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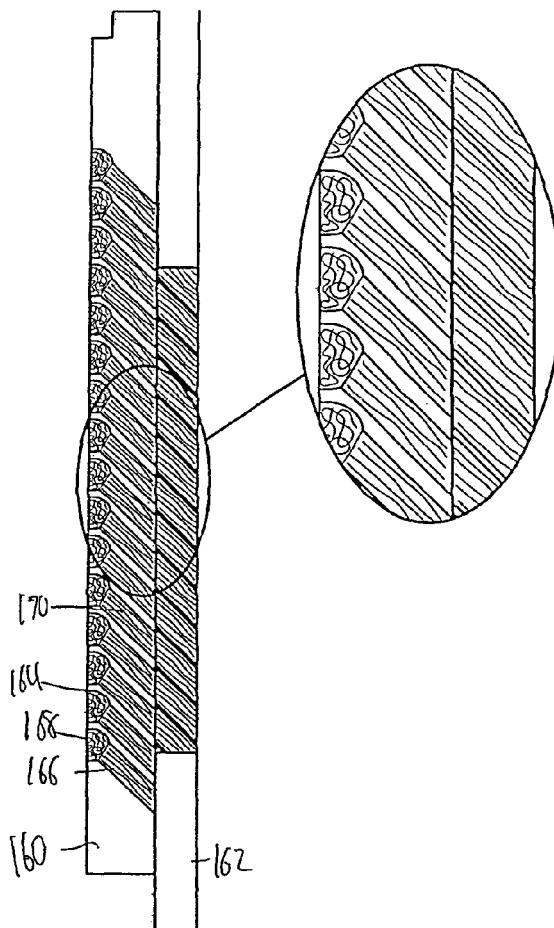
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(54) Title: IMPROVED FORMED FOOD PRODUCT

(57) Abstract: A food product having aligned fibers.



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## IMPROVED FORMED FOOD PRODUCT

### Related Applications

The present application is related to a continuation-in-part of pending application serial nos. 13/374,441 filed December 29, 2011, 13/374,417, filed December 5, 2011, 13/374,422, filed December 27, 2011, 13/374,421, filed December 27, 2011 and 13/374,423, filed December 27, 2011 which all are a continuation-in-part of application serial no. 13/199,910 filed on September 12, 2011.

### Field of the Invention

The present invention relates to an improved formed food meat product, a 0 method of preparing a formed meat product and a method of preparing a cooked meat patty.

### Background of the Invention

Current forming technology relies on high pressure, speed and complicated material flow pathways which produce a product lacking in quality. High pressure works 5 the meat cells, the higher the pressure the more massaging or squeezing of the meat cells takes place. High speed combined with a complicated flow path massages and works the meat product, releasing myosin/actin from the cells causing the muscle fiber to bind together and contract (protein bind). The contraction takes place during high heat application as in cooking. The action of the meat fiber is to contract in length, this 20 contraction combined with protein bind not only shortens the muscle fiber which if not controlled causes odd cook shapes but a rubber like texture with a tough bite.

In muscle, actin is the major component of thin filaments, which together with the motor protein myosin (which forms thick filaments), are arranged into actomyosin myofibrils. These fibrils comprise the mechanism of muscle contraction.

Using the hydrolysis of ATP for energy, myosin heads undergo a cycle during which they attach to thin filaments, exerting a tension, and then depending on the load, perform a power stroke that causes the thin filaments to slide past, shortening the muscle.

Muscle fibril structure is measured from micrometers to several millimeters in length. These fibril structures are bundled together to form muscles. Myofibril proteins are the largest group and probably more is known about these proteins than any other. In muscle cells actin is the scaffold on which myosin proteins generate force to support muscle contraction. Myosin is the major protein that is extracted from the muscle cells by mechanical means.

An important purpose of tumbling and massaging is to solubilize and extract myofibril proteins to produce a protein exudate on the surface of the meat. The exudates bind the formed pieces together upon heating. Binding strength also increases with increased massaging or blending time. This is due to increased exudate formation on the surface of the meat. Crude myosin extraction is increased with increased blending time.

Grinding/chopping utilizes the concept of rupturing the cell to release protein. This mechanical chopping or shearing takes place at the shear/fill plate hole. This process extracts actin and myosin from muscle cells.

Mixing, utilizes friction and kinetic energy to release protein exudate. Fill hole shape and spacing can cause dead spots and turbulence in the meat flow. This change of direction is a form of mixing and massaging. This is another process, which extracts actin and myosin from muscle cells.

Massaging, utilizes friction and kinetic energy to increase protein extraction. This action takes place almost anywhere meat comes in contact with processing equipment and is moved or has a change of direction via pressure. This is also a procedure which involves extracting actin and myosin from muscle cells.

U.S. Patent 4,315,950 relates to a cooking appliance having a plurality of parallel spaced heat transfer fins. An array of projecting cooking fins on which the hamburger patty is impaled are thermally connected to heat transfer fins. The cooking appliance is introduced into a water based liquid heating medium so that heat is transferred through the fins and projecting grills to the heat interior of the hamburger patty. In this way, cooking is accomplished in a relatively short period of time, and the amount of fat or meat juices boiled away is reduced.

U.S. Patent 4,521,435 relates to a hamburger type meat patty and a method for reducing the weight loss of the patty by applying a juice retaining coating to the patty. The coating contains at least 30% by weight dry powdered egg whites.

U.S. Patent Publication No. 20050042321 relates to a molding apparatus for forming food patties having top and bottom surface contours. The device forms a two-dimensional horizontal profile patty that is curved or otherwise irregular to stimulate the shape of a food item, such as a chicken drumstick.

U.S. Patent Publication No. 20050214399 relates to an apparatus for forming food patties having surface indentations. A mold pattern having open areas and solid areas is arranged adjacent a first face of the cavity and indented from a second face. The patent teaches a patty having one or more grooves in a top surface thereof. The patent teaches a patty having one or more non-longitudinal depressions in at least the top surface of the patty.

U.S. Patent Publication No. 20070054005 relates to a molding apparatus for forming food patties having top and bottom surface contours. That teaches a patty having an irregular or curved profile taken through a vertical cross section and a horizontal cross section. The patent teaches a patty having both a top and bottom non flat surface contour.

Reference to any prior art in the specification is not an acknowledgment or suggestion that this prior art forms part of the common general knowledge in any jurisdiction or that this prior art could reasonably be expected to be combined with other pieces of prior art by a skilled person in the art.

0 **Summary of the Invention**

In accordance with a first aspect of the present invention, there is provided a formed meat product comprising: said formed meat product comprising muscle fibers; said fibers being aligned in one direction within said formed meat product; said formed meat product having a controlled length of fiber that is non-random.

5 In accordance with a second aspect of the present invention, there is provided a method of preparing a formed meat product comprising: placing said formed-meat product comprising muscle fibres through a device which generates a venturi effect; aligning said muscle fibers in one direction in said formed-meat product; controlling fiber length of said fibers, which length is non-random.

20 Desirably, the product of the present invention comprises less releasing and mixing of myosin with actin than with current formed food products. It is an object of the present invention for the product to have a controlled orientation of the fiber. It is an object of at least a preferred embodiment of the present invention for the product to have less myosin activity resulting in a better bite/bind and control over the final cook 25 shape.

The formed meat product may be stretched to align the fibers of the product.

It is an object of at least a preferred embodiment of the present invention for the formed food product to cool uniformly.

It is an object of at least a preferred embodiment of the present invention for the formed food product to have a softened texture/bite.

5 It is an object of at least a preferred embodiment of the present invention for the formed food product to have little or no release of actin and myosin.

It is an object of the present invention for the formed food product to have a controlled length of fiber.

0 It is an object of the present invention for the formed food product to have a non-random length of fiber.

There are several factors which relate to a cooked formed food product. The factors are cook shape, color, texture or feel, retention of moisture, bite, protein exude.

With regards to current meat patties and other formed food products, the cook shape has a change in diameter and a fall off. Desirably, the formed food products of 5 the present invention have a consistent cook shape where the patty changes in diameter consistently and there is no fall off of the formed food products. Such that the formed food product holds its shape. In the prior art, the user relied on the grill for the formed food product to hold its shape. With the formed food product of the current invention, the cook shape is held consistently and does not depend on the grill.

20 With regards to the color, the current formed food product has inconsistent color, delamination, voids and cracking due to an inconsistent transfer of temperature. In at least a preferred embodiment of the present invention, the formed food product has a consistent color due to consistent contact with the grill.

With regards to the texture and feel, the current formed food products have a cross grain texture with more interference. The formed food product of at least a preferred embodiment of the present invention has a through grain texture.

With regards to retention of moisture, the current formed food products have an inconsistent moisture retention. The formed food products of at least a preferred embodiment of the present invention have a consistent controllable retention of moisture and retain more moisture than the prior art.

The formed food products have been found to hold in stores for 45 minutes on average, versus the prior formed food products which last on average for only 15 minutes.

With regards to bite/rubberiness, the current products create a rubbery patty product. The formed food products of at least a preferred embodiment of the present invention is a non-rubber product.

With regards to protein exudate, the current formed food products exude protein. The formed food product of at least a preferred embodiment of the present invention is subjected to less mixing and therefore, there is less protein exudate.

The formed food product of the present invention is preferably not subjected to more pressure and so there is less myosin squeezed from the cell membrane.

With regards to a product made from chicken or other formed food product, the current formed food product may provide a less spongy product.

Described herein is an apparatus and method for accelerating formed food product in order to cause the product to be stretched aligning the fibers of the product. A hole or orifice may be provided to change size from a larger to a smaller diameter with vertical or concave sides. The sides may have a sharp edge. The principle has design

similarities to a venturi. It is referred to as a nozzle, venturi, orifice, or a restriction to flow which results in product acceleration with a corresponding pressure drop through the orifice.

The venturi may create a reduction in acceleration with an increase in pressure.

5 By reducing the cross-sectional area of a tube through which a substance passes, the velocity is increased. This is the principle of Conservation of Mass. When the velocity increases the pressure of the material is reduced. This is the principle of the Conservation of Energy.

For every liquid, there is a ratio between the cross-sectional area (C) and the 0 cross-sectional area (c) through which velocity can only be increased by reducing temperature or increasing pressure. Although meat is not a homogeneous liquid, the same concepts still apply. It is impossible to attain a venturi unless there is a transition between the orifices and the small orifice has a finite length. The transition may be a spherical hemisphere or curved structure which has a diameter which is no greater than 5 the choke flow for the liquid gas or solid used and is no less than the diameter of the connected cylindrical portion.

A venturi allows a smooth transition from a larger orifice to a smaller one. This transition minimizes flow transitions and thereby reduces restrictions in the system. The transition minimizes energy loss and supports fiber alignment.

20 The transition in a venturi is extremely difficult to create in a production tooling environment. As a result, using the geometric properties of a sphere or similar shape allows the ability to obtain many of the venturi effect properties using standard production practices.

25 All points on a sphere are the same distance from a fixed point. Contours and plane sections of spheres are circles. Spheres have the same width and girth. Spheres

have maximum volume with minimum surface area. All of the above properties allow formed food product to flow with minimum interruptions. There are not static or dead zones. No matter what angle the cylinder intersects the sphere, the cross section is always a perfect circle.

5 It is described herein to increase formed food product velocity forcing linear fiber alignment.

It is described herein to have spherical geometry or a similar shape in fill or stripper plate to create venturi effects.

0 It is described herein for the process to make a formed food product cool uniformly and soften the texture/bite of the product.

It is described herein for the process to make the formed food product heat uniformly.

Desirably, the formed food product is a meat patty.

5 All of this is accomplished by creating the venturi effect in any of a fill plate, stripper plate, breather plate, orifice plate for a grinding machine, and any combination of same.

Utilizing the properties of a sphere, the air can achieve acceleration by intersecting a cylinder with a sphere of a larger diameter.

20 In a sphere, pressure is equal in all directions. Therefore, when the sphere is intersected by a an opening, i.e., a cylinder, the air will move in a direction coaxial with the cylinder at a high velocity. The impact on the food product particles in the breather system is greater because air moving at a higher velocity will generate more momentum and turbulence.

Desirably, a venturi effect is created in the hole or orifice by creating a sphere to cylinder hole or opening. This creates a venturi effect or a venturi pump. This accelerates the product through the hole. Preferably, this creates a self-cleaning breather plate. The spherical cut creates equal pressure in all directions. It is described herein a spherical hemisphere or curved structure which has a diameter which is no greater than the choke flow for the liquid gas or solid used and is no less than the diameter of the connected cylindrical portion. It is described herein for the spherical hemisphere or curved structure to have a diameter between 1.1 to 2.5 times greater than a cylindrical portion which intersects the same. It is preferred to have a sharper edge from the edge to the hole.

It is described herein to use spherical hemisphere or curved structure which has a diameter which is no greater than the choke flow for the liquid gas or solid used and is no less than the diameter of the connected cylindrical portion to create conditions to formed food product flow which maintain improved cell structure.

It is described herein to use spherical geometry, with cylindrical intersections, and the ratio of the diameter of the sphere divided by the area of the cylinder greater than or equal to approximately 1.1 to 2.5 to create conditions to meat flow which maintain improved cell structure.

Irregular shapes do not have diameters, but they do have areas. For a given ratio of a linear item, the ratio becomes the square of the linear ratio. For curved and irregular shapes, the ratio of the initial area and the reduced area is from approximately 1.2 to 6.25.

In accordance with a third aspect of the present invention, there is provided a method for preparing a cooked meat patty comprising: forming a meat patty comprising muscle fibres, said muscle fibres being aligned in one direction within said patty by use of a venturi or pressure drop; placing said meat patty on a grill; changing shape in a said meat patty diameter

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consistently; having little or no fall off of meat from said meat patty; holding shape during cooking of said meat patty; contacting said meat patty consistently to said grill to cause a consistent color in said meat patty.

**Brief Description of the Drawings**

Figure 1 shows a prior art formed food product or patty.

Figure 2 shows a formed food product or patty of the present invention.

Figure 3 shows a cross-sectional view of an embodiment of the device of the present invention.

Figure 4 shows an enlarged view of Fig. 3.

**Detailed Description**

Figure 1 shows a prior art formed food product or patty 10, having a lighter less cooked area 12 and a darker more cooked area 14. Sides 16 and 18 of the patty 10 have less of a circular figure and less meat.

Figure 2 shows a formed food product or patty 20 having a uniform color top side 22, and even round circular sides 24.

Figure 3 shows a fill plate 160 and a stripper plate 162 having a sphere 164 and a cylinder 166 showing the random fibers 168 when entering the venturi device and the aligned fibers 170, thereafter.

Figure 4 shows an enlarged view of Figure 3.

The present invention relates to a formed food product that comprises less releasing and mixing of myosin with actin then with current formed food products. The formed food product has a controlled orientation of the fiber. The formed food product has less myosin activity resulting in a better bite/bind and control over the final cook shape.

The formed food product is stretched to align the fibers of the product. The formed food product cools uniformly. The formed food product has a softened

texture/bite. The formed food product to has little or no release of actin and myosin.

The formed food product to have a controlled length of fiber. The formed food product has a non-random length of fiber.

There are several factors which relate to a cooked formed food product. The factors are cook shape, color, texture or feel, retention of moisture, bite, protein exude.

The formed food products have a consistent cook shape where the patty changes in diameter consistently and there is no fall off of the formed food products. The formed food product holds it shape. The formed food product cook shape is held consistently and does not depend on the grill. The formed food product has a consistent color due to consistent contact with the grill. The formed food product of the present invention has a through grain texture.

The formed food products have a consistent controllable retention of moisture and retain more moisture than the prior art. The formed food products have been found to hold in stores for 45 minutes on average. The formed food products are a non-rubbery product.

The formed food product is subjected to less mixing and therefore, there is less protein exudate. The formed food product is not subjected to more pressure and so there is less myosin squeezed from the cell membrane. With regards to a product made from chicken or other formed food product, the formed food product provides a less spongy product.

The present invention relates to an apparatus and method for accelerating formed food product in order to cause the product to be stretched aligning the fibers of the product.

The present invention increases formed food product velocity forcing linear fiber alignment. The formed food product cools uniformly and softens the texture/bite of the product. The formed food product heats uniformly.

In an embodiment, the formed food product is meat, or a meat patty.

The meat patty or formed food product diameter changes in shape consistently. Little or no meat or product falls off of the formed food product during grilling. The formed food product or meat patty holds shape during cooking. The formed food product or meat patty contacts the cooking surface consistently to cause a consistent color in the formed food product or meat patty.

The present invention relates to fiber orientation technology. The fiber orientation technology, aligns the fibers of formed food product so that the contraction of the muscle fiber that does take place is in a direction of choice controlling both bite and shrinkage. The fiber orientation technology provides a lower resistance to product flow.

The fiber orientation technology provides a better shear surface for a cleaner cut. The fiber orientation technology aligns the fibers in the fill hole so the shearing action disrupts as few muscle cells as possible. The fiber orientation technology decreases the total area of metal fill plate blocking the formed food product flow resulting in less direction change to the product which works the formed food product. The fiber orientation technology pulls the formed food product through the fill hole instead of pushing using the principles of the venturi.

All of these characteristics of fiber orientation technology reduce the release and mixing of myosin with actin, the net effect is a controlled orientation of the fiber, less myosin activity resulting in a better bite/bind and control over the final cook shape.

A spherical geometry feeding into a circular cross section which creates a product velocity increased while maintaining more consistent pressure on the formed food product. A sphere has the following properties:

- All points on a sphere are the same distance from a fixed point.
- Contours and plane sections of spheres are circles.
- Spheres have the same width and girth.
- Spheres have maximum volume with minimum surface area.
- These properties allow meat to flow with minimum interruptions. There are no static or dead zones.
- No matter what angle the cylinder intersects the sphere; the cross section is always a perfect circle.
- Pressure inside of a sphere is uniform in all directions.

When formed food product is passed through a circular cross section of a sphere, the fact that pressure is uniform in a sphere creates forces which will be coaxial with the sphere. The reduction in area accelerates the meat through the cylindrical section of the fill plate. The acceleration has been shown empirically to align fibers in the primary direct of flow. Hence, there is fiber orientation.

The claims defining the invention are as follows:

1. A formed meat product comprising:

    said formed meat product comprising muscle fibers;  
    said fibers being aligned in one direction within said formed meat product;  
    said formed meat product having a controlled length of fiber that is non-random.

2. The formed meat product of claim 1 wherein said formed meat product comprises aligned fibers of meat such that the contraction of the muscle fiber that does take place during cooking is in a direction of choice controlling both bite and shrinkage.

3. A method of preparing a formed-meat product comprising:

    placing said formed-meat product comprising muscle fibres through a device which generates a venturi effect;  
    aligning said muscle fibers in one direction in said formed-meat product;  
    controlling fiber length of said fibers, which length is non-random.

4. The method of claim 3 wherein there is substantially no release of actin and myosin during formation of said formed meat product.

5. The method of claim 3 wherein manufacturing of said formed meat product does not squeeze said formed meat during formation of said formed meat product.

6. A method for preparing a cooked meat patty comprising:

    forming a meat patty comprising muscle fibres, said muscle fibres being aligned in one direction within said patty by use of a venturi or pressure drop;  
    placing said meat patty on a grill;  
    changing shape in a said meat patty diameter consistently;  
    having little or no fall off of meat from said meat patty;

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holding shape during cooking of said meat patty;  
contacting said meat patty consistently to said grill to cause a consistent color in said meat patty.

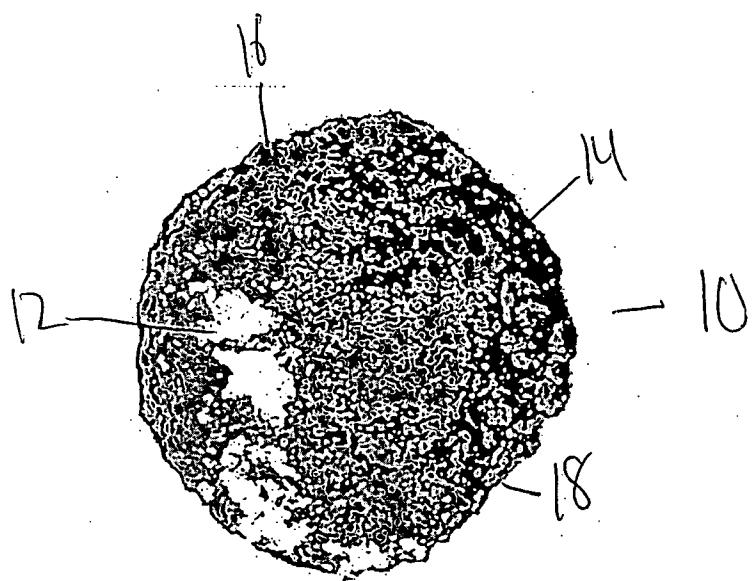


Fig. 1

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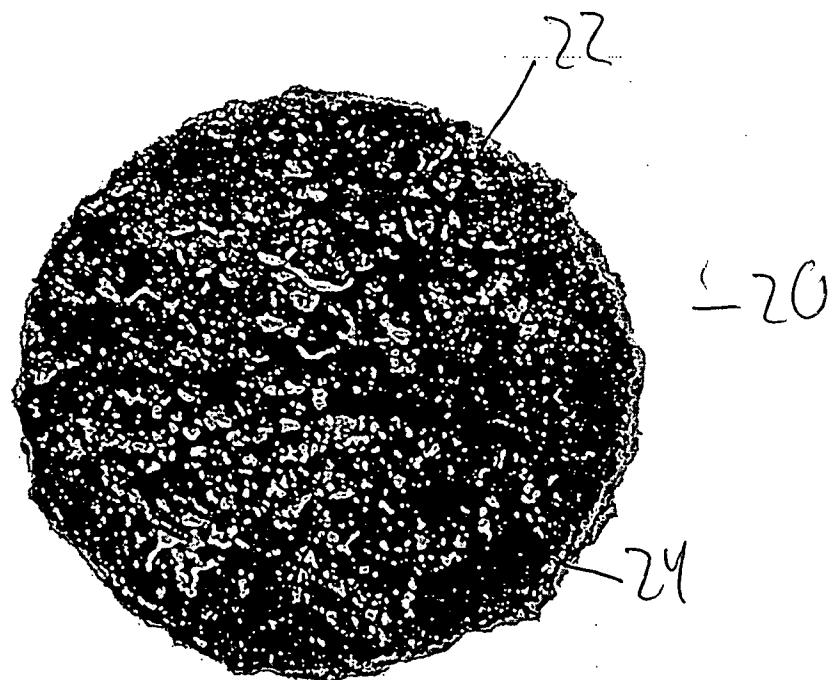


Fig. 2

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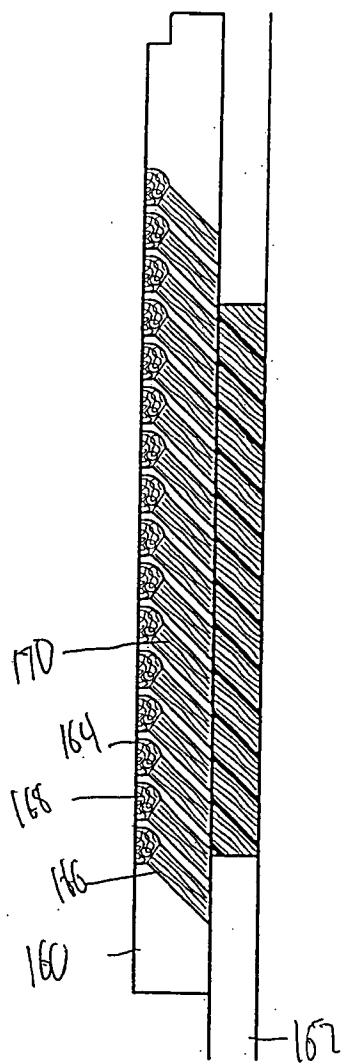


Fig. 3

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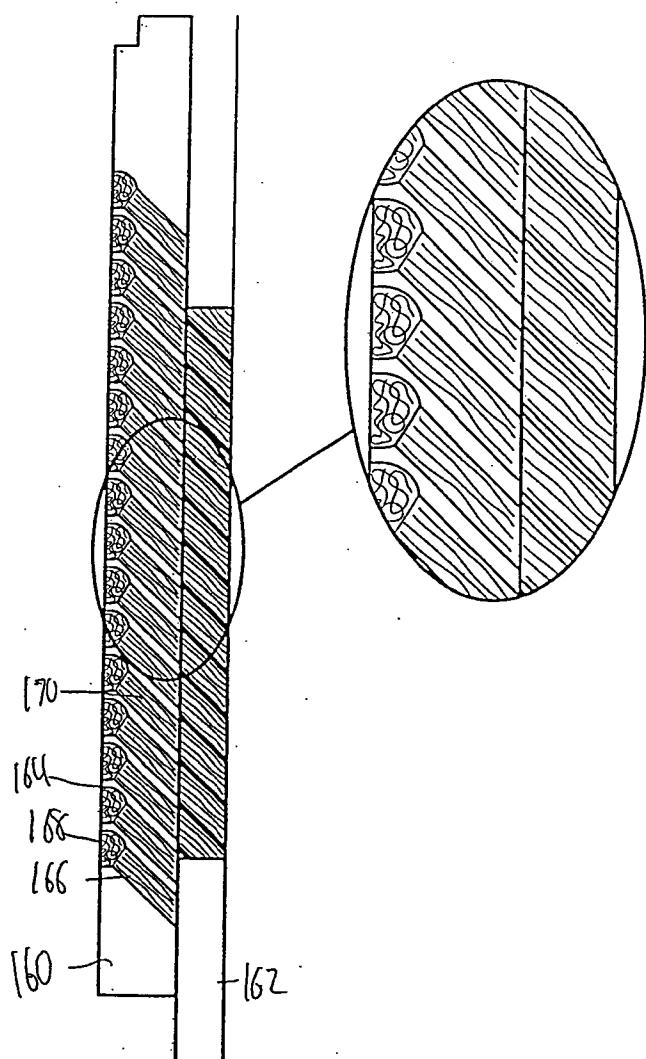


Fig. 4