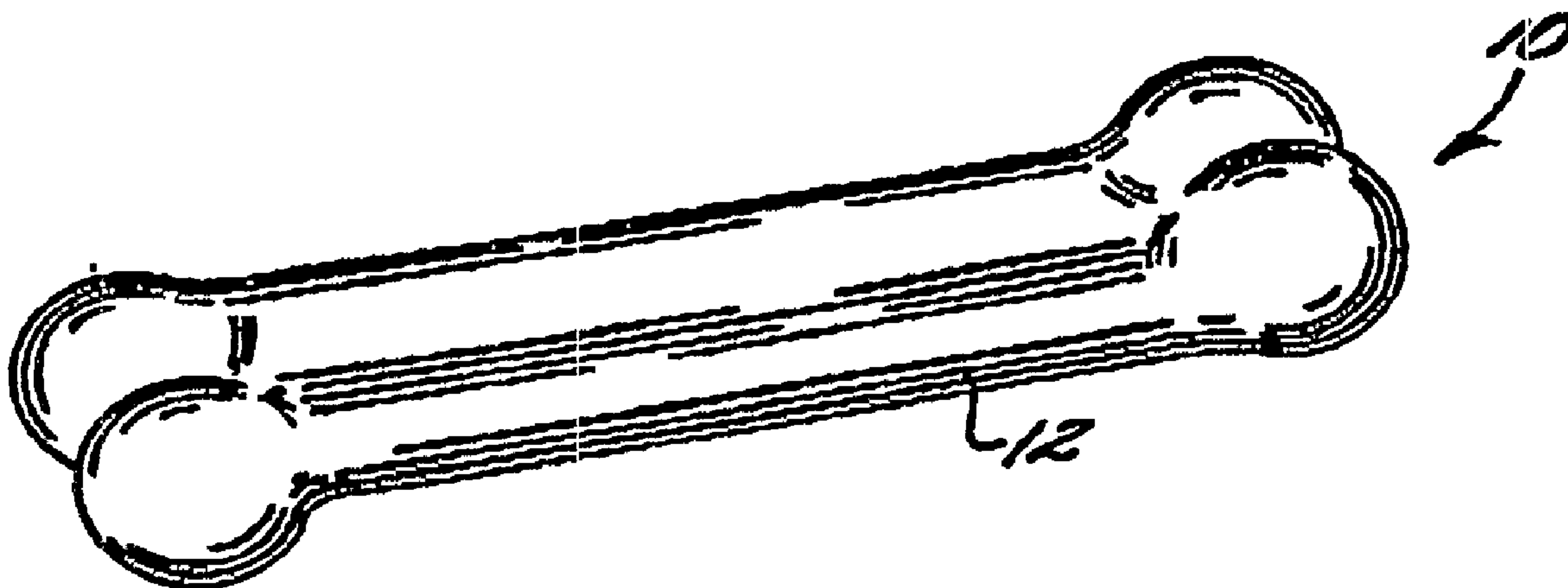




(22) Date de dépôt/Filing Date: 1997/10/24
 (41) Mise à la disp. pub./Open to Public Insp.: 1998/04/25
 (45) Date de délivrance/Issue Date: 2001/12/25
 (30) Priorités/Priorities: 1996/10/25 (08/738,423) US;
 1997/01/17 (08/784,834) US; 1997/07/07 (08/888,611) US;
 1997/09/03 (08/923,070) US

(51) Cl.Int.⁶/Int.Cl.⁶ A23K 1/18, A23K 1/175, A23K 1/14,
 A23K 1/00
 (72) Inventeur/Inventor:
 AXELROD, Glen S., US
 (73) Propriétaire/Owner:
 T.F.H. PUBLICATIONS, INC., US
 (74) Agent: MOFFAT & CO.

(54) Titre : ALIMENT A MACHER POUR CHIEN
 (54) Title: EDIBLE DOG CHEW



(57) Abrégé/Abstract:

An injection molded dog chew comprising vegetable matter such as potato starch or filamentateous vegetable matter has good chew characteristics, particularly when expanded by application of heat.

ABSTRACT

5 An injection molded dog chew comprising vegetable matter such as potato starch or filamentateous vegetable matter has good chew characteristics, particularly when expanded by application of heat.

5 The present invention relates to an injection molded dog chew, such as a completely digestible, nutritious dog chew, the texture or hardness of which is easily modified to suit a particular dog.

10 Most dogs enjoy chewing on things although preferences vary as to the hardness of the substances favoured. Many dogs are especially attracted to animal bones and animal-derived chew toys. Some dogs like to chew on very hard materials such as cow bones, wood or nylon, others prefer softer chews such as polyurethane or rubber chews while still others favour dried snacks. 15 Young dogs have insufficiently developed teeth, while old dogs may have diseased gums or may have lost some of their teeth.

20 Many indigestible objects are given to dogs to chew and although the dogs may enjoy chewing thereon, the objects are often swallowed in whole or in part. Once swallowed, these objects or fragments thereof can have an adverse effect on the dog's digestion and can become impacted in, impaled in or otherwise obstruct 25 the dog's intestinal tract with life-threatening consequences. By way of example, dog chews have been marketed which utilize an ethylene copolymer which can be fractured by the chewing action of a dog, and when ingested can block the dog's stomach passages.

30 While various vegetable derived products are available to address such concerns, the chewability of such products does not conform to the chew characteristics desired in dog chews. The material is either not hard 35 enough to serve as a dog chew or is extremely hard and

dense to the point that it is brittle and is therefore quickly and easily shattered by a large dog.

5 Other edible dog chews have been marketed which have a comparatively short shelf life and must therefore be replaced by retail outlets at frequent intervals. Yet other prior art dog chews are lacking in structural integrity whereby they are susceptible to breakage during handling and shipping.

10

It is desirable to provide a dog chew that has the chewing characteristics normally associated with chew toys, as well as nutritional characteristics not found in indigestible plastic dog chews and in traditional 15 meat/chicken-based dog chews.

The Applicant has previously developed an edible dog chew that is wholly digestible, nutritious and has a texture or hardness which is individually adjustable 20 by the application of heat to suit a wide variety of dog's preferences or needs. Such dog chews utilize a mixture containing primarily casein and are disclosed in US-A-5,200,212 and US-A-5,240,720. Such dog chews, while constituting a major improvement over other 25 prior art edible dog chews, do not provide all the advantages of the dog chew of the present invention.

The present invention provides an injection molded dog chew comprising vegetable matter, preferably at least 30 50wt%, more preferably at least 60 wt%, even more preferably at least 80wt% non-casein vegetable matter..

The present invention also provides an injection 35 molded dog chew which comprises vegetable starch and

an attractant.

The present invention additionally provides an injection molded dog chew comprising filamentateous vegetable matter and casein.

The present invention further provides an injection molded dog chew comprising about 60 to 85wt%, preferably about 70wt%, potato starch, about 10 to 15wt%, preferably about 15wt%, water, about 5 to 10wt% calcium carbonate, about 1 to 5wt% attractant and about 1 to 5wt% natural vegetable additives.

The present invention also provides a first method of forming a dog chew comprising:

- i) drying vegetable matter;
- ii) reducing said vegetable matter to beads;
- iii) injection molding said beads to the shape of the dog chew; and
- iv) allowing the molded shape to harden.

The present invention additionally provides a second method of forming a dog chew comprising:

- i) drying vegetable matter;
- ii) reducing said vegetable matter to particles;
- iii) melting said dried particles;
- iv) injection molding said molten vegetable matter to the shape of the dog chew;
- v) removing the dried dog chew from the mold; and
- vi) allowing said molding to harden.

The edible dog chew of the present invention is completely digestible and nutritious, and is preferably devoid of deleterious additives. The chew

may be composed completely of natural ingredients.
The chew has a modifiable texture or hardness that is
quickly and easily tailorable by the owner to suit the
need or preference of his particular dog. The chews
5 have a long shelf life as compared to prior edible dog
chews.

The chews are biodegradable and extremely rugged so as
to be able to withstand shocks resulting from shipping
10 and handling. Upon removal from the chew's package,
the chew can be caused to swell, for example up to 2
to 8, preferably up to 6 to 8, times its original
volume, if desired, by subjecting it to microwave
radiation. With this procedure, the chew's texture or
15 hardness can be adjusted to any magnitude from its
original high density, extremely hard state to a low
density, expanded, easily chewed state depending on
the amount of microwave exposure to which it is
subjected. Accordingly the chew can thereby be
20 quickly and easily adjusted to the texture preference
of a wide variety of dogs from a strong, large,
healthy dog to a small puppy with puppy teeth or an
older dog with decayed molars.

25 Other features and advantages of the present invention
will become apparent from the following detailed
description taken in conjunction with the accompanying
drawings which illustrate by way of example the
principles of the invention.

30 Fig. 1 illustrates a preferred embodiment of an edible
dog chew of the present invention in its unexpanded
state.

35 Fig. 2 illustrates the dog chew of fig. 1 in its

partially expanded state.

Fig. 3 illustrates the dog chew of fig. 1 in its fully expanded state.

5

The dog chew of the present invention comprises vegetable matter. Suitable vegetable matter is, for example, vegetable starch or filamentateous vegetable matter. An example of a vegetable starch is potato starch. Examples of filamentateous vegetable matter are carrot, spinach, asparagus, broccoli, bean, pea and corn matter. Some vegetable matter may have both a filamentateous content and a starch content.

15 The vegetable starch may be contained in the chew in an amount of, for example, 60 to 85wt%. The filamentateous vegetable matter may be contained in the chew in an amount of, for example, up to 80wt%.

20 The vegetable matter, for example the spinach or carrot matter, may have a size of no larger than 6.35mm to 12.7mm (0.25 to 0.50 inches) in its largest dimension.

25 The dog chew of the present invention may comprise other ingredients such as an attractant (for the dog), for example a vegetable attractant, casein, gelatin, calcium carbonate, lecithin or nutrients.

30 The casein may be present, for example, in an amount of up to 31 or 32wt%. Alternatively the casein may be present in, for example, an amount of up to about 30 to 50wt%. The gelatin may be present, for example, in an amount of up to about 4wt%. The calcium carbonate
35 may be present, for example, in an amount of up to

about 10wt%. The lecithin may be present, for example, in an amount of up to about 10wt%. Water may be present, for example, in an amount up to about 13 to 14wt%.

5

The dog chew may, for example, be in the form of a bone.

10 In the methods of the present invention a humectant may be added to help retain moisture in the finished dog chew and thereby render the chew resilient to resist shattering. A suitable humectant is, for example, salt or glycerin. The moisture content of the beads or particles is, if desired or if necessary,
15 adjusted to about 10 to 20wt% before the molding step. The water content may, for example, decrease to about 10wt% after injection molding.

20 The injection molding may take place, for example, at about 6.9 to 17.2 MPa (1,000 to 2,500 psi) and about 121 to 204 °C (250 to 400 F). The molding is preferably allowed to harden to a moisture content of about 4wt%.

25 In the second method of the present invention the vegetable matter, for example the filamentateous material such as carrot matter, may be first comminuted into small particles. These particles are brought to a desired moisture content, casein and
30 gelatin may be added, and the mixture is injected in a liquefied state at a raised pressure into an injection mold. The molded form is then allowed to cool in the injection mold until it hardens.

35 In the course of subjecting the comminuted matter to

melting temperatures, the material becomes sterilized. Such sterilization serves to interrupt any decaying process that may be in progress, and therefore alleviates the potential for the dog chew to emit a
5 foul odour. Furthermore, sterilization is achieved without baking the molded material so as to yield a very chewable product with a consistency and texture preferred by most dogs. By molding the mixture under a raised pressure, a substantially more cohesive
10 product is formed than is possible using a baking process.

A preferred dog chew of the present invention has as a basic ingredient a potato starch product sold under
15 the trade mark PARAGON IM 1010 by AVEBE of Veendam, The Netherlands. The PARAGON product is sold in the form of thermoplastic granules which are molded into a desired shape. The weight contents of such pellets are about 70% potato starch, about 15% water (about
20 10% after the pellets are molded), about 5 to 10% calcium carbonate and about 1 to 5% natural vegetable additives.

To such a mixture is added an attractant such as
25 chicken powder, liver powder, ham, turkey, beef and/or fish in an amount of 1 to 5% by weight. Natural vegetable additives such as spinach or carrots may also be added. The resultant mixture is molded under heat and pressure into a desired form, such as a dog
30 bone. Molding can be accomplished in an injection molding machine at temperatures between 121 to 204 °C (250 to 400 F) and pressure of 6.9 to 17.2 MPa (1,000 to 2,500 psi) depending on the injection molding machine utilized, the material's location within the
35 molding machine, the type of additives, the particular

mold and the size of the bone being molded.

Another preferred dog chew of the present invention may be prepared from filamentateous vegetable matter such as carrot. Dried vegetable matter is comminuted into small particles not exceeding 6.35 to 12.7mm (0.25 to 0.50 inches) across their largest dimension. Up to about 31% by weight of casein, up to about 30% by weight of water and up to about 4% by weight of gelatin may then be added to the carrot particles to facilitate molding and to adjust the chewability of the ultimate product. Various attractants such as chicken or liver and/or certain nutrients such as vitamins may additionally be added to the particle mixture. The vegetable matter includes up to about 4wt% ash.

The particle mixture is then injected into a conventional injection molding machine having a barrel temperature of about 121 to 204°C (250 to 400 F) and a molding pressure of about 6.9 to 17.2 MPa (1,000 to 2,500 psi). The heat serves to sterilize the mixture while the commensurate liquefaction of the particle mixture ensures that a relatively homogenous mixture of carrot matter, casein, gelatin and any additives results. Homogeneity is most desirable as clumps of high concentrations of certain vitamins, for example, could be deleterious to the dog's health.

After the particle mixture in the mold has been molded, it is cooled sufficiently to cause the molded form to re-solidify into a desired shape, such as a bone, to thereby allow it to be ejected or extracted from the mold. Finally, the product is allowed to dry in a drying room over the course of about a week,

while its moisture content is adjusted to about 13 to 14wt%. It is not necessary to package the dog chew made in accordance with the present invention in moisture-proof packaging.

5

It has been found that dogs find the dog chew resulting from this method especially attractive, presumably by virtue of its chewability and consistency. As the dog chews on the product, small
10 slivers thereof become dislodged, at which point the dog gains the benefit of any of the nutritional components contained therein. The consistency of the resulting dog chew is such that it takes most dogs about 30 minutes to a day to consume depending upon
15 the particular dog, thereby providing a cost saving to the dog owner as compared to typical soft or small dog treats.

In another preferred embodiment of the present
20 invention, dried vegetable matter such as potato, rice or wheat is chopped or ground into small granules or powder such that the largest particles do not exceed 6.35mm to 12.7mm (0.25 to 0.50 inches) across their largest dimension. The moisture content of these
25 particles is then further adjusted if necessary to less than about 10 to 20wt%. Up to about 10wt% calcium carbonate powder and up to about 5wt% lecithin may then optionally be added to facilitate extruding and/or molding and to adjust the chewability of the
30 ultimate product. Small quantities, for example 1 to 3wt%, of salt or glycerin or other natural humectant may also be added to help retain moisture in the finished product and thereby render the finished product sufficiently resilient to resist shattering
35 when dropped or otherwise impacted. Casein in an

- 10 -

approximate amount of 15wt% may also be added. Alternatively casein in an amount of about 30 to 50wt% may also be added. Various dog attractants such as chicken powder, liver powder, ham, turkey, beef and/or fish in an amount of 1 to 5wt% are additionally added, if desired. Certain nutrients such as, for example, vitamins may be added to the mixture. Gelatin powder in an amount of up to 5 wt% may be added to facilitate molding and cohesion of the finished product.

10

The mixture is then "beaded" in an extruder, which creates beads that may be fed into an injection molder. The previously mentioned attractants may be added either before or after the "beading" process.

15

The glycerin, casein, attractants, vitamins and/or gelatin may be added either during the extruding process or injection process. The beaded product has a diameter of approximately 3 to 10 mm. The beads may be placed in a microwave or oven and will expand in a popcorn-like fashion. Such beads can be used directly as a food product.

20

The mixture of beads is then fed into an injection molding machine having a barrel temperature of 121 to 204 °C (250 to 400 F) and a molding pressure of about 6.9 to 17.2 MPa (1,000 to 2,500 psi) which causes most of the particles to melt. The heat serves to sterilize the mixture, while the commensurate liquidification ensures a relatively homogenous mixture of vegetable matter, calcium carbonate, lecithin, attractants and any other additives. The product may be molded into any of a variety of shapes, including for example the general shape of a bone.

25

30

35

After the particle mixture in the mold has been molded

- 11 -

into a desired shape, it is cooled sufficiently to cause the molded form to solidify, thereby to allow it to be ejected or extracted from the mold.

5 Upon removal from its package, if any, the person feeding the dog can modify the texture or hardness of the molded chew by heating, preferably in a microwave oven. The expansion of the moisture within the chew causes the chew to expand. Subjecting the chew to
10 microwave radiation facilitates the heating of areas deep within the chew at the same time that the exterior heats up and expands. Fig. 1 illustrates the chew 10 prior to heating, in which state it has a substantially smooth exterior surface 12 and is of an
15 extremely hard texture preferred by some dogs. A short exposure to microwave radiation initiates the expansion process. Fig. 2 illustrates the chew 10 in a partially expanded state evidenced by partially bubbled surface 14. In this state the chew 10 is of
20 an intermediate hardness preferred by other dogs. Fig. 3 illustrates the chew 10 in a fully expanded state as may result from a 25 seconds to 1 minute exposure in a standard household microwave oven, depending on the size of the bone and the power
25 setting of the oven. The entire chew 10 has a bubbled surface 14 and is easily chewable by most dogs. The chew in this state is ideal for small dogs with puppy teeth or old dogs who suffer from gum disease or may have lost teeth. Sufficient exposure to microwave
30 radiation will cause the chew to expand up to 2 to 8, for example about 6 to 8, times its original volume with a commensurate reduction in hardness and density.

In use the chew is given to the dog in its initial
35 hardness state. If the dog is unwilling or is unable

to chew on it, the chew is microwaved for short time increments and re-offered to the dog until the chew reaches a state of expansion and degree of hardness preferred by the dog. Large, strong and healthy dogs would probably prefer the chew in its unmodified and hardest state, while very small, young or very old dogs would prefer the chew in its most expanded state. Dog chews based on vegetable starches typically undergo a greater expansion than those based on filamentateous vegetable matter.

The dog chew of the present invention can have various compositions falling within the above definitions. Examples of such compositions are as follows:

Potato Starch Product:

Potato Starch Source	44.4 kg (98 pounds)
Misc Ingredients	9.5 kg (21 pounds)

The misc ingredients can be fishmeal, lamb, rice, chicken, liver, cheese, rawhide, venison, spinach, peanut, carrot or any combination.

Carrot Product:

Casein	18.1 kg (40 pounds)
Carrot flakes	22.7 kg (50 pounds)
Gelatin	2.4 kg (5.25 pounds)
Water	23.9 l (21 quarts)

Filamentateous Vegetable Product

Casein	18.1 kg (40 pounds)
--------	---------------------

- 13 -

Vegetable	22.7 kg (50 pounds)
Gelatin	2.4 kg (5.25 pounds)
Water	23.9 l (21 quarts)

5

It should be particularly noted that an edible dog
chew made in accordance with the present invention
does not dry out and fall apart after being packaged
and accordingly can have a shelf life of several years
10 without being packaged in a waterproof container.
Additionally the dog chew is extremely resistant to
breakage during shipping and handling.

15

Chewing the hard molded dog chew made in accordance
with the present invention serves to massage a dog's
teeth and gums thereby inhibiting the formation of
plaque. Additionally, because a dog satisfies its
craving for food by chewing such a dog chew, obesity
in the dog is also inhibited. The chew has a low
20 protein content and high carbohydrate content. Most
chews on the market are high in protein and dogs
should have limited quantities of high protein chews
or snacks.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. An injection molded dog chew comprising potato starch or filamentateous vegetable matter.
2. A chew according to claim 1 which additionally comprises an attractant.
3. A chew according to claim 1 or 2 wherein the filamentateous vegetable matter is carrot or spinach matter.
4. A chew according to claim 1 or 2 wherein the filamentateous vegetable matter is asparagus, broccoli, bean, pea or corn matter.
5. An injection molded dog chew which comprises potato starch and an attractant.
6. An injection molded dog chew comprising filamentateous vegetable matter and casein.
7. A chew according to claim 6 wherein the filamentateous vegetable matter is spinach matter.
8. A chew according to claim 6 wherein the filamentateous vegetable matter is carrot matter.
9. A chew according to claim 6 wherein the filamentateous vegetable matter is asparagus, broccoli, bean, pea or corn matter.
10. A chew according to anyone of claims 6 to 9 which additionally comprises gelatin.
11. A chew according to claim 6 or 7, which additionally comprises gelatin, and wherein the vegetable matter is spinach matter and has a size of no larger than 6.35 mm to 12.7 mm (0.25 to 0.50 inches) in its largest dimension, the casein is present in an amount of up to 31 wt % and the gelatin is present in an amount of up to 4 wt %.
12. A chew according to claim 6 or 8, which additionally comprises gelatin and wherein the vegetable matter is carrot matter and has a size of no larger than 6.35 mm to 12.7 mm (0.25 to 0.50 inches) in its largest dimension, the casein is present in an amount of up to 32 wt % and the gelatin is present in an amount of up to 4 wt %.

13. A chew according to any one of claims 6 to 12 which additionally comprise an attractant.
14. A chew according to any one of claims 1 - 13 which further comprises calcium carbonate.
15. An injection molded dog chew comprising 60 to 85 wt % potato starch, 15 wt % water, 5 to 10 wt % calcium carbonate, 1 to 5 wt % attractant and 1 to 5 wt % natural vegetable additives, to a total of 100%.
16. A chew according to any one of claims 1 - 15 which additionally comprises nutrients.
17. A chew according to any one of claims 1 - 16 which is in the form of a bone.
18. A method of forming a dog chew comprising:
 - a. drying vegetable matter;
 - b. reducing said vegetable matter to beads;
 - c. injection molding said beads to the shape of the dog chew; and
 - d. allowing the molded shape to harden.
19. A method according to claim 18, wherein the vegetable matter is a vegetable starch.
20. A method according to claim 19, wherein the vegetable starch is potato starch.
21. A method of forming a dog chew comprising:
 - a. drying vegetable matter;
 - b. reducing said vegetable matter to particles;
 - c. melting said dried particles;
 - d. injection molding said molten vegetables matter to the shape of the dog chew;
 - e. removing the dried dog chew from the mold; and
 - f. allowing said molding to harden.
22. A method according to claim 21 wherein the vegetable matter is filamentateous vegetable matter.
23. A method according to claim 22 wherein the filamentateous vegetable matter is spinach matter.

24. A method according to claim 22 wherein the filamentateous vegetable matter is carrot matter.
25. A method according to claim 22 wherein the filamentateous vegetable matter is asparagus, broccoli, bean, pea or corn matter.
26. A method according to any one of claims 18 to 24 wherein a humectants is added to help retain moisture in the finished dog chew and thereby render the chew resilient to resist shattering.
27. A method according to claim 26 wherein the humectants is salt or glycerin.
28. A method according to any one of claims 18 to 27 wherein said vegetable matter is reduced in size to no larger than 6.35 mm to 12.7 mm (0.25 to 0.50 inches) in any dimension.
29. A method according to any one of claims 18 to 28 which further comprises adding casein and gelatine to the dried vegetable matter.
30. A method according to claim 29, wherein the casein is added in an amount of up to 31 wt % and the gelatin is added in an amount of up to 4 wt %.
31. A method according to claim 29 wherein the casein is added in an amount of up to 30 to 50 wt %, calcium carbonate is added in an amount of up to 10 wt %, and lecithin is added in an amount of up to 10 wt %, and the moisture content of the beads is, if necessary, adjusted to 10 to 20 wt % before the molding step.
32. A method according to any one of claims 18 to 31 wherein dog attractants are added to the beads or particles.
33. A method according to any one of claims 18 to 32 wherein the injection molding takes place at 6.9 to 17.2 MPa (1,000 to 2,500 psi) and 121 to 204°C (250 to 400 F).
34. A method according to any one of claims 18 to 33 wherein the molding is allowed to harden to a moisture content of 4 wt %.

FIG. 1

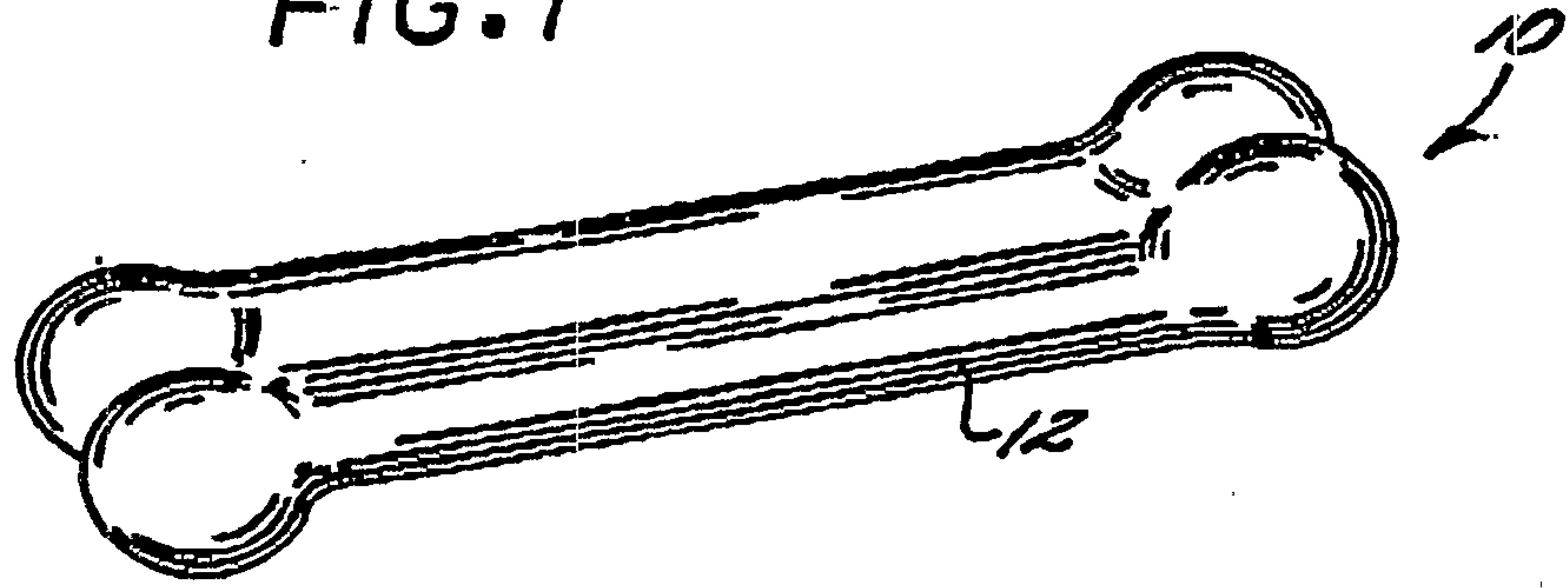


FIG. 2

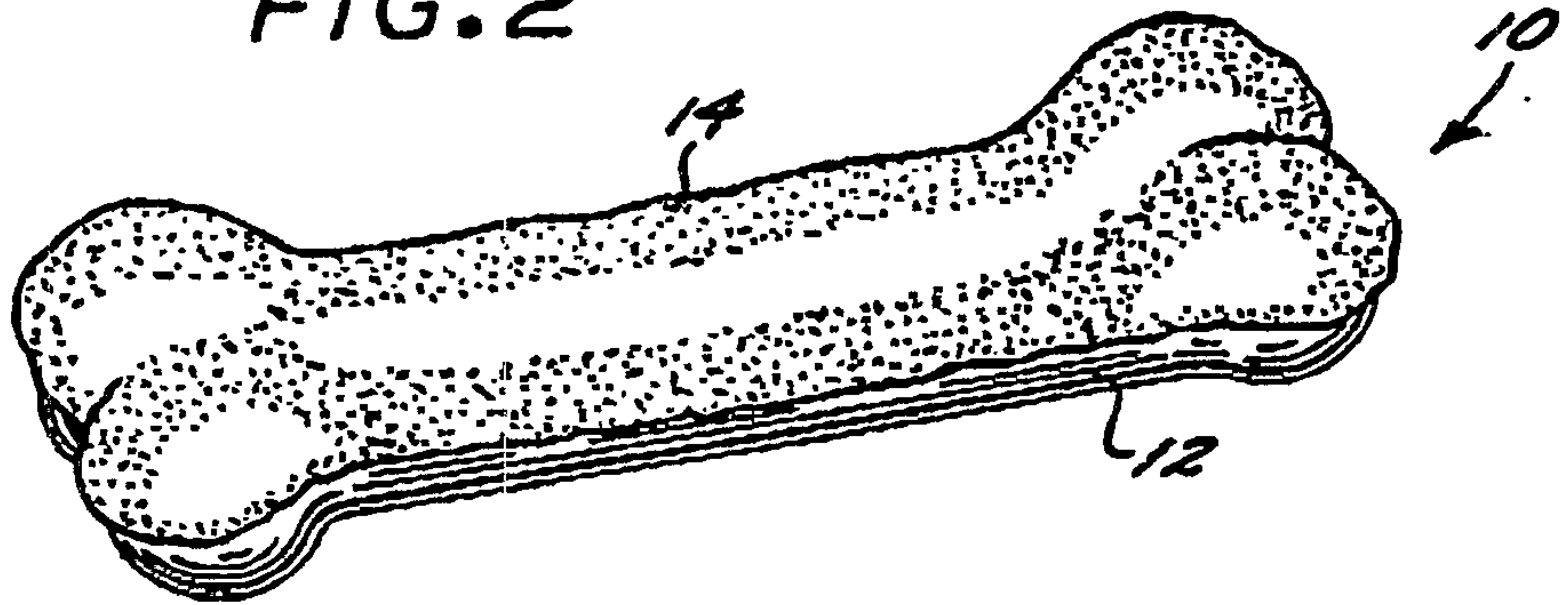


FIG. 3

