A method and apparatus for packaging items, such as meat, non-meat products and non-food products, using ultrasound or heat is disclosed herein. In a preferred embodiment, a continuous thermoplastic tubular mesh material is used to package multiple meat products. The preferred packaging method does not use metal clips as in conventional packaging, and instead uses thermal energy, ultrasonic energy, or other types of energy to create seals in the packaging material itself. The method advantageously causes one seal to be formed between each pair of adjacently packaged products. This single seal can be cut in half thereby creating two seals, one seal for each adjacently packaged product.
METHOD AND APPARATUS FOR PRODUCT PACKAGING

CROSS-REFERENCE TO RELATED APPLICATIONS
[0001] Not applicable.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT
[0002] Not applicable.

BACKGROUND OF THE INVENTION
[0003] 1. Field of the Invention

[0004] The present invention relates to the packaging industry. More particularly, the present invention relates to a method and apparatus for packaging meat products and other foods, but may apply to other non-food items as well.

[0005] 2. Description of the Related Art

[0006] Almost everything consumers purchase is packaged in some way or another. Accordingly, there are many packaging methods in use today. Choosing a packaging method often depends on many variables such as size of the item to be packaged, whether the item is perishable, cost, and other considerations. For example, one ubiquitous type of packaging technique for a meat product (e.g., turkey, ham, chicken) includes enclosing the product in a mesh material or plastic, and sealing either end with metal clips or some other type of “foreign object” (i.e., an object or material different from the material that encloses the product).

[0007] Although generally satisfactory, the meat packaging technique described above is not problem free. For example, occasionally, metal clips may dislodge and become embedded in the meat product itself. Visual inspection usually catches this problem. However, to provide further safeguards, metal detectors are used to scan the packaged meat for improperly located metal clips. Such metal detectors are expensive and require maintenance. Also, the clips are formed in such a way as to preferably prevent sharp edges from occurring, but sharp edges may still remain. Another disadvantage of using metal clips is that each meat item requires at least two clips, with one clip on either side of the packaged product. When packaging tens of thousands of items, or more, the cost of the clips becomes significant and thus this type of packaging can be costly in a factory setting where large scale processing occurs. Another disadvantage of using foreign objects to seal the ends of the mesh is that it requires the mesh to be cut, after which strands of the cut end may break loose and end up in the meat product. In addition, although individual, pre-cut bags may be used to independently wrap meat products without the necessity of metal clips, using them often requires the cumbersome process of tying knots, which also is undesirable in a large scale factory setting. For these reasons and others, an improved product packaging technique is needed.

SUMMARY OF THE PREFERRED EMBODIMENTS OF THE INVENTION

[0008] The problems noted above are solved in large part with a method and apparatus for packaging products (e.g., meat products, non-meat food products, non-food products) without the use of metal clips or other foreign objects. By avoiding the use of foreign objects, the preferred packaging technique overcomes various disadvantages of the previous meat packaging methods. In a preferred embodiment of the invention, a continuous thermoplastic tubular mesh material is used to package multiple items. Preferably, a first seal in the continuous meshing is made at one end using ultrasound or another suitable sealing mechanism, while the other end is left unsealed. Next, a first product is placed into the mesh tubing from the open end, and the mesh is then sealed at this end and adjacent the product creating a second seal. However, this second seal creates, not only the second seal for the first product, but also a beginning seal in the continuous mesh tubing for a subsequent product to be loaded into the open end.

[0009] In accordance with the preferred embodiment, the second seal may be severed while making the second seal in order to separate the first packaged product from a subsequent packaged product. As an alternative to severing this second seal during is formation, the seal may be perforated such that the packaged products subsequently may be separated by pulling them apart. Further, the seal may be left intact entirely, resulting in a chain of meat products that can be separated at a later time using scissors or other cutting tools to manually sever the seals. In addition, the seal may be formed in such a way as to convey identification information. For example, a company that has many factories may want to be able to identify which factory a product is from. Accordingly, imprinting identification information on the seal while it is being formed makes this possible. Also the seal may be formed in any shape (e.g., company logo, round, square).

[0010] In accordance with another embodiment, a handle may be created while forming the seals. The handle may be formed as a loop arrangement at one end of the product or as a strap that spans across the product between opposite seals.

[0011] By not using foreign objects, the problems discussed above regarding such objects are avoided. Further, being able to effectively create two seals at a time (i.e., one seal that is severed in two) permits the packaging process to occur more efficiently than many traditional packaging assembly lines. These and other aspects and benefits of the preferred embodiments of the present invention will become apparent upon analyzing the drawings, detailed description and claims, which follow.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] A better understanding of the present invention can be obtained when the following detailed description of the preferred embodiment is considered in conjunction with the following figures, wherein like parts have been given like numbers:

[0013] FIG. 1 shows a preferred embodiment of a meshing tubing being loaded on a horn;

[0014] FIG. 2 shows the horn with the tubing loaded thereon and one end of the tubing material being sealed;

[0015] FIG. 3 depicts a meat item placed in the horn;

[0016] FIG. 4 shows a seal being created on the opposite end of the meat item;
FIG. 5 shows the finished seal of FIG. 4;

FIG. 6 shows the packed meat item and the horn still loaded with mesh and having the initial seal for the next meat item in line;

FIG. 7a shows the packaged meat item in which a preferred embodiment of a handle is formed as part of the packaging and spans across the meat item; and

FIG. 7b shows an alternative embodiment of a handle formed as a loop in an end of the packaging material.

While the invention is susceptible to various modifications and alternative forms, specific embodiments thereof are shown by way of example in the drawings and will herein be described in detail. It should be understood, however, that the drawings and detailed description thereto are not intended to limit the invention to the particular form disclosed, but rather, the intention is to cover all modifications, equivalents and alternatives falling within the spirit and scope of this disclosure as defined by the appended claims. It should also be noted that the term "weld" and the term "seal" are used interchangeably herein and should be construed as equivalents. Further, the term "foreign object" refers to an object or material that is different and apart from the material that encloses the product.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

In accordance with a preferred embodiment of the invention, an improved packaging method and system is provided that solves the problems described. The preferred embodiment described below shows the packaging of a meat product (e.g., turkey, chicken, ham). More broadly, the preferred embodiment of the invention can be applied to any type of product, such as non-meat food products and even non-food products (e.g., clothes, toys), as well as meat products. Further, the preferred packaging method described herein does not use foreign objects (e.g., metal clips) to seal the ends of a product, and instead uses thermal energy, ultrasonic energy, or other types of energy to create seals in the packaging material. Furthermore, the method provides for the creation of one seal being formed for each product in the packaging system, although ultimately each product will have a seal at either end of the completed package. These features will be described in detail below.

Referring now to FIG. 1, the initial step of a preferred embodiment for packaging a meat product includes a "horn" 100 which is loaded or "ruucked" with a mesh 102 that is gathered into successive folds around the horn 100. The mesh 102 is preferably made from a thermoplastic material, which can be sealed using heat energy, ultrasonic energy or other suitable sealing energy as explained below. Also, the mesh 102 is preferably made in a continuous tubular form such that it may be ruucked onto the horn in successive folds. The accumulation of mesh 102 on horn 100 allows for multiple meat items to be packaged without having to reload the horn 100 with mesh 102 with each meat item. Instead, the mesh 102 preferably is continuously fed from the horn 100 enabling the packaging of multiple meat items in a serial fashion. Generally, with an initial seal formed on one end of the tubular mesh 102, the other end remains open to accept meat items into the horn 100. This process is illustrated in greater detail with regard to FIGS. 2-6 and explained below. It should be noted that although a mesh 102 is shown in FIG. 1, any material that is suitable for heat and/or ultrasonic sealing may be used.

Referring now to FIG. 2, the horn 100 again is shown. The mesh 102 is loaded thereon and one end 201 of the mesh 102 has been welded, while the other end of the mesh 102 remains open and loaded on the horn 100. Preferably, as explained below with respect to FIG. 4, the mesh 102 is welded ultrasonically using a welder 200 to form the beginning weld 201 for the first meat product. Ultrasonic welding typically includes converting AC electrical power at a frequency in the 15-40 kHz range into mechanical energy at a similar frequency. This conversion preferably occurs by applying the electrical power to a piezoelectric converter that expands and contracts, which creates mechanical vibrations at these frequencies. The mechanical vibrations are then delivered to the mesh 102 using an anvil 205 (which is shown in more detail in FIG. 4.)

The horn 100 shown in FIG. 2 has an entry point 100a in which meat products are loaded and an exit point 100b for removing the meat product 202 from the horn 100 ensnared in the mesh 102. A meat item 202 is shown placed into the entry point for the horn 100 such that meat item 202 and all subsequent meat items may be packaged in a serial fashion (i.e., one at a time). Turning to FIG. 3, the meat product 202 is shown enclosed in the mesh 102 by the beginning weld 201. The meat product preferably is pushed or pulled through the horn 100 to the horn's exit point 100b, while the mesh 102 is still ruucked on the horn 100. Referring to FIG. 4, the meat product 202 is shown with the open end of mesh 102, (i.e., the end of the mesh opposite weld 201) secured in anvil 205 such that the mesh may receive a second seal to fully enclose the meat item 202 in the mesh 102. Once the mesh 102 is secured in the anvil 205, ultrasonic vibrations force the walls of the tubular mesh 102 to impact against each other at a predetermined frequency, thereby creating a molecular bond. Preferably the meat product 202 also is rotated such that the mesh 102 surrounding it is twisted prior to its placement in the anvil 205, thus making it more amenable to sealing. In addition, by rotating the meat product 202 in this manner there is less waste of the mesh 102 because the meat product 202 is wrapped tightly in the mesh 102.

Turning now to FIG. 5, the final weld 500 formed in anvil 205 secures the meat product 202 into the mesh 102 is shown. Many combinations of weld time, distance, and energy may be performed to achieve a variety of desired weld joints. The final weld 500 preferably is of a sufficient size to be cut in half, thereby forming the sealed ends of two different packaged products. Preferably, the final weld 500 is about one-half inch wide and about three-quarters of an inch long.

FIG. 6 shows the meat product 202 packaged in accordance with the preferred embodiment where the meat product 202 is fully packaged and separated from the mesh 102, which is ready for the next meat product. As such, the final weld 500 is preferably severed after the mesh 102 is welded to separate packaged meat product 202. By severing the weld 500 in this manner, packaged meat product 202 is separated and the initial weld is already formed for the next meat product to be packaged. In effect, only one weld is
formed for each packaged product. Moreover, this allows meat products to be packaged serially in an efficient manner and yields well to the possibility of automation in a factory setting. The preferred embodiment also avoids the use of foreign objects such as metal clips, thereby eliminating the cost of the metal clips as previously mentioned, and also eliminating the costs associated with metal detection equipment. Additionally because the mesh is welded onto itself the preferred embodiment circumvents the risk of mesh strands contaminating meat products as a result of the mesh being cut.

[0028] As described above, a weld is formed between successively packaged products. The weld is large enough so that it can be cut thereby separating the two adjacent products. The weld can be cut in accordance with several different embodiments. For example, the weld can be cut in half just after its formation while the weld is still in welder 200. That is, the weld can be formed and then cut at the same time. It should be noted that successive welds do not necessarily need to be symmetrical, for example the beginning weld may be smaller than successive welds. Also, the weld can be cut with scissors, knives, or other suitable cutting tool. Alternatively, the weld can be formed and perforated, but not severed during the welding process. By perforating each weld, a serial string of packaged products can be easily separated by pulling them apart at the perforations. Any known tool for perforating the weld can be used and preferably incorporated into the welder 205. In another embodiment, the seal may be left intact and without perforations, resulting in a chain of meat products that are preferably separate in a group fashion at a later time by cutting the welds with a cutting tool. Further, the weld may be cut approximately at its midpoint as noted above or at a location in the weld other than the midpoint. In this latter case, one side of the asymmetrical cut will be larger than the other which may be desirable, for example, for placement of product information on the packaging.

[0029] In another embodiment, the weld may be formed into different geometrical shapes (e.g., round, square, etc.), also, the weld may be formed preferably in the shape of a company logo. Alternately, the weld may be formed to contain identification information for each packaged product.

[0030] In yet another embodiment a handle may be created while forming the seals on the packaged product. FIG. 7a shows an embodiment of a handle 700a formed as a strap across the packaged product 202. FIG. 7b shows an alternative embodiment of a handle 700b that may be fashioned in a loop arrangement at one end of the packaged product 202. In either case, the handle preferably is made of the same mesh material used to package the product 202.

[0031] Although ultrasound or heat can be used to form the welds, other methods can be used for creating the weld joints in the thermoplastic material. Regardless of the technology used to form the weld, each weld joint is preferably created so as to create seals for opposing ends of adjacent packaged meat products. It should be noted that in a large scale factory setting where meat is being packaged, ultrasound is particularly beneficial for producing weld joints due to the prevalence of water and grease in the environment, which can interfere with heat sealing techniques.

[0032] Numerous variations and modifications will become apparent to those skilled in the art once the above disclosure is fully appreciated. It is intended that the present invention be interpreted to embrace all such variations and modifications.

What is claimed is:

1. A method of packaging items in a tubular thermoplastic material, having either end of the tubular material initially open and with each packaged item sealed at opposite ends by first and second seals, said method including:

(a) forming a first seal in the material;
(b) placing an item in the tubular material wherein the item is adjacent to the seal formed in (a);
(c) forming a second seal in the material so as to enclose the item between the first and second seals; and
(d) severing the second seal to package the item, thereby creating a first seal for a subsequent item to be packaged.

2. The method of claim 1, further including placing a subsequent item into the tubular material to be adjacent to the first seal created in (d) and forming a second seal in said material so as to enclose the subsequent item between the first seal and the second seal.

3. The method of claim 2, wherein forming the seals includes using ultrasound.

4. The method of claim 3, wherein the seals have a width of about one-half of an inch and a length of about three-quarters of an inch.

5. The method of claim 3, wherein the ultrasound is at a frequency in the range of about 15 kHz to 40 kHz.

6. The method of claim 2, wherein forming the seals includes using heat sealing.

7. The method of claim 2, further including rotating each item prior to forming a seal such that the tubular material is gathered together for sealing.

8. The method of claim 2, wherein the multiple items are food products.

9. The method of claim 8, wherein the food products are meat products.

10. The method of claim 2, wherein the multiple items are non-food products.

11. A method of packaging items in a tubular thermoplastic material without the aid of foreign objects, having either end of the tubular material initially open and with each packaged item sealed at opposite ends by first and second seals, said method including:

(a) forming a first seal in the material;
(b) placing an item in the tubular material wherein the item is adjacent to the seal formed in (a);
(c) forming a second seal in the material so as to enclose the item between the first and second seals; and
(d) severing the second seal to package the item, thereby creating a first seal for a subsequent item to be packaged.

12. The method of claim 11, wherein (a) and (c) include a logo in the seal.

13. The method of claim 11, wherein (d) includes severing the second seal approximately at its midpoint.

14. The method of claim 11, wherein a handle is formed at the same time as the seals are being formed.

15. The method of claim 11, wherein the seals in (a) and (c) include identification information.
16. The method of claim 11, wherein (d) includes severing the second seal at a location away from its midpoint so as to result in two cut portions of different sizes.

17. A method of packaging items in a tubular thermoplastic material, having either end of the tubular material initially open and with each packaged item sealed at opposite ends by first and second seals, including:

(a) forming a first seal in the material using ultrasound;

(b) placing an item in the tubular material adjacent to the first seal formed in (a);

(c) forming a second seal in the material so as to enclose the item between the first and second seals; and

(d) perforating the second seal thereby creating two seals when the perforation is separated, one of said two seals being a first seal for a subsequent item to be packaged.

18. The method of claim 17, further including placing a subsequent item into the tubular material to be adjacent to the first seal created by the perforation in (d) and forming a second perforated seal in said material so as to enclose the subsequent item between the first perforated seal and the second perforated seal.

19. The method of claim 17, wherein forming the seals includes using ultrasound.

20. The method of claim 19, wherein each seal has a width of about one-half of an inch and a length of about three-quarters of an inch.

21. The method of claim 19, wherein the ultrasound has a frequency in the range of about 15 kHz to 40 kHz.

22. The method of claim 17, wherein forming the seals includes using heat sealing.

23. An apparatus for packaging multiple items, comprising:

a horn having two open ends, a receiving end for receiving an item and an exit end through which the item exits the horn;

a tubular thermoplastic material that fits over the exit end of the horn;

a welder which forms seals in the material;

wherein the welder forms one weld in said material between adjacent items to be packaged such that the weld so formed can be cut thereby providing a weld for opposing ends of adjacently packaged items.

24. The apparatus of claim 23, wherein the welder uses ultrasound to form the welds in said material.

25. The apparatus of claim 23, wherein the welder uses heat to form the welds in said material.

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