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(54) Title: SHREDDABLE ROPE PET CHEW AND METHOD OF MAKING SAME

(57) Abstract: Pet chews and method for making the same are described herein. A pet chew comprises a major body and an edible binder placed onto the outer surface of the major body. The major body comprises at least two bundles, and each bundle comprises a plurality of strands. The at least two bundles are twisted around a central axis and entangled through a length of the pet chew. The pet chew provides unique visual appearance that is appealing to animals. The pet chew also has great toughness and strength and improves the occupancy time in pets mouth. The shredded strands are highly chewable and digestible, reducing the risk of damaging pets teeth and oral tissues.

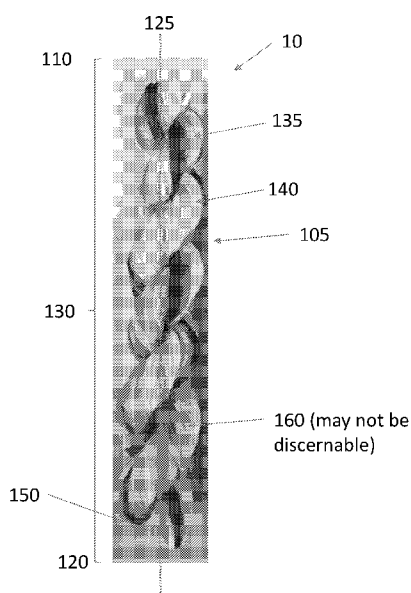


FIG. 1

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SHREDDABLE ROPE PET CHEW AND METHOD OF MAKING SAME**CROSS-REFERENCE TO RELATED APPLICATION**

5 This application is a PCT International Patent Application and claims priority to U.S. Provisional Patent Application No. 63/049,386, filed July 8, 2020; the disclosure of which is hereby incorporated by reference in its entirety.

INTRODUCTION

10 Traditional pet treat or pet chew products are either hard and friable or highly dense with more elastic or rubbery properties. The hard and friable pet treat products crumble or break down relatively quickly and are more easily digested, but have a relatively short occupancy time in the pet's mouth. The highly dense and elastic pet treat products, for example, rawhides or dehydrated rawhides, are more difficult to chew, harder to digest, and have more extended occupancy time in the pet's mouth. Many of
15 these traditional products are based on hard and tough textures that require repeated chewing for efficacy. While such products may offer teeth cleaning functions, in many cases they pose risks to pets either from physical injury such as gum injury, teeth fracture, or blockage of the digestive system.

 US 20140290587 provides a comestible animal chew and play toy made from an
20 edible composition having a helical shape. The edible composition of the comestible animal chew and play toy can be an extruded pet food composition.

 US 20160029664 discloses an edible pet chew having a twisted body form with enhanced textural characteristics over un-twisted body forms. The pet chew is comprised of fibrous protein, water absorbing polymer, plasticizer, water, and additives.

25 US 20140261231 provides a chewable rope embodiment containing a rope either impregnated with 10 to 25 wt % of a dental protection composition or containing a rope coated with the edible pet chew formulation.

 US 20200146313 discloses a pet chew comprising a first component comprising fibrous connective tissue and a second component comprising internal organ tissue,
30 wherein the second component is coupled to the first component.

 US Patent 5,467,741 discloses a chew toy for dogs comprised of a plurality of strands of soft pliable threads twisted about one or more strands of twisted or synthetic fibers so as to substantially encase and retain the fibers within the pliable threads. The chew toy comprises a pair of knots at each end of the chew toy.

In spite of the above disclosures, it is still desirable for new pet chew having unique configuration and textural characteristics that meet the above stated consumer needs. Therefore, there remains a need for a product that is completely edible, long lasting and safe, that is designed to effectively clean teeth without the risk of choking, tooth
5 damage, intestinal obstruction or other injury. Meanwhile, a need remains for designing pet chew products having textural characteristics that result in extended occupancy and oral health care properties.

In addition, the traditional pet chews such as rawhide stick do not provide a visually appealing treat for dog. The pet chews also do not give the pet owner a visually
10 acceptable reaction when purchasing the pet chew. It is thus desired for a pet chew that provides a visually appealing product that stimulates a human to purchase the pet chew.

SHREDDABLE ROPE PET CHEW AND METHOD OF MAKING SAME

The present disclosure relates to shreddable, edible pet chews or pet treats, the compositions thereof, and the method making the pet treats.

15 In some aspects, the present disclosure relates to a pet chew comprising a major body having an elongate central axis, wherein the major body comprises at least two bundles, each of the at least two bundles comprising a plurality of strands; wherein the at least two bundles are twisted around the central axis; and a binder disposed on the plurality of strands.

20 In some embodiments, the present pet chew extends from a first end to a second end along the longitudinal axis. In some embodiments, the pet chew is substantially straight. In other embodiments, the pet chew has at least one curvature along the longitudinal axis.

In some embodiments, the pet chew has a rope-like or braid-like configuration. In
25 some embodiments, the pet chew has a number of twists (or helical turns) of at least 2, at least 3, at least 4, at least 5, at least 6, at least 7, at least 8, at least 9, or at least 10 through the length of the pet chew.

In some embodiments, the pet chew has a substantially circular cross-section through a length the pet chew. In other related embodiments, the cross-section of the pet
30 chew has a substantially uniform circumference through a length the pet chew.

In some embodiments of the present pet chew, each of the at least two bundles comprises at least about 5, at least about 10, at least about 15, at least about 20, at least about 25, or at least about 30 strands. In embodiments, the at least two bundles have

substantially equal number of strands, for example, each of the bundles have about 10-40 individual strands.

In some embodiments of the present pet chew, each of the at least two bundles has a substantially circular cross-section uniformly through a length of the bundle. In
5 embodiments, the cross-section of each bundle has a substantially uniform circumference through a length of the bundle. In embodiments, each of the at least two bundles has substantially the same circumference of the cross-section.

In some embodiments of the present pet chew, wherein the major body comprises two open ends and is free from a knot or a tied structure or the like through a length of the
10 pet chew.

In some embodiments of the present pet chew, each of the plurality of strands has a width of about 10 mm or less, or about 8 mm or less, or about 6 mm or less, or about 5 mm or less, or about 4 mm or less, or about 3 mm or less, or about 2 mm or less, or about 1mm or less.

15 In some embodiments of the present pet chew, the strands are shredded and stretched strips cut from a sheet of animal rawhide. In other embodiments, the strands comprise plant-based material and are substantially free from rawhide or animal tissues.

In some aspects of the present disclosure, the pet chew strands comprise a meat flavor. In embodiments, the strands comprise a binding agent, a moisturizing compound, a
20 salt, a sugar, an acid, a mold inhibitor, one or more flavoring compound, an aroma compound, a coloring compound and any combination of two or more thereof. The strands may also comprise a food additive. The strands may also include a health ingredient.

In some embodiments of the present pet chew, the binder is a gelatin. In
25 embodiments, a part of the binder fills in the interstitial spaces among the twisted bundles and/or the strands.

In some aspects, the present disclosure relates to a method of making a pet chew according to the present disclosure. The method comprises providing at least two bundles, each of the at least two bundles comprising a plurality of strands; twisting the at least two
30 bundles around a common central axis, whereby forming a major body; and disposing a binder onto a surface of the major body.

In some embodiments, the present method further comprises twisting at least one of the bundles prior to forming the major body. In some embodiments of the present

method, the step of disposing a binder comprises dipping the twisted major body into a liquid binder and drying the binder.

Definitions

5 As used herein, “weight percent,” “wt%,” “percent by weight,” “% by weight,” and variations thereof refer to the concentration of a substance as the weight of that substance divided by the total weight of the composition and multiplied by 100. It is understood that, as used here, “percent,” “%,” and the like are intended to be synonymous with “weight percent,” “wt%,” etc.

10 As used herein, “g” represents gram; “L” represents liter; “mg” represents “milligram (10^{-3} gram);” “mL” represents milliliter (10^{-3} liter); “cm” represents centimeter (10^{-2} meter); “mm” represents millimeter (10^{-3} meter).

 The term “about” is used in conjunction with numeric values to include normal variations in measurements as expected by persons skilled in the art, and is understood
15 have the same meaning as “approximately” and to cover a typical margin of error, such as $\pm 10\%$ of the stated value. The term “about” also encompasses amounts that differ due to different equilibrium conditions for a composition resulting from a particular initial composition. Whether or not modified by the term “about,” the claims include equivalents to the quantities.

20 It should be noted that, as used in this specification and the appended claims, the singular forms “a,” “an,” and “the” include plural referents unless the content clearly dictates otherwise. Thus, for example, reference to a composition containing “a compound” includes having two or more compounds that are either the same or different from each other. It should also be noted that the term “or” is generally employed in its
25 sense including “and/or” unless the content clearly dictates otherwise.

 In the interest of brevity and conciseness, any ranges of values set forth in this specification contemplate all values within the range and are to be construed as support for claims reciting any sub-ranges having endpoints which are real number values within the specified range in question. By way of a hypothetical illustrative example, a disclosure in
30 this specification of a range of from 1 to 5 shall be considered to support claims to any of the following ranges: 1-5; 1-4; 1-3; 1-2; 2-5; 2-4; 2-3; 3-5; 3-4; and 4-5.

 The term “substantially free” may refer to any component that the composition of the disclosure lacks or mostly lacks. When referring to “substantially free” it is intended that the component is not intentionally added to compositions of the disclosure. Use of the

term “substantially free” of a component allows for trace amounts of that component to be included in compositions of the disclosure because they are present in another component. However, it is recognized that only trace or *de minimus* amounts of a component will be allowed when the composition is said to be “substantially free” of that component.

5 Moreover, the term if a composition is said to be “substantially free” of a component, if the component is present in trace or *de minimus* amounts it is understood that it will not affect the effectiveness of the composition. It is understood that if an ingredient is not expressly included herein or its possible inclusion is not stated herein, the disclosure composition may be substantially free of that ingredient. Likewise, the express inclusion
10 of an ingredient allows for its express exclusion thereby allowing a composition to be substantially free of that expressly stated ingredient.

The methods and compositions of the present disclosure may comprise, consist essentially of, or consist of the components and ingredients of the present invention as well as other ingredients described herein. As used herein, “consisting essentially of”
15 means that the methods and compositions may include additional steps, components or ingredients, but only if the additional steps, components or ingredients do not materially alter the basic and novel characteristics of the claimed methods and compositions.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an illustration of an embodiment of the pet chew according to a present
20 disclosure.

FIG. 2 illustrates a cross-section of an embodiment of a pet chew according to the present disclosure.

DETAILED DESCRIPTION

25 In some aspects, the present disclosure relates to a shreddable pet chew comprising a major body having an elongate central axis, wherein the major body comprises at least two bundles, each of the at least two bundles comprising a plurality of strands; wherein the at least two bundles are twisted around the central axis; and a binder disposed on the plurality of strands.

30 The present disclosure is based upon the discovery that chews having a twisted body configuration comprising shredded strands will induce an animal to play with the chew as well as consume the chew. While not bound by theory, it is believed that the rope-like configuration combined with the twisted bundles of shredded strands provide unique visual appearance and textual characteristics. The rope-like configuration is playful and

entertaining. The twisted bundle of the chew body provides great toughness and strength and improves the occupancy time in pet's mouth. On the other hand, the individual shredded strips due to the much smaller width are highly chewable and can easily break down in pet's mouth, thereby reducing the risk of damaging teeth and oral tissues when
5 chewing by pets. Many other shapes do not induce such playful activity, even when the chew is made from the same ingredients.

Pet chew

Now referring to FIG. 1-2, particular embodiments of the pet chew will be
10 described. Pet chew **10** comprises a major body **105**. The major body extends from a first end **110** to a second end **120** and has an elongate central axis **125** and a length **130**. The major body comprises at least two bundles **135** and **140**. In embodiments, the major body may comprise at least 3, at least 4, at least 5, at least 6, at least 7, at least 8, at least 9, or at least 10 bundles (not shown in FIG. 1). Each bundle comprises a plurality of strands **150**.
15 The at least two bundles **135** and **140** are twisted around the central axis **125** and are entangled with each other in physical contact substantially through the length **130**, forming a rope-like or braid-like configuration.

The present pet chew may have a number of twists of at least 2, at least 3, at least 4, at least 5, at least 6, at least 7, at least 8, at least 9, or at least 10 through a length of the
20 pet chew. The number of twists is defined as the average number of helical turns of each bundle through a length of the pet chew. For example, the particular pet chew **10** having a length of about 20.3 cm may have 3 twists through the length.

The present pet chew **10** may be substantially straight through the length **130**. Alternatively, the pet chew **10** may be curved, having at least one curvature along the
25 central axis **125** (not Shown). It is noted that the first end **110** and the second end **120** are both open, and the pet chew does not have a knot or a tied structure or the like. Knots are commonly used in conventional pet chews that used to resemble a bone. An example of a knot is shown in US Patent 5,467,741. Adding knots to the present shreddable pet chew is generally not preferred because it will significantly change the configuration and
30 undermines the uniqueness of the visual appearance.

The length **130** of the pet chew may vary, depending on the consumer need and product specification. A typical length **130** is in a range from about 5 cm to about 30 cm. It is noted that the bundles and strands may have a longer length than the length of the pet chew due to the twisted structure and helical turns. A skilled artisan would be able to

calculate the length of the strands and bundles in order to arrive at a desired length of the pet chew.

Each of the at least two bundles **135** and **140** comprises at least about 5, at least about 10, at least about 15, at least about 20, at least about 25, at least about 30, or at least about 40, or at least about 50 strands. The at least two bundles **135** and **140** may be substantially identical with respect to length, size, circumference, cross-section, and number of strands. As a non-limiting example, each of the bundle **135** and **140** has 30 strands.

The strands **150** may have a width of about 10 mm or less, or about 8 mm or less, or about 6 mm or less, or about 5 mm or less, or about 4 mm or less, or about 3 mm or less, or about 2 mm or less, or about 1mm or less. The strands **150** may have a thickness in a range from about 0.1 mm to about 5.0 mm. In embodiments, the strands **150** may be substantially the same with respect to width, size, thickness, color, and composition. Alternatively, the strands **150** may be different in at least one aspect as to width, size, thickness, and color, or composition.

The strands **150** can be a suitable source of animal safely digestible structure-supporting ingredients include fibers derived from animal tissue-for example from the skin, muscles, intestines, etc. of animals, for example, from tendons, animal hides such as cowhide, rawhide, etc. One convenient method of preparing such animal safely digestible structure-supporting strands is to cut, chip, grind, shred, shear, beat, etc., animal skins such as cowhide, rawhide, etc., or by combinations of these operations to yield collagen fibers which can be incorporated into the pet chew to enhance its unit integrity. As a particular non-limiting example, the strands **150** are rawhide strips obtained from cutting or shredding a sheet of rawhide followed by stretching the shreds. A skilled artisan would be able to choose a suitable method for preparing the strands known in the art, for example, described in US Patent 4,260,635, which is incorporated herein by reference in its entirety.

The pet chew **10** may have a substantially circular cross-section **160** through the length **130** of the pet chew, as shown in FIG. 2. The cross-section **160** may have a substantially uniform circumference through the length **130** of the pet chew. The circumference of the major body depends on parameters such as the number of bundles, the number of strands in each bundle, the size, thickness, hardness or toughness of the strands. A skilled artisan would be able to calculate and select the parameters to arrive at the desired circumference of the pet chew.

The at least two bundles **135** and **140** may have a substantially circular cross-section uniformly through a length of the bundle prior to being twisted. After being twisted, the size and shape of the cross-section of each bundle may not be significantly changed. The size of the cross-section of each bundle may depend on the number of the
5 strands in each bundle, and the nature of the strands such as the size, thickness, hardness, or toughness. A skilled artisan would be able to calculate and select the parameters of the strands to arrive at the desired circumference of the bundle.

The pet chew **10** comprises an edible binder **160** (or edible adhesive/glue or the like) disposed on at least a portion of the surface of the major body **105**. For example, the
10 edible binder **160** may be in the form of an edible adhesive coating that includes plant-based materials such as Xanthan, Guar, Locust bean gum, casein, cornstarch, glycerin, cellulose, or a combination thereof. The edible binder **160** may also be protein-based, including but not limited to gelatin, gluten, collagen, or a combination thereof. In
15 embodiments, the edible binder may include one or more additives, such as flavoring agents, coloring agents, vitamins, minerals, scents, preservatives, food additives etc., as desired. In some embodiments, a part of the edible binder **160** fills in the interstitial spaces among the twisted bundles and/or the strands. As such, the edible binder **160** may function to enhance coupling of the at least two bundles. In addition, the edible binder may also enhance the coupling of the strands within each bundle, e.g., by providing an adhesive
20 bond there among and improving the overall structural integrity.

The present pet chew may keep an animal such as a dog interested in the pet chew **10** for an extended period of time. Further, the twisted major body having high strength and integrity reduces the likelihood that the pet chew will splinter for an improved and safe chewing experience.

25 **Composition**

The present pet chew may have various nutritional values derived from the strands, the edible binder, and/or additional components. As discussed above, the strands may be a suitable source of animal tissue such as cowhide or rawhide. The pet chew may further comprise a meat flavor selected from the group consisting of pork, beef, chicken, duck,
30 goat, horse, buffalo, venison, elk, moose, liver, fish, veal, lamb, turkey, goose, shellfish, bovine, porcine, and combinations thereof. The meat flavor may be formulated into the strands or an additional component added to the pet chew. Alternatively, the strands may be based on plant-based materials and are substantially free from rawhide or animal tissues. Compositions and method of making plant-based materials that mimic the

characteristics of animal rawhide sheets are generally known in the pet food industry. The strands may be formulated in a manner to provide different physical, optical, sensual, or interfacial properties. In some embodiments, each bundle of the pet chew may have strands that are substantially different with respect to composition. For example, a first
5 bundle consists essentially of rawhide strands, and a second bundle consists essentially of strands made of plant-based material. Such combination may enhance pet's interest in chewing and consuming the pet chew.

The present pet chew may further comprise a component such as binding agent, a moisturizing compound, a salt, a sugar, an acid, a mold inhibitor, a flavoring compound,
10 an aroma compound, a coloring compound and any combination of two or more thereof. In some embodiments, the pet chew may comprise two or more animal flavors that are different, such as a natural pork flavor or a natural beef flavor known in the art. In embodiments, each of the bundles of the pet chew may comprise different animal flavors. Such component may be formulated into the strands or the edible binder, or both, or an
15 additional component added to the pet chew.

The present pet chew may further comprise a food additive selected from the group of preservative, sorbitol, desired colorant, glycerin, yeast extract, flavor, salt, cochineal, potassium sorbate, or combinations thereof. Such food additive may be a part of the strands or a part of the edible binder, or both, or may be an additional component added to
20 the pet chew.

The present pet chew may further comprise a health ingredient selected from the group consisting of glucosamine, chondroitin, flax seed, calcium, parsley seed, peppermint, chlorophyll, vitamin E, L-carnitine, and lycopene, and combinations thereof. Such health ingredient may be formulated into the strands or the edible binder, or both, or
25 may be an additional component added to the pet chew.

The present pet chew may further comprise one or more coloring compounds selected from a group consisting of caramel coloring, mallic acid, allura red AC, annatto, astaxanthin, betanin or beetroot red, blue 2, brilliant black BN, brilliant blue FCF, brown FK, canthaxanthin, carmine, carotene, Color Blue, curcumin, erythrosine, orange number
30 1, iron oxide, orange B, ponceau 6R, red 40, red 2G, saffron, sunset yellow FCF, tartrazine, titanium dioxide, turmeric, yellow 5, yellow 2, or any combination of two or more thereof. Such coloring compound(s) may be formulated into the strands or the edible binder, or both, or may be an additional component added to the pet chew.

The other additional ingredients for the pet chew include, but not limited to fats, fibers, dental supplements, skin and coat supplements and vitamin supplements. It should be appreciated that in formulations that already include protein, fat and fiber, additional proteins, fats and/or fibers may be added. Fats are selected from a group consisting of animal fats (e.g., pork and the like), fish oil (e.g., salmon, herring and the like) or plant oils (e.g., coconut, palm, soybean, safflower, sunflower, canola and the like) and combinations thereof. Fibers are selected from a group consisting of soluble and insoluble dietary fibers. A non-exclusive list includes cellulose, arabinoxylans, inulin, lignin, waxes, chitin, pectins, beta-glucans, oligo- saccharides and combinations thereof.

The pet chew may further comprise supplements. For example, dental supplements within the scope of the invention are selected from a group consisting of sodium bicarbonate, parsley and other ingredients shown to support dental and/or gum health. Skin and coat supplements are selected from a group consisting of omega-3, omega-6, omega-9 unsaturated fatty acids and combinations thereof. Vitamin supplements are selected from a group consisting of Vitamin A, B, C, D3, E and combinations thereof.

A particular formulation of a pet chew according to the present disclosure is shown in Table 1. The present may comprise at least about 70 wt% of protein; at least about 0.1 wt% of fat; less than about 3 % of fiber; and less than about 20 wt% of moisture.

Table 1. Formulation of a pet chew according to present disclosure.

Ingredient	wt%	Species of animal origin
Rawhide	90.8814%	Bovine
Chicken breast	3.1100%	Avian
Gelatin	3.0952%	Bovine
Glycerin	0.9547%	Non bio-diesel derived
Natural pork flavor	0.5000%	
Natural beef flavor	0.5000%	
Potassium sorbate (preservative)	0.4371%	
Wheat gluten	0.3016%	
Sucrose	0.2000%	
Natural Fusion Hazelnut Brown	0.0100%	
Natural Carmine color	0.0100%	
Total ingredients	100.0%	

A particular formulation of a pet chew according to the present disclosure is shown in Table 2. The present may comprise at least about 70 wt% of protein; at least about 0.1 wt% of fat; less than about 3 % of fiber; and less than about 20 wt% of moisture.

5

Table 2. Formulation of a pet chew according to present disclosure.

Ingredient	wt%	Species of animal origin
Plant-based formulation	90.8814%	
Chicken breast	3.1100%	Avian
Gelatin	3.0952%	Bovine
Glycerin	0.9547%	Non bio-diesel derived
Natural pork flavor	0.5000%	
Natural beef flavor	0.5000%	
Potassium sorbate (preservative)	0.4371%	
Wheat gluten	0.3016%	
Sucrose	0.2000%	
Natural Fusion Hazelnut Brown	0.0100%	
Natural Carmine color	0.0100%	
Total ingredients	100.0%	

Method of making

10 In some aspects, the present disclosure relates to a method of making a pet chew according to the present disclosure. The method comprises: providing at least two bundles, each of the at least two bundles comprising a plurality of strands; twisting the at least two bundles around a common central axis, whereby forming a major body; and disposing an edible binder onto a surface of the major body.

15 As discussed above, the strands may be prepared by common methods known in the food industry. As an exemplary example, the strands can be made by cutting and shredding a sheet of rawhide into strips. The strips can be further stretched or elongated to arrive at a desired length, or width, or thickness.

The strands may be grouped into bundles, and each bundle may have substantially
20 the same number of strands, for example 10, 15, 20, 25, 30 or 40 strands. Each bundle

may be individually twisted prior to forming the major body of the pet chew. The pre-twisted bundle may have enhanced strength and toughness of the final pet chew.

Next, at least two bundles of strands are placed together and aligned in a longitudinal direction. The bundles are twisted around a central axis in a latitudinal direction to form at least 2 helical turns (twists) through the length of the resulted major body. The step of twisting can be carried out manually or automatically by a machine. The torque required to form a desired number of twists may vary depending on the number of bundles, number of strands in each bundle, and the nature of the strands. Generally, more torque is needed to achieve more twists in the pet chew. However, the number of twists may be limited by the maximum torque available and the breaking (tensile) strength of the strand. The twisted bundle may be allowed to hold for a certain amount of time before the applied torque is removed in order to release at least a part of internal stress generated during the twisting step. The twisted major body can substantially remain its shape and configuration for a long period of time.

Next, the twisted major body is coated with an edible binder as discussed above. As an exemplary example, the twisted major body may be dipped into a liquid gelatin, or coated with liquid gelatin for a certain amount of time to allow for the gelatin to be disposed onto at least a portion of an outer surface of the major body. The liquid gelatin may also penetrate into the surface of the major body and the bundles, filling into the interstitial spaces among the bundles and/or the strands. The coated major body may be added with other components or ingredients described above. The coated major body may be optionally dried. The edible binder such as liquid gelatin upon drying will solidify and further enhance the structural cohesiveness and integrity of the pet chew.

Although only exemplary embodiments of the present disclosure has been described in detail above, those skilled in the art will readily appreciate that many modifications are possible without materially departing from the novel teachings and advantages of this invention. Accordingly, all such modifications are intended to be included within the scope of this disclosure as defined in the following claims.

What is claimed is:

1. A pet chew comprising:
a major body having an elongate central axis, wherein the major body comprises at least two bundles, each of the at least two bundles comprising a plurality of strands, wherein the at least two bundles are twisted around the central axis; and
a binder disposed on the plurality of strands.
2. The pet chew of claim 1, wherein the pet chew is substantially straight.
3. The pet chew of any of claims 1-2, wherein the pet chew has a rope-like configuration.
4. The pet chew of any of claims 1-3, wherein the pet chew has a number of twists of at least 2, at least 3, at least 4, at least 5, at least 6, at least 7, at least 8, at least 9, or at least 10 through a length of the pet chew.
5. The pet chew of any of claims 1-4, wherein the pet chew has a substantially circular cross-section through a length the pet chew.
6. The pet chew of claim 5, wherein the cross-section of the pet chew has a substantially uniform circumference through a length the pet chew.
7. The pet chew of any of claims 1-6, wherein each of the at least two bundles comprises at least about 5, at least about 10, at least about 15, at least about 20, at least about 25, at least about 30 strands, or at least about 40 strands.
8. The pet chew of any of claims 1-7, wherein the at least two bundles have substantially equal number of strands.
9. The pet chew of any of claims 1-8, wherein each of the at least two bundles has a substantially circular cross-section uniformly through a length of the bundle.
10. The pet chew of any of claims 1-9, wherein the major body comprises two open ends free from a knot.

11. The pet chew of any of claims 1-10, wherein each of the plurality of strands has a width of about 10 mm or less, or about 8 mm or less, or about 6 mm or less, or about 5 mm or less, or about 4 mm or less, or about 3 mm or less, or about 2 mm or less, or about 1mm or less.
12. The pet chew of any of claims 1-11, wherein the strands are shredded and stretched rawhides.
13. The pet chew of any of claims 1-12, wherein the strands comprise a meat flavor selected from the group consisting of pork, beef, chicken, duck, goat, horse, buffalo, venison, elk, moose, liver, fish, veal, lamb, turkey, goose, shellfish, bovine, porcine, and combinations thereof.
14. The pet chew of any of claims 1-13, wherein the strands comprise a binding agent, a moisturizing compound, a salt, a sugar, an acid, a mold inhibitor, a flavoring compound, an aroma compound, a coloring compound and any combination of two or more thereof.
15. The pet chew of any of claims 1-14, wherein the strands comprise a food additive selected from the group of preservative, sorbitol, desired colorant, glycerin, yeast extract, flavor, salt, cochineal, potassium sorbate, or combinations thereof.
16. The pet chew of any of claims 1-15, wherein the strands comprise a health ingredient selected from the group consisting of glucosamine, chondroitin, flax seed, calcium, parsley seed, peppermint, chlorophyll, vitamin E, L-carnitine, and lycopene, and combinations thereof.
17. The pet chew of any of claims 1-16, wherein the strands comprises one or more coloring compounds selected from a group consisting of caramel coloring, malliouse, allura red AC, annatto, astaxanthin, betanin or beetroot red, blue 2, brilliant black BN, brilliant blue FCF, brown FK, canthaxanthin, carmine, carotene, Color Blue, curcumin, erythrosine, orange number 1, iron oxide, orange B, ponceau 6R, red 40, red 2G, saffron, sunset yellow FCF, tartrazine, titanium dioxide, turmeric, yellow 5, yellow 2, or any combination of two or more thereof.

18. The pet chew of any of claims 1-17, wherein the binder is a gelatin.
19. The pet chew of any of claims 1-18, wherein a part of the binder fills in the interstitial spaces among the twisted bundles and/or the strands.
20. The pet chew of any of claims 1-19, comprising:
 - at least about 70 wt% of protein;
 - at least about 0.1 wt% of fat;
 - less than about 3 % of fiber; and
 - less than about 20 wt% of moisture.
21. A method of making a pet chew comprising:
 - providing at least two bundles, each of the at least two bundles comprising a plurality of strands;
 - twisting the at least two bundles around a common central axis, whereby forming a major body; and
 - disposing a binder onto a surface of the major body.
22. The method of claim 21, wherein the pet chew has a rope-like configuration.
23. The method of any of claims 21-22, wherein the major body has a number of twists of at least 2, at least 3, at least 4, at least 5, at least 6, at least 7, at least 8, at least 9, or at least 10 through a length of the pet chew.
24. The method of any of claims 21-23, wherein the pet chew has a substantially circular cross-section through a length the pet chew.
25. The method of claim 24, wherein the cross-section of the pet chew has a substantially uniform circumference through a length the pet chew.
26. The method of any of claims 21-25, wherein each of the at least two bundles comprises at least about 5, at least about 10, at least about 15, at least about 20, at least about 25, at least about 30 strands, or at least about 40 strands.

27. The method of any of claims 21-26, wherein the at least two bundles have substantially equal number of strands.
28. The method of any of claims 21-27, wherein each of the at least two bundles has a substantially circular cross-section uniformly through a length of the bundle.
29. The method of any of claims 21-28, wherein the major body comprises two open ends free from a knot.
30. The method of any of claims 21-29, wherein each of the plurality of strands has a width of about 10 mm or less, or about 8 mm or less, or about 6 mm or less, or about 5 mm or less, or about 4 mm or less, or about 3 mm or less, or about 2 mm or less, or about 1mm or less.
31. The method of any of claims 21-30, wherein the strands are shredded and stretched rawhides.
32. The method of any of claims 21-31, wherein the step of disposing a binder comprises dipping the twisted major body into a liquid binder and drying the binder.
33. The method of any of claims 21-32, wherein the binder is a gelatin.
34. The method of any of claims 21-33, wherein a part of the binder fills in the interstitial spaces among the twisted bundles and/or the strands.
35. The method of any of claims 21-34, further comprising twisting at least one of the bundles prior to forming the major body.

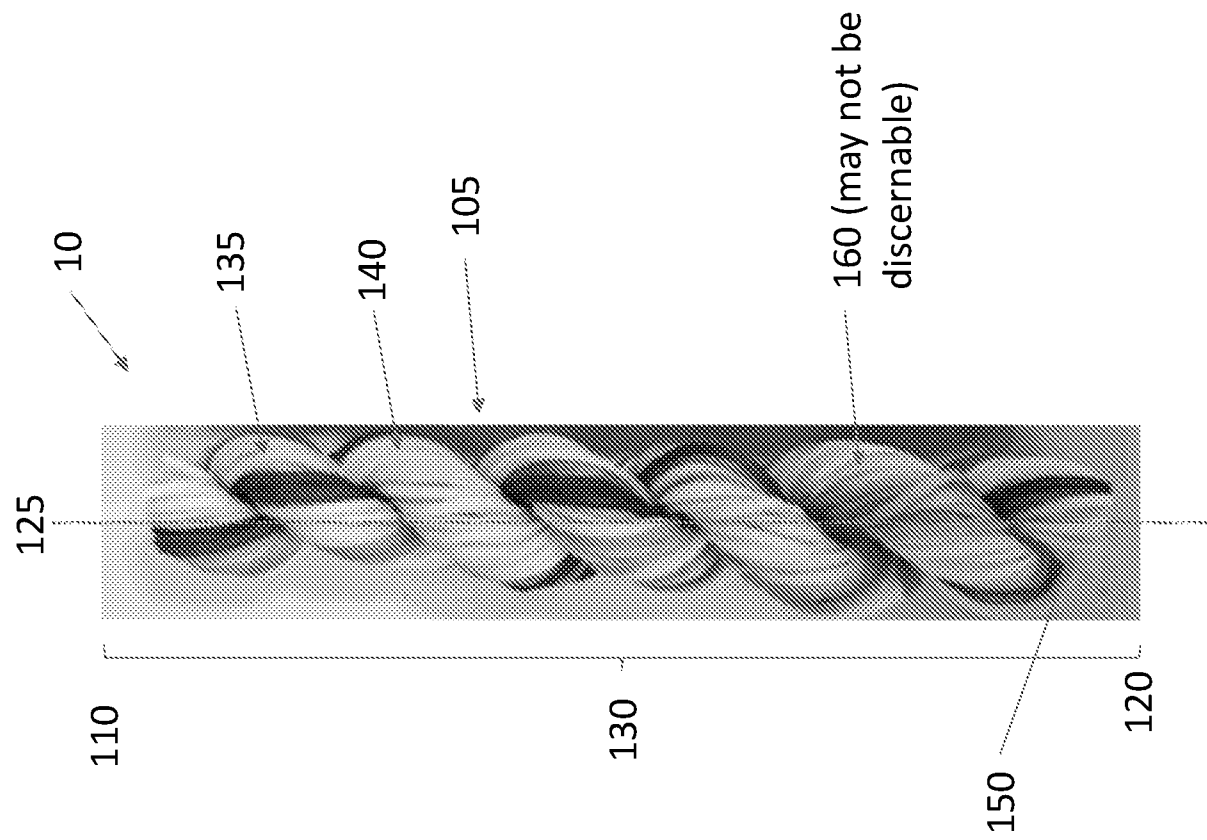


FIG. 1

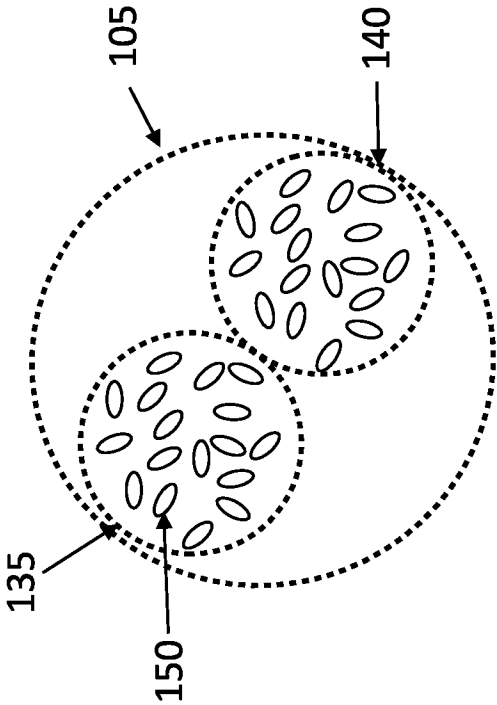


FIG. 2

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2021/040846

A. CLASSIFICATION OF SUBJECT MATTER

A01K 15/02(2006.01)i; A23K 10/20(2016.01)i; A23K 40/00(2016.01)i; A23K 50/40(2016.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A01K 15/02(2006.01); A01K 11/00(2006.01); A01K 29/00(2006.01); A01K 5/00(2006.01)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords: pet, chew, gum, rope, strand, twist

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6044800 A (KUBO et al.) 04 April 2000 (2000-04-04) column 3, line 20 - column 4, line 54, column 6, lines 20-48, column 8, line 30 - column 10, line 24 and figures 1-3	1-35
X	US 9027512 B2 (PRANGE et al.) 12 May 2015 (2015-05-12) column 2, line 49 - column 3, line 3 and figures 1,4	1-2,21
A	JP 2001-120103 A (DOGGY MAN HAYASHI CO., LTD.) 08 May 2001 (2001-05-08) claim 1 and figures 1-5	1-35
A	US 8349381 B2 (WEINBERG, CHRISTOPHER ALAN) 08 January 2013 (2013-01-08) column 2, line 66 - column 3, line 46 and figure 1	1-35
A	CN 2739959 Y (ZHANG, SHIPING) 16 November 2005 (2005-11-16) page 4 and figures 1-3	1-35



Further documents are listed in the continuation of Box C.



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“O” document referring to an oral disclosure, use, exhibition or other means

“P” document published prior to the international filing date but later than the priority date claimed

“T” later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

“X” document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

“Y” document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

“&” document member of the same patent family

Date of the actual completion of the international search

26 October 2021

Date of mailing of the international search report

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

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