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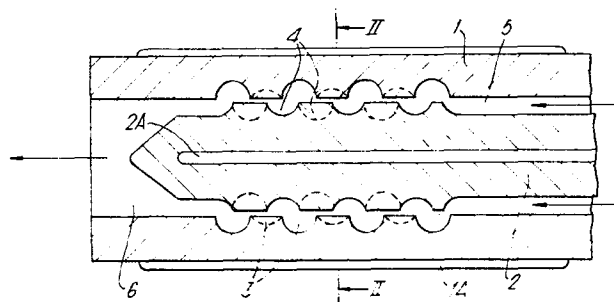
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Detergent bar processing.

A soap-containing material is aerated by passing the material admixed with a gas through a cavity transfer mixer. This device has two mutually displaceable surfaces between which the material moves while subjected to working.



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TITLE : DETERGENT BAR PROCESSING

Field of the Invention

This invention relates to the processing of soap feedstocks to provide a bar containing entrained gasses.

5 These bars are usually referred to as aerated bars.

Background to the Invention

The presence of entrained gas in a detergent bar
10 reduces the bulk density of a product and thus allows it to float in the washing solution if sufficient gas is incorporated. The gas, which is usually air but may be nitrogen, carbon dioxide or other gas amenable to dispersal throughout the detergent, is introduced into the material
15 in finely dispersed form to provide a product which appears to have uniform structure when viewed by the user.

General description

20 The present invention uses a device of the cavity transfer mixer class to introduce gas into the detergent material. These devices comprise two closely spaced mutually displaceable surfaces each having a pattern of cavities which overlap during movement of surfaces so that
25 material moved between the surfaces traces a path through cavities alternately in each surface so that the bulk of the material passes through the shear zone in the material generated by displacement of the surfaces.

Cavity transfer mixers are normally prepared with a cylindrical geometry and in the preferred devices for this process the cavities are arranged to give constantly available but changing path ways through the device during mutual movement of the two surfaces. The devices having a cylindrical geometry will comprise a stator within which is journaled a rotor; the opposing faces of the stator and rotor carry the cavities through which the material passes during its passage through the device.

The device may also have a planar geometry in which opposed plane surfaces having patterns of cavities would be moved mutually, for example by rotation of one plane, so that material introduced between the surfaces at the point of rotation would move outwards and travel alternately between cavities on each surface.

Another form of cylindrical geometry maintains the inner cylinder stationary while rotating the outer cylinder. The central stator is more easily cooled, or heated if required, because the fluid connections can be made in a simple manner; the external rotor can also be cooled or heated in a simple manner. It is also mechanically simpler to apply rotational energy to the external body rather than the internal cylinder. Thus this configuration has advantages in construction and use.

Material is forced through the mixer using auxiliary equipment as the rotor is turned. Examples of the auxiliary equipment are screw extruders and piston rams. The auxiliary equipment is preferably operated separately from the mixer so that the throughput and work performed on it can be separately varied. The separate operation may be achieved by arranging the auxiliary equipment to provide material for processing at an angle to the centre line of the shear-producing device. This

arrangement allows rotational energy to be supplied to the device producing shear around its centre line. An in-line arrangement is more easily achieved when the external member of the device is the rotor. Separate operation of
5 the device and auxiliary equipment assists in providing control of the processing.

In general a variety of cavity shapes can be used, for example Metal Box (UK 930 339) disclose longitudinal
10 slots in the two surfaces. The stator and rotor may carry slots, for example six to twelve, spaced around their periphery and extending along their whole length.

Preferably one or both surfaces are subjected to
15 thermal control. The process allows efficient heating/cooling of the materials to be achieved.

The detergent feedstock may contain non-soap detergents. Examples of these actives are alkane
20 sulphonates, alcohol sulphates, alkyl benzene sulphonates, alkyl sulphates, acyl isethionates, olefin sulphonates and ethoxylated alcohols. These non soap detergents may be the major proportion or, in some formulations, the whole of the detergent content.

25

The processed feedstock was made into bar form using standard stamping machinery. Other product forms, eg extruded particles (noodles) and beads can be prepared from the feedstock. The process of the invention provides
30 efficient dispersal of the gas throughout the detergent. The gas may be introduced as a component or may be formed in situ by a chemical reaction controlled by injection of a reactant. The incorporation of the gas will usually be dependant on the temperature and composition of the
35 detergent.

The gas may be incorporated in the auxilliary equipment or the cavity transfer mixer.

5 Examples of points at which gas can be incorporated are the input hopper of the auxilliary equipment, injection points in a screw plodder and by direct injection into a cavity, or cavities, in the cavity transfer mixer.

Drawings:

10

The invention will be described with reference to the accompanying diagrammatic drawings in which:

15 Figure 1 is a longitudinal section of a cavity transfer mixer with cylindrical geometry;

Figure 2 is a transverse section along the line II-II on Figure 1;

20 Figure 3 illustrates the pattern of cavities in the device of Figure 1;

Figures 4, 5 and 7 illustrate other patterns of cavities;

25

Figure 6 is a transverse section through a mixer having grooves in the opposed surfaces of the device;

30

Figure 8 is a longitudinal section of a cavity transfer mixer in which the external cylinder forms the rotor;

Specific description of devices

Embodiments of the devices will now be described.

5 A cavity transfer mixer is shown in Figure 1 in longitudinal section. This comprises a hollow cylindrical stator member 1, a cylindrical rotor member 2 journaled for rotation within the stator with a sliding fit, the facing cylindrical surfaces of the rotor and stator
10 carrying respective pluralities of parallel, circumferentially extending rows of cavities which are disposed with:

- 15 a) the cavities in adjacent rows on the stator circumferentially offset;
- b) the cavities in adjacent rows on the rotor circumferentially offset; and
- 20 c) the rows of cavities on the stator and rotor axially offset.

 The pattern of cavities carried on the stator 3 and rotor 4 are illustrated on Figure 3. The cavities 3 on the
25 stator are shown hatched. The overlap between patterns of cavities 3, 4 is also shown in Figure 2. A liquid jacket 1A is provided for the application of temperature control by the passage of heating or cooling water. A temperature control conduit 2A is provided in the rotor.

30 The material passing through the device moves through the cavities alternately on the opposing faces of the stator and rotor. The cavities immediately behind those shown in section are indicated by dotted profiles on
35 Figure 1 to allow the repeating pattern to be seen.

The material flow is divided between pairs of adjacent cavities on the same rotor or stator face because of the overlapping position of the cavity on the opposite stator or rotor face.

5

The whole or bulk of the material flow is subjected to considerable working during its passage through the shear zone generated by the mutual displacement of the stator and rotor surfaces. The material is entrained for a short period in each cavity during passage and thus one of its velocity components is altered.

The mixer had a rotor radius of 2.54 cm with 36 hemispherical cavities (radius 0.9 cm) arranged in six rows of six cavities. The internal surface of the stator carried seven rows of six cavities to provide cavity overlap at the entry and exit. The material to be worked was injected into the device through channel 5, which communicates with the annular space between the rotor and stator, during operation by a screw extruder. The material left the device through nozzle 6.

Figure 4 shows elongate cavities arranged in a square pattern; these cavities have the sectional profile of Figure 2. These cavities are aligned with their longitudinal axis parallel to the longitudinal axis of the device and the direction of movement of material through the device; the latter is indicated by the arrow.

Figure 5 shows a pattern of cavities having the dimensions and profile of those shown in Figures 1, 2 and 3. The cavities of Figure 5 are arranged in a square pattern with each cavity being closely spaced from flow adjacent cavities on the same surface. This pattern does not provide as high a degree of overlap as given by the pattern of Figure 3. The latter has each cavity closely

spaced to six cavities on the same surface, ie a hexagonal pattern.

Figure 6 is a section of a cavity transfer mixer
5 having a rotor 7 rotatably positioned within the hollow stator 8 having an effective length of 10.7 cm and a diameter of 2.54 cm. The rotor carried five parallel grooves 9 of semi-circular cross section (diameter 5 mm) equally spaced around the periphery and extending parallel
10 to the longitudinal axis along the length of the rotor. The inner cylindrical surface of the stator 8 carried eight grooves 10 of similar dimensions extending along its length and parallel to the longitudinal axis. This embodiment, utilised cavities extending along the length of the stator
15 and rotor without interruption. Temperature control jacket and conduit were present.

Figure 7 shows a pattern of cavities wherein the cavities on the rotor, shown hatched, and stator have a
20 larger dimension normal to the material flow; the latter is indicated by an arrow. The cavities are thus elongate. This embodiment provides a lower pressure drop over its length compared with devices of similar geometry but not having cavities positioned with a longer dimension normal,
25 i.e. perpendicular to the material flow. To obtain a reduction in pressure drop at least one of the surfaces must carry elongate cavities having their longer dimension normal to the material flow.

30 The cavity transfer mixer of Figure 8 had the external cylinder 11 journaled for rotation about central shaft 12. Temperature control jacket 13 and conduit were present but the latter is now shown because the cavities on the central shaft are shown in plan view while the rotor is
35 sectioned. The central stator (diameter 52 mm) had three rows 14 of three cavities with partial, i.e. half cavities

at the entry and exit points. On the rotor there were four rows 15 of three cavities. The cavities on the stator and rotor were elongate with a total arc dimension of 5.1 cm normal to the material flow with hemispherical section ends 5 of 1.2 cm radius joined by a semicircular sectioned panel of the same radius. The cavities were arranged in the pattern of Figure 7, i.e. with their long dimension normal to material flow. The rotor was driven by a chain drive to external toothed wheel 16.

10

Example

A cavity transfer mixer illustrated in Figure 1 was used.

15

The mixer had a rotor radius of 2.54cm with 36 hemispherical cavities (radius 0.9cm) arranged in six rows of six cavities. The internal surface of the stator carried seven rows of six cavities to provide cavity 20 overlap at the entry and exit.

A soap feedstock derived from tallow (60%) and coconut oil (40%) in which 7.5% was present as free fatty acids; was vacuum dried to 10% moisture and 0.6% 25 electrolyte. The dried material in chip form was extruded through a standard soap plodder which did not apply a vacuum to the feed chamber. Air was thereby incorporated in the material as coarse bubbles. The material then passed into the cavity transfer mixer as the rotor was 30 rotated at 120 rotations per minute. The soap temperature at the mixer inlet was 38°C and it left the mixer at 55°C; the throughput was 500g min⁻¹. Water cooling was applied to the rotor and starter.

35 The extruded billet presented an even appearance and had a reduced density.

* * * * *

What we claim is:

1. The process of aerating soap-containing detergent
5 material in which soap-containing material in admixture
with gas is subjected to working by passing the material
between two closely spaced mutually displaceable surfaces
each having a pattern of cavities which overlap during
movement of the surfaces so that the material moved between
10 the surfaces traces a path through cavities alternately in
each surface, whereby the bulk of the material passes
through the shear zone in the material generated by
displacement of the surfaces.
- 15 2. A process according to Claim 1 wherein the two surfaces
have cylindrical geometry.
3. A process according to Claim 1 or 2 wherein thermal
control is applied to at least one surface.
- 20 4. A process according to any preceding claim wherein the
cavities in at least one surface are elongate with their
long dimension normal to the flow of material.

Fig. 1.

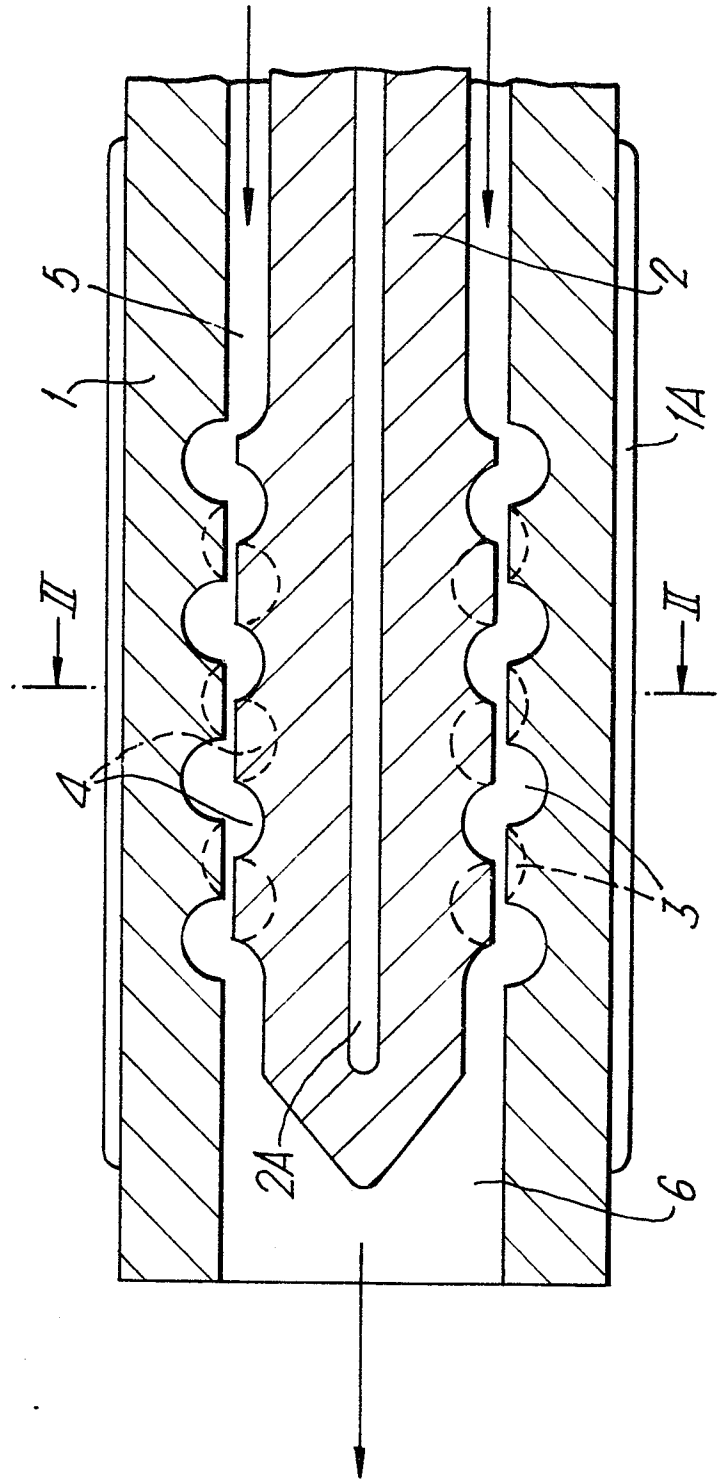


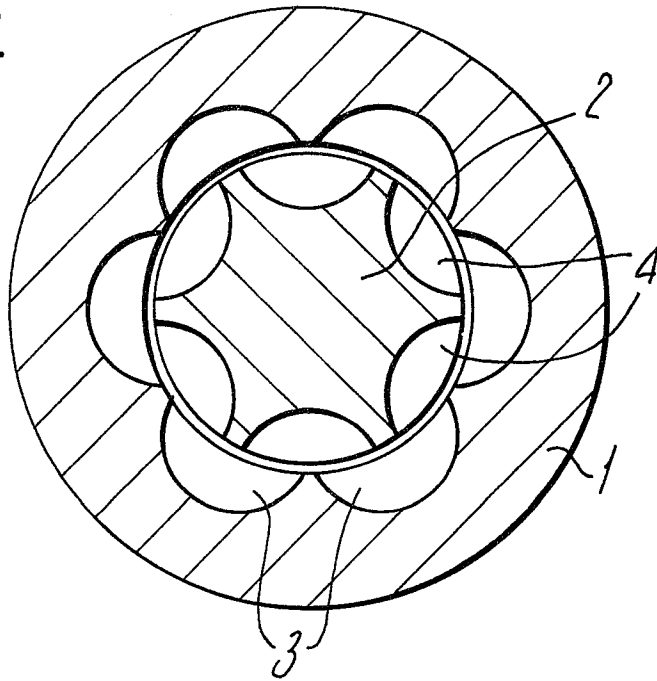
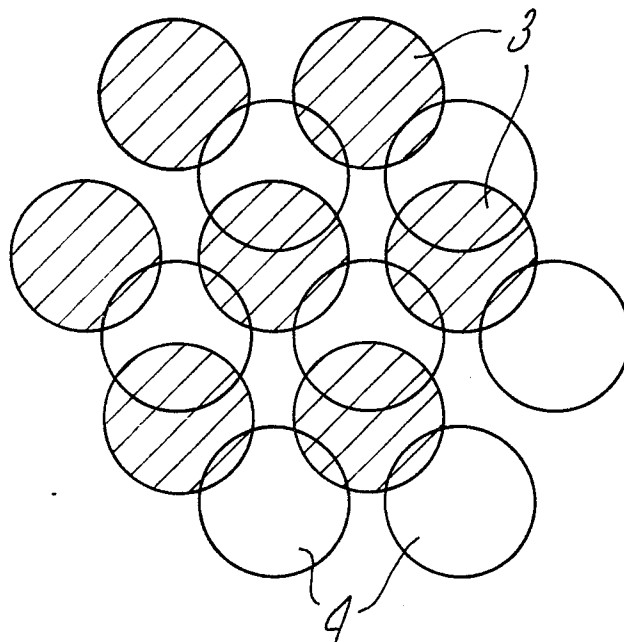
Fig.2.*Fig.3.*

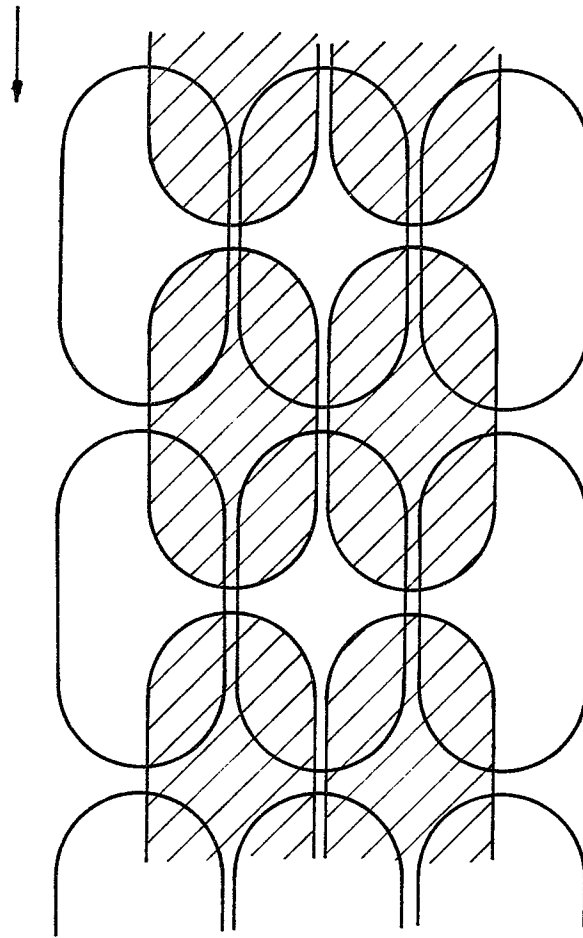
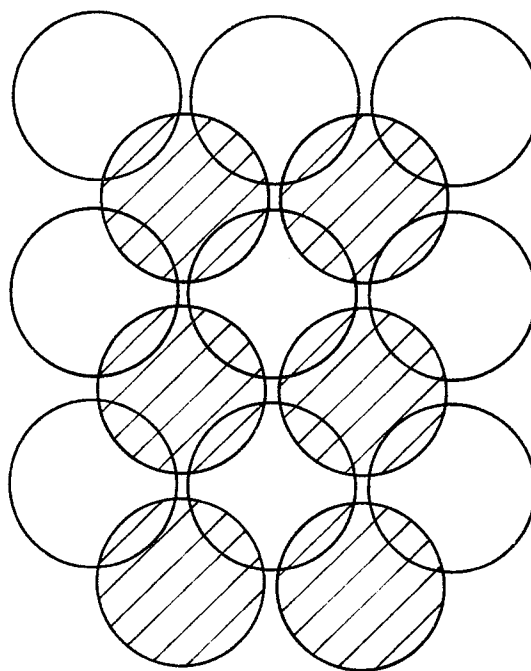
Fig. 4.*Fig. 5.*

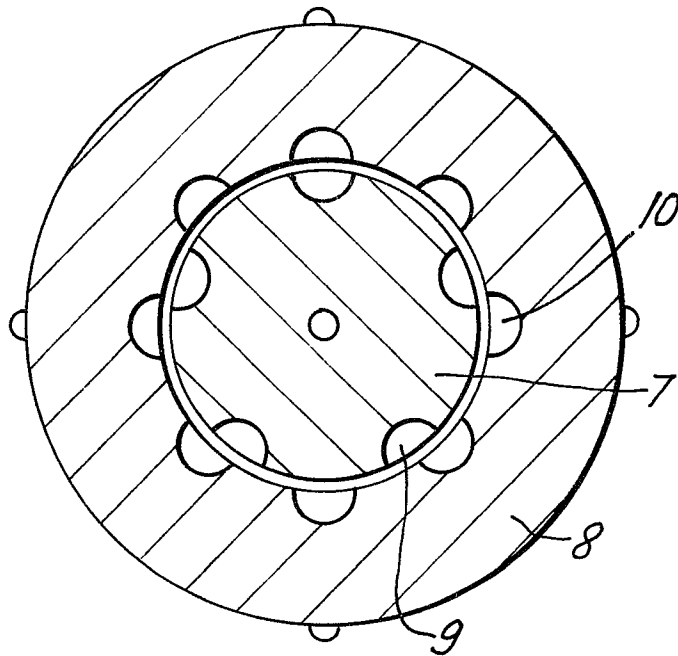
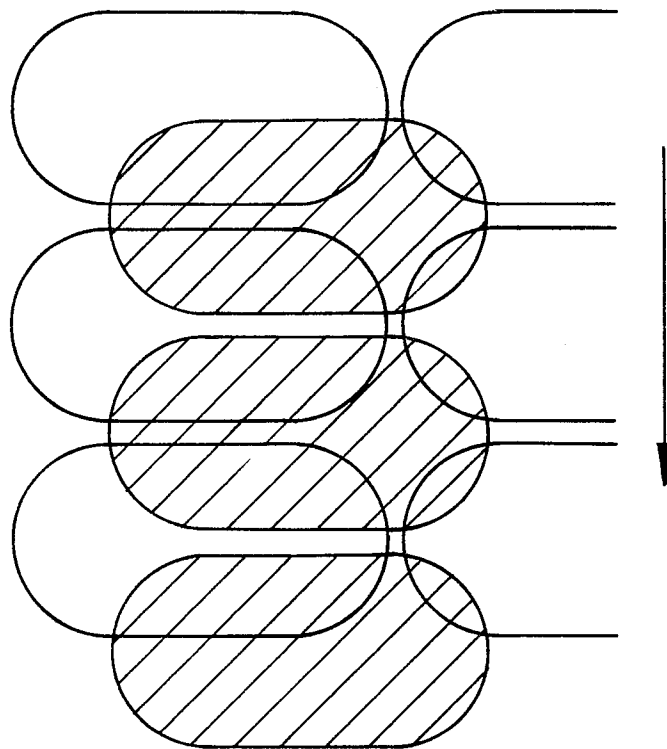
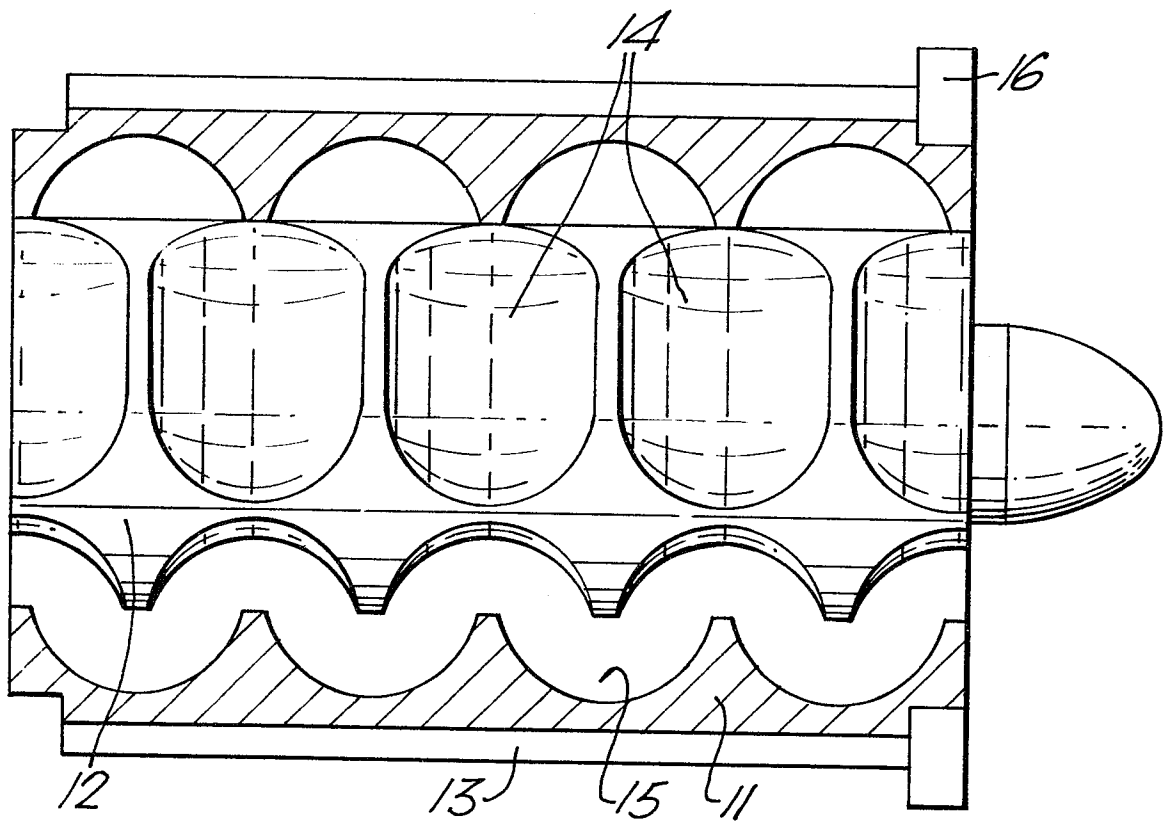
Fig.6.*Fig.7.*

Fig. 8.



DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
D, A	GB-A- 930 339 (METAL BOX CO.) * Claims 1-4; figure 3 *		C 11 D 13/10
A	--- GB-A-2 034 742 (F.J. ZUCKER) * Claim 1 *		
A	--- US-A-3 779 521 (H. GODINES) * Figures 1, 2; claim 1 *		
A	--- DE-C-1 090 183 (DRAISWERKE GMBH) * Figure 4 *		

The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 15-06-1983	Examiner SCHULTZE D
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	