and output to the output device 24. Alternatively, or in addition, to outputting the area to an output device 24, further calculations can be performed using the area of the cross-sectional Surface of the muscle, other parameters readily Seen by one of skill in the art of meat Science as calculable from the $L^*a^*b^*$ data, other image-derived parameters, or values of parameters input by the operator, to derive estimated Yield Grades or other overall indices of composition of the meat.” EX1007, 10:43-56.

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	“...a length of the area of interest, a width of the area of interest, density of the lean tissue, density of the fat tissue, and density of the connective tissue.” EX1007, 14:3-5. “...a marbling distribution, a marbling dispersion, a marbling texture, a marbling fineness, an average texture of the lean tissue, a firmness of the lean tissue, a Surface area of the area of interest, a length of the area of interest, a width of the area of interest, density of the lean tissue, density of the fat tissue, and density of the connective tissue.” EX1007, 15:25-31.
1[B] cutting device coupled to the measurement device for automatic separation of the fat cover from the flesh component in dependence on the thickness determined by the measurement device	“Referring to FIG. 5, a front right side enlarged isometric View of the meat cut trimming System is shown. The System is shown with the hold-down conveyor assembly 112 lifted upward by cylinder 318 to its maintenance position. One cutting blade 406 is shown installed. However, there are positions for three other blades. The cutting blade assembly 502 is shown mounted beneath the split multiple belts. The probe assembly base 202 is also shown mounted to the frame 104.” EX1006, 8:48-56. “The controller sends a signal representative of the fat to lean interface which will control the blade assembly to variably position the blade to follow the contour of the lean to fat interface. As indicated above, multiple blades can be utilized in order to conform more closely to the three dimensional path or contour described by the fat/lean interface map.” EX1006, 5:20-26.

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	 EX1006, Fig. 5, Fig. 8 (annotated). “The probes can then communicate the data representative of the lean to fat 55 interface to a controller which is operable to interpret the information and generate a signal responsive to the data or map of the contour that will vary the attack angle or angle of approach of the cutting blade to follow the contour of the lean to fat interface.” EX1006, 4:53-59, “The controller can send a signal responsive to the probe data to control an actuator which in turn controls the articulating arm for positioning the blade. The blade can be operatively mounted to the articulating arm such that it is spring loaded with a level of compliance. The blades are designed with a range to dive and climb.” EX1006, 5:30-35.
1[C] a cutting blade whose position is variable relative to a product support; and	“The controller sends a signal representative of the fat to lean interface which will control the blade assembly to variably position the blade to follow the contour of the lean to fat interface map. As indicated above, multiple blades can be utilized in order to conform more closely to the three dimensional path or contour described by the fat/lean interface map.” EX1006, 5:20-26. “This device can utilize optical probing or other probing technology to determine the fat/lean interface on a meat cut such as a beef strip loin. Multiple laterally aligned probes can

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	be utilized to repetitively penetrate the meat cut. The output signal can be processed by a controller to form a map of the fat to lean interface contour. The controller then articulates the cutting blades to follow the fat/lean interface map.” EX1006, 2:28-35. “A third advantage is controlled blades that are capable of following a three dimensional fat/lean interface map. The present method and apparatus can be utilized for meat cuts other than the beef strip to determine the contour of a fat/lean interface.” EX1006, 2:48-51. “Drive 120 drives the conveyor assembly with a pulley assembly. The conveyor assembly 108 comprises multiple endless conveyor belts, which are substantially coplanar and parallel along their lengths having end to end equidistant gaps therebetween and laterally aligned. The gaps allow the probes to extend upward therethrough to penetrate the meat cut. The conveyor assembly 108 further comprises a plurality of pulley assemblies for effecting conveyance of the conveyor belts as well as driving the multi-toothed conveyor chain, which is designed to grab the meat cut and pull it underneath the hold down assembly 112 downstream toward and into contact with the blades of the blade assembly.” EX1006, 4:9-19.
1[D] a control unit for control of the position of the cutting blade in dependence on the thickness determined by the measurement device,	“The controller sends a signal representative of the fat to lean interface which will control the blade assembly to variably position the blade to follow the contour of the lean to fat interface. As indicated above, multiple blades can be utilized in order to conform more closely to the three dimensional path or contour described by the fat/lean interface map. As indicated above, multiple blades can be utilized in order to conform more closely to the three dimensional path or contour described by the fat/lean interface map. The blades do not necessarily correspond to a given probe, but is preferably designed to be controlled independent of a given probe to follow the contour of the map. The blade position can be

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	controlled by an articulating arm. See Fig. The controller can send a signal responsive to the probe data to control an actuator which in turn controls the articulating arm for positioning the blade” EX1006, 5:20-33. “The probe assembly completes this cycle multiple times along the length of the meat cut thereby taking a plurality of measurements for the fat to lean interface along the length of the meat cut. This mechanism allows for multiple probe penetrations into the meat cut thereby gathering data to map the lean to fat interface contour. The probes can then communicate the data representative of the lean to fat interface to a controller which is operable to interpret the information and generate a signal responsive to the data or map of the contour that will vary the attack angle or angle of approach of the cutting blade to follow the contour of the lean to fat interface.” EX1006, 4:48-59.
1[E] wherein at least one travel profile is stored in the control unit in accordance with which the position of the cutting blade relative to the product support is to be set in dependence on a product feed.	“The probe assembly completes this cycle multiple times along the length of the meat cut thereby taking a plurality of measurements for the fat to lean interface along the length of the meat cut. This mechanism allows for multiple probe penetrations into the meat cut thereby gathering data to map the <i>lean to fat interface contour</i>. The probes can then communicate the data representative of the lean to fat interface to a controller which is operable to interpret the information and generate a signal responsive to the data or map of the contour that will vary the attack angle or angle of approach of the cutting blade to follow the <i>contour of the lean to fat interface</i>.” EX1006, 4:48-59. “The controller sends a signal representative of the fat to lean interface which will control the blade assembly to variably position the blade to follow the <i>contour of the lean to fat interface</i>. As indicated above, multiple blades can be utilized in order to conform more closely to the three dimensional path or contour described by the fat/lean interface map. As

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	indicated above, multiple blades can be utilized in order to conform more closely to the three dimensional path or contour described by the fat/lean interface map. The blades do not necessarily correspond to a given probe, but is preferably designed to be controlled independent of a given probe to follow the contour of the map. The blade position can be controlled by an articulating arm. See Fig. The controller can send a signal responsive to the probe data to control an actuator which in turn controls the articulating arm for positioning the blade” EX1006, 5:20-33.
14[Preamble] A method for separation of a fat cover of a meat product from a flesh component of the meat product, comprising:	<i>See</i> 1[Preamble].
14[A] determining the thickness of the fat cover in a contactless manner;	<i>See</i> 1[A].
14[B1] setting a position of a cutting blade in dependence on the determined thickness of the fat cover	<i>See</i> 1[B].
14[B2] in accordance with a preset travel	<i>See</i> 1[B].

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profile and in dependence on a feed of the meat product,	
14[B3] wherein the setting comprises setting the position in a direction transverse to the feed direction; and	“The controller sends a signal representative of the fat to lean interface which will control the blade assembly to variably position the blade to follow the contour of the lean to fat interface. As indicated above, multiple blades can be utilized in order to conform more closely to the three dimensional path or contour described by the fat/lean interface map. As indicated above, multiple blades can be utilized in order to conform more closely to the three dimensional path or contour described by the fat/lean interface map. The blades do not necessarily correspond to a given probe, but is preferably designed to be controlled independent of a given probe to follow the contour of the map. The blade position can be controlled by an articulating arm. See Fig. The controller can send a signal responsive to the probe data to control an actuator which in turn controls the articulating arm for positioning the blade” EX1006, 5:20-33. “The blade can be operatively mounted to the articulating arm such that it is spring loaded with a level of compliance. The blades are designed with a range to dive and climb. The blade can also be mounted such that a range of pitch is provided and such that a range of cutting depths is possible. The multiple blades are positioned based on the control signal received from the controller.” EX1006, 5:33-39. “Drive 120 drives the conveyor assembly with a pulley assembly. The conveyor assembly 108 comprises multiple10 endless conveyor belts, which are substantially coplanar and parallel along their lengths having end to end equidistant gaps therebetween and laterally aligned. The gaps allow the probes to extend upward therethrough to penetrate the meat cut. The conveyor assembly 108 further comprises a plurality of pulley

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	assemblies for effecting conveyance of the conveyor belts as well as driving the multi-toothed conveyor chain, which is designed to grab the meat cut and pull it underneath the hold down assembly 112 downstream toward and into contact with the blades of the blade assembly. The conveyor assembly 108 has left and right side frame members for mounting the various conveyor assembly components. The hold down assembly 112 is mounted above the conveyor assembly. The hold down assembly also has a left and right side frame members for mounting the hold down 25 assembly members thereon. The hold down assembly 112 is mounted to side frame members of the conveyor assembly.” EX1006, 4:8-26.
14[C] with the cutting blade, separating the fat cover from the flesh component, wherein during the separating, the cutting blade is at the set position according to the travel profile.	See 1[E].