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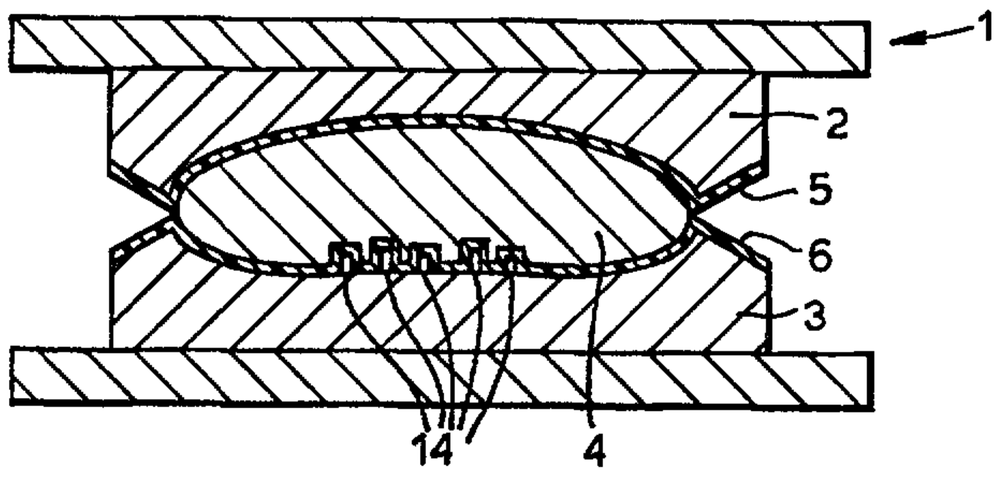
(54) **PROCEDE D'ESTAMPAGE DE PAINS DETERGENTS**
(54) **PROCESS FOR STAMPING DETERGENT BARS**



(57) L'invention se rapporte à un dispositif d'estampage d'un pain détergent, c.-à-d. d'un pain comprenant du savon, un détergent synthétique actif ou un mélange de ceux-ci, ce dispositif comportant une matrice. La matrice comporte au moins une surface d'estampage pourvue d'au moins un revêtement élastomère (5, 6) dont l'épaisseur est inférieure à 200 microns.

(57) A device for stamping a detergent bar, i.e. a bar comprising soap, a synthetic detergent active or a mixture thereof, includes a die. The die has at least one bar stamping surface provided with at least one elastomeric coating (5, 6) having a thickness of less than 200 microns.

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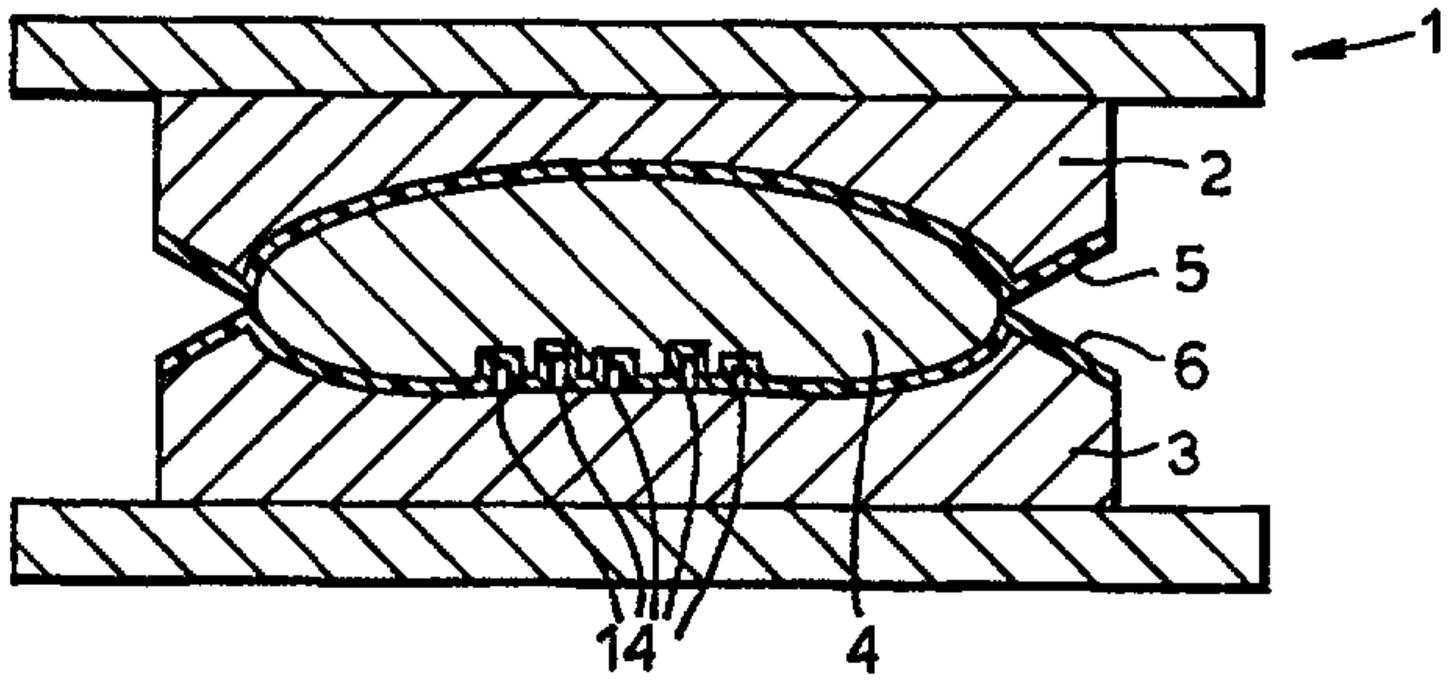
(54) Title: PROCESS FOR STAMPING DETERGENT BARS

(57) Abstract

A device for stamping a detergent bar, i.e. a bar comprising soap, a synthetic detergent active or a mixture thereof, includes a die. The die has at least one bar stamping surface provided with at least one elastomeric coating (5, 6) having a thickness of less than 200 microns.



PROCESS FOR STAMPING DETERGENT BARS

The present invention relates to a device, process and apparatus for stamping a plastic material using a die to form a shaped article. In particular, it relates to process for stamping a detergent bar.

By "detergent bar" is meant a tablet, cake or bar in which the level of surface active agent, which comprises soap, synthetic detergent active or a mixture thereof, is at least 20wt% based on the bar.

In the manufacture of detergent bars, preformed composition comprising all components of the bar is typically extruded from a nozzle to form a continuous "rod" which is cut into smaller pieces of predetermined length, commonly referred to as "billets". These "billets" are then fed to a stamper or, alternatively, are given an imprint on one or more surfaces using, for example, a die of the same dimensions as the bar surface which is hit with force such as with a mallet or a die in the shape of a roller.

Stampers typically have a die formed in two halves each with a surface which contacts the billet during the stamping operation. These surfaces are adapted to close to a preset separation distance, thereby compressing the billet between the die halves to give the bar its final shape and appearance, and then separate. Excess composition is squeezed out from the die halves as they close. This is commonly referred to as "flash". The flash is then separated from the soap bar by transferring the bar through holes in a "deflashing plate".

Conventional die stamping machines include "pin die" shape machines in which a pair of opposing die members or die

halves meet during a compaction step and a "box die" machine in which a pair of opposing die members stamp a bar held within a through-opening in a box frame but do not meet during compaction, the peripheral face of the bar being restrained by the box frame.

The die halves are often each provided with a die or ejector insert. These are normally held closed within the die halve by springs but can be pushed open by compressed air or mechanical means to assist in the release of the bar from the die. During closing of the die halves vacuum can be applied to remove air trapped in the die cavity between the detergent bar and die surface and, in the case of rotary dies, this vacuum assists in retaining the bars in place during rotation.

Stamping of detergent bars using a die is carried out to give the bars a reproducible shape, smooth surface and/or to imprint a design such as a logo, trade mark or similar onto at least part of a surface of the bar.

However, as a result of die-blocking, i.e. amounts of residual detergent left on die halves which builds up during continued use of the dies, bars are often formed with visible imperfections on their surfaces or they may not release from the die surface.

Numerous solutions to these problems have been proposed. One solution involves chilling the die halves during the stamping operation.

Another solution is described in GB-A-746 769 which discloses a die set which includes a die box and a pair of companion die members made of plastic materials comprising polymers with a specified modulus of elasticity. A disadvantage with

this system is that die release agent is necessary to prevent detergent from adhering to and building up on the dies and marring the surfaces of subsequently pressed bars.

JP-A-56124237 and JP-A-06064054 disclose a use of an elastomeric film on mating mould surfaces to absorb irregularities in contact or in finish of the mould surfaces to give a clean finish to the moulded product. It is not, however, suggested that such elastomeric surfaces will assist in de-moulding in the production of detergent bars. The film may be very thin (JP-A-56124237 discloses a film thickness of 5-10 µm).

Another solution is proposed in EP 276 971 which involves the use of two die members, each comprising a non-elastomeric and an elastomeric part. The elastomeric part, which contacts the soap bar during the stamping process, comprises an elastomer coating of at least 200 µm and having a modulus of elasticity within a specified range.

A disadvantage of thick coatings, such as those above 200 µm, is that typically they need to be applied via a casting or moulding process performed on the die. As an alternative, separate parts are moulded which are then attached to the die. The moulding process involves manufacturing dies in which the cavities cut into the die are deeper than the final intended depth of the bar. Furthermore, a separate coating jig often needs to be employed to coat the ejectors.

During curing of the coating shrinkage often occurs and, although the volume may be insignificant, the shape change may result in gaps between the die and the ejector insert.

Thus, the manufacture of thick coated dies is a complex and expensive process. Furthermore, although it is possible to recoat the dies, there are many difficulties associated with the process, namely specialist equipment is required for compounding and mixing the coating, air can become entrapped within the elastomer during the recoating process and it is necessary to bleed out excess elastomer. In view of these difficulties, in many cases it is necessary to use expensive specialist equipment generally only available at a location remote from the detergent bar manufacturing facility.

In US Patent 5 269 997 it is proposed to provide each of two dies of a soap mould with elastomeric septum stretched across their surface. Such a system would be complex to use at the speed required for commercial manufacture and a thin covering would be prone to tearing and logo reproduction would be expected to be poor.

We have now found an alternative device that can be used to produce bars such that surface decoration can be achieved in an easy reproducible manner.

Hereinafter "surface decoration" is meant a uniform shape, smooth surface, a design such as a logo, trade mark or similar.

Thus, according to the invention there is provided a device for stamping a detergent bar comprising a die, the die having at least one bar stamping surface wherein the bar stamping surface is provided with an elastomeric coating, the total thickness of the elastomeric coating being less than 200 µm.

In a preferred embodiment, the elastomeric coating is the sole elastomeric material of the bar stamping surface.

By "elastomeric" according to the invention is meant a material as defined in ISO (International Standard Organisation) 1382 as an "elastomer", or a "rubber". Also included in the definition of "elastomeric" materials according to the invention are thermoplastic elastomers and copolymers and blends of elastomers, thermoplastic elastomers and rubbers.

Elastomers are defined as polymers with long flexible chains, independent in the raw material and transformed via vulcanising or crosslinking agents which introduce crosslinks and form a crosslinked network structure. The network

and form a crosslinked network structure. The network structure retains the movement of the macro-molecular chain molecules and as a result returns rapidly to approximately its initial dimension and shape after deformation by a force and release of the force.

With increasing temperature an elastomer goes through a rubbery phase after softening and retains its elasticity and elastic modulus until its decomposition temperature is reached.

Thermoplastic elastomers consist of amorphous and crystalline phases. The amorphous phase has a softening range below ambient temperature and thus acts as an elastic spring whilst the crystalline segments whose softening range is above ambient temperature, act as crosslinking sites

Preferably the elastomeric material according to the invention is selected from those classes described in American Society for Testing and Materials D1418 which include :-

1. Unsaturated carbon chain elastomers (R Class) including natural rubbers e.g. Standard Malaysian Rubber; butadiene e.g. "BUNA™" type ex Bunawerke Huls; and butadiene acrylonitrile copolymer e.g. "Perbunan™" ex Bayer.

2. Saturated carbon chain elastomers (M Class) including ethylene-propylene types e.g. "Nordel™" ex DuPont and fluorine containing types e.g. "Viton™" ex DuPont.

3. Substituted silicone elastomers (Q Class) including liquid silicone rubbers e.g. Silastic™ 9050/50 P (A + B) ex Dow Corning.

4. Elastomers containing carbon, nitrogen and oxygen in the polymer chain (U Class) including polyurethanes e.g. polyurethanes ex Belzona™.

Suitable elastomeric coatings can be obtained from materials such as liquid silicone rubbers such as Silastic 9050/50 P A+B (ex Dow Corning) which after curing has a modulus of elasticity about 2-3 MPa; and polyurethanes, for example Belzona PU2221, as hereinafter defined, which after curing has a modulus of elasticity of about 9MPa, and Belzona 2131 (MP Fluid Elastomer), a 2 part product based on a diphenylmethane 4,4'-diisocyanate (MDI) system with a phenylmercuric neodecanoate catalyst.

The "elastomeric" material, as hereinbefore defined, may be pretreated, such as by forming a solution of a commercially available elastomer, prior to it being applied as a coating on the die surface. The elastomers, rubbers, and copolymers and blends thereof are generally cured or crosslinked, in-situ on the die surface. For example, the components including the base elastomeric material, cross-linking agents and other materials such as accelerators may be mixed prior to application as a coating. Once applied to the die the coatings are cured in-situ. This maybe aided by the application of heat or other accelerating processes, for example pressure; radiation or UV light.

In some cases, materials may be dissolved with an appropriate solvent, applied to the die and the solvent subsequently driven off.

In the case of themoplastic materials, they can be heated to melt condition applied to the die, cooled and resolidified.

Materials suitable as elastomeric coatings in the present invention will preferably have a modulus of elasticity, in the range 0.1 to 50 MPa, most preferably 1 to 35 MPa.

The modulus of elasticity of an elastomeric coating may be measured by recording the force required to indent the coating as a function of the indentation depth. Typically an indentor with a spherical tip may be employed and the slope, s, of the force as a function of the indentation depth to the power 3/2 is determined. The indentation depth is the movement of an indentor into the coating after it first contacts the surface of the coating. In general, it is necessary to correct the measured indentation depth for the compliance of the measurement apparatus. That is, the actual indentation depth, d, is related to the measured apparent value d' by the following expression

$$d = d' - (F.C)$$

where F is the indentation force. The compliance C is determined by compressing the indentor against a rigid surface and recording the apparent displacement as a function of the applied force which has a slope equal to C. The modulus of elasticity E is calculated from the following expression

$$E = \frac{3}{4} s. \frac{1}{\sqrt{R}} . (1 - b^2)$$

where $s = F / d^{3/2}$, R is the radius of the spherical tip of the indenter and b is the Poisson's ratio of the coating which is equal to about 0.5 for elastomers.

Under certain conditions to be described hereafter, the above indentation method may give falsely large values of the elastic modulus due to the influence of the rigid material onto which the coating is applied. In order to safely avoid this problem it is necessary to ensure that the contact radius of the indentor with the coating does not exceed about 1/10 of the thickness of the coating. The contact radius, a, is related to the indentation depth by the following expression

$$a = \sqrt{dR}$$

For coatings less than 200 µm, it is recommended that a nano-indenter is used which is capable of measuring indentation forces at small indentation depths using indentors with tips having a small radius. An example of such equipment is the "NanoIndenter II" (Nano-instruments). The alternative is to make thick (greater than 200 µm) test coatings so that more conventional measurement equipment such as an Instron tester, (eg Model 5566) may be employed.

An advantage of the device according to the invention is that the elastomeric coating being thin can easily be applied in a factory to a conventional die with a built in logo. For example it can be applied using a brush or spraying techniques such as air assisted, airless or electrostatic spraying. A combination of techniques may also be used, if necessary. This may be so where it is necessary to apply coatings of different thicknesses on different parts of the die. For example, if a particular thickness is required in a finely detailed region on the die, for example the logo, a spray technique can be used with the logo ejector removed from the main body of the die.

The coating can be cured on the die at ambient temperature or elevated temperatures depending on the type of elastomeric material. Higher temperatures can be employed to drive off solvent in solvent borne elastomers. Other methods such as ultra violet light curing can be employed to hasten the curing process.

A further advantage of the invention is that the elastomeric coating can be applied to conventional dies. Consequently, new dies need not be manufactured as is generally the case when thick coatings are used. Typically with thick coatings when the elastomeric part becomes worn or damaged through use resulting in, for example, marking of the stamped detergent bar the coating has to be removed; the die cleaned and the new coating prepared and remoulded to the die surface using specialist equipment. By contrast, the device of the present invention can easily be recoated on site simply by removing, for example, by mechanical means the old coating with the aid of an appropriate chemical treatment (e.g. using a solution of potassium hydroxide in a mixture of ethanol and toluene in the case of silicone coatings and ethanol and/or methanol in the case of polyurethane coatings), treating the die surface and replacing the old coating with new material. This results in considerable savings both in terms of the loss of production time and the cost of recoating.

Preferably the die comprises a rigid material selected from metals and their alloys, for example brass and other copper alloys and steels including carbon and stainless steel; and other non-elastomeric materials such as thermosetting and thermoplastic resins, for example polyester, epoxy resins, furan resins; hard cast polyurethanes; ceramics; composites and laminates.

Additional materials, for example fillers, can be added to the elastomeric material to modify its mechanical and processing properties. The effects of filler addition depends on the mechanical and chemical interaction between the elastomeric material and the filler.

Fillers can be used to modify the elastomeric material such that desirable properties, for example tear resistance, is achieved. Suitable fillers include carbon blacks; silicas; silicates; and organic fillers such as styrene or phenolic resins

Other optional additives include friction modifiers and antioxidants.

Preferably, the elastomeric coating has a thickness within the range 1 to less than 200 μm, preferably at least 10 to 150 μm, most preferably at 15 to 100 μm. At thicknesses below 1 μm uniform coverage of the elastomeric coating on the die surface may not be obtained. At thicknesses above 200 μm it may be difficult to apply the elastomeric coating by simple application techniques such as application by a brush and the resulting logo reproduction may be less distinct.

An advantage of the present invention is that the thickness and hardness of the elastomeric coating can be varied according to the detergent bar composition, processing temperature and/or process parameters such as the shape of the cavity in the die halves, speed of the stamping equipment and separation distance of the die halves, in order to achieve the desired result, for example, good release of the detergent bar from the die. It has been found that for a particular bar composition in combination with a simple logo free die, elastomeric coatings at the lower end of the

thickness range as defined and the upper end of modulus range can achieve acceptable die release. However, for the same composition with a complex logo bearing die or a complex die shape acceptable die release is achieved with a coating closer to the upper end of the thickness range and with a lower modulus. Similarily, for a bar composition which is inherently more difficult to stamp acceptable die release may be achieved with an elastomeric coating closer to the upper end of the thickness range and a lower modulus of elasticity. Therefore, the invention allows for coatings of varying thicknesses and moduli within the defined range whilst maintaining the advantages of using thin coatings in the manufacture of detergent bars.

The device according to the invention can be used to stamp a detergent bar comprising a surface active agent which comprises substantially soap or a synthetic detergent or a mixture of soap and synthetic detergent. It finds particular application in the stamping of soft and/or tacky detergent bars which contain synthetic surfactants, translucent and transparent soap bars having a reduced fatty matter content, for example, in the range 63-78%wt with respect to the total bar weight and those bars containing skin beneficial agents such as humectants, polyols, oils, fatty acids and fatty alcohols.

According to a further aspect of the invention there is provided a process for stamping a detergent bar comprising

i) forming an elastomeric coating of less than 200 μm on at least one bar stamping surface of a die;

ii) feeding a detergent bar composition to the die of step i;

iii) stamping the composition in the die to form a stamped bar; and

iv) releasing the bar from the die such that a surface decoration is applied to the bar in an easily reproducible manner.

Preferably, the elastomeric coating is bonded to the die stamping surface by mechanical and/or chemical means to increase the adhesion between the die and the coating.

The die surface may be subjected to a number of pre-treatments prior to coating with the elastomeric material, to improve the bond strength between the die surface and the coating. These pre-treatments aim to remove weak boundary layers for example weak oxides on metals; optimise the degree of contact between surface and coating and/or alter the surface topography such that the bondable surface area is increased, and to protect the die surface before bonding. Suitable techniques can be divided into three main groups:-

1. Mechanical Abrasion - techniques include wire brushing abrasion paper, blasting techniques such as water, grit, sand and glass bead blasting, polishing such as diamond polishing and spark erosion.

2. Chemical Treatment - including solvent cleaning, acidic treatment, surface etching for example using acid, anodising, application of a primer or application of an adhesive bonding chemical for example a silane or silicone, or combinations thereof.

3. Energetic Surface Pretreatment: More widely used with non-metallic systems, techniques include corona discharge, plasma, and laser techniques.

In addition to being applied to the bar stamping surface of the die, the elastomeric coating may advantageously be applied to other parts of the stamping device and other machinery in the soap processing line. For example, it may be applied to the "deflashing plate", which separates the stamped bar from the excess extruded bar composition, the backing plate on which the die is mounted as well the non-stamping surfaces of the die.

The invention is further illustrated with reference to the accompanying figures and the following non-limiting examples.

Figure 1 is a cross-sectional view of a die with a detergent bar.

Figure 2 is a cross-sectional view of the die in closed position with the detergent bar stamped between the die halves.

Figure 3 is a cross-sectional view of the die in its open position after the stamping operation.

Figure 4 is a top elevation of the carbon steel die half used in the following examples.

Figure 5 shows the logo borne by the die halves used in the following examples.

Figure 6 is a cross section through the centre of a detergent bar stamped with the die of figure 4 bearing the logo shown in figure 5.

Referring to the figures in detail. Figure 1 shows a die 1 comprising two die halves. Each die halve comprises a rigid member 2, 3. Each die half is provided, on the bar stamping

surface 9, 12, with an elastomeric coating 5,6 respectively. Elastomeric coating is also provided on the surfaces 8, 10, 11 and 13 of the die halves. One die half is provided with a logo 14 on the bar stamping surface of the rigid member 3. (In some cases both die halves will incorporate a logo). This is also coated with elastomeric coating 6.

Figure 2 shows the die in the closed position where the logo has been stamped onto the detergent bar 4.

Figure 3 shows the die in the open position after the stamping has been completed. The billet is easily released from the die half 2 because of the elastomer coating 5. Removal of the billet from the second die half 3 is also easy because of the coating 6.

Figure 4 shows a die half 15 with a die cavity 16 and pin holes 17, 18 for aligning and securing the die half onto a stamper. The cavity is provided with an opening 19 in which an ejector bearing a logo is placed. The hole 20 represents the passage through which vacuum can be applied during use of the die half in the stamping operation.

Figure 5 shows the die cavity 16 complete with an ejector bearing a logo 21.

<u>Examples</u>

The stamper used in the trials was a Binacchi USN 100.

A range of die halves were manufactured in carbon steel and were spark eroded to a range of surface roughness values (Ra) shown in the table, degreased with acetone, treated with a primer and then coated with a range of elastomeric materials.

A series of brass die halves were also used in the examples. Similarly, these were degreased with acetone, treated with a primer and then coated.

In the examples, the elastomeric coatings were formed from polyurethanes or silicone materials.

The polyurethanes used were:-

PU - Polyurethane - Belzona 2221 (MP Fluid Elastomer) a two part product based on a toluene diisocyanate (TDI) and polyol/Phenylmercuric neodecanoate catalyst. Xylene was added to reduce the viscosity of the TDI component. The resultant mixture was then mixed with the polyol and catalyst and applied to the dies. The coatings were allowed to cure on the dies at ambient temperature.

PUA- Belzona 2221 modified by xylene as above and by the addition of polypropylene glycol to reduce the modulus of elasticity of the coating. The three components, i.e. the TDI/xylene, Polyol/catalyst and polypropylene glycol were mixed and the resulting material was applied to the die surface and allowed to cure.

KE - Kemira Durelast, a one part system composed of a isocyanate tipped polyurethane prepolymer based on diphenylmethane 4,4'diisocyanate (MDI). The coating was applied to the die surface and allowed to cure, following exposure to atmospheric moisture, at ambient temperature.

The primer used for the polyurethanes was Belzona 2921 (Elastomer GP Conditioner) based on a MDI/dichloromethane solution.

The silicone based materials used as elastomeric coatings were:-

Si - liquid silicone rubber Silastic 9050-50P Parts A and B, ex Dow Corning. In order to prepare the coating the two parts were mixed at room temperature. The resulting mixture was then brushed onto the die surface and cured at 200°C.

HS - Silastic HS 500 ex Dow Corning, a peroxide cured silicone elastomer. The premixed silicone elastomer and peroxide were dissolved in white spirit. This was then brushed onto the die surface. Heat was then applied to accelerate the curing system.

The primer used for the silicone elastomers (Dow Corning 3-6060) comprised 95% methyl isobutyl ketone, 2% ethyl polysilicate, 1% isopropoxybis(acetylacetonate) titanium and 2% dimethyl, methyvinyl siloxane, acetoxy-terminated) was diluted with white spirit.

The bar compositions used in the examples were as follows:-

Formulation A	%wt
Anhydrous tallow soap	52.3
Anhydrous coconut soap	29.9
Coconut fatty acid	5.2
Water and minors	to 100

Formulation B	%wt
Sodium cocyl isethionate	27.00
Cocoamidopropyl betaine	5.00
Polyethylene glycol, M.Wt	33.12
Fatty acid	11.00
Filler	10.00
Sodium stearate	5.00
Water + minors	to 100

Formulation C	%wt
Sodium cocyl isethionate	49.78
82/18 Soap	8.31
Sodium Stearate	2.98
Alkyl Benzene sulphonate	2.02
Stearic acid	20.15
Coco fatty acid	3.08
Sodium Isethionate	4.68
Water + minors	to 100

Example	1	2	3	4	5	6	7	8	1*	2*
Average Surface Roughness (Ra)/ µm	0.8	3.2	1.6	1.6	3.2	0.8	3.2	-	-	-
Coating Thickness/µm	PU 16.2	PUA 102	Si 21	Si 21	HS <10	PU 100	KE 42	Si 25	- -	- -
Modulus of Elasticity MPa	9	1	3	3	3	9	35	3	-	-
Bar composition	B	C	C	B	B	B	A	B	B	C
Die Block/ Release	2	3	3	2	5	1	1	1	5	5
Logo Reproduction	1	2	3	2	1	1	4	1	1	1
Maximum speed of stamper (Tables/min-1)	70	20	70	70	>40	45	70	45	<20	<20

For examples 1 to 7 carbon steel die halves were used. In example 8 and comparative examples 1* and 2* brass die halves were used. In 1* and 2* no elastomeric coating was applied to the surface of the die.

For all examples, die block/release and logo reproduction was assessed.

Die Block/Release was assessed visually and scored according to a scale on which 1 indicates the bar released freely from the die and 5 where the bar sticks to the die.

Logo Reproduction was assessed visually on detergent bars released from the die and scored according to a scale on which 1 indicated reproduction of all the detail of the logo and 5 indicates poorly defined logo where at least some of the detail is missing.

The results demonstrate thin coatings can be used on dies to stamp a variety of product formulations and obtain good die block/release and logo reproduction. In the absence of an elastomeric coating detergent bars did not release from the die.

CLAIMS

1. A device for stamping a detergent bar comprising a die, the die having at least one bar stamping surface wherein the bar stamping surface is provided with an elastomeric coating, characterized in that the total thickness of the elastomeric coating is less than 200 μm.

2. A device according to claim 1 wherein the elastomeric coating is the sole elastomeric material of the bar stamping surface.

3. A device according to claim 1 or 2 wherein the die comprises a rigid material selected from metals and their alloys; thermosetting and thermoplastic resins; hard case polyurethanes; ceramics; composites and laminates.

4. A device according to claims 1 or 2 wherein the elastomeric coating is selected from elastomers; rubbers; and thermoplastic elastomers; and copolymers and blends thereof.

5. A device according to claims 1 or 2 wherein the elastomeric coating has a thickness within the range 1 to less than 200 μm.

6. A device according to claims 1 or 2 further comprising a deflashing plate coated with at least one elastomeric coating.

7. A device according to claims 1 or 2 further comprising a backing plate on which the die is mounted, the plate coated with at least one elastomeric coating.

8. A device according to claims 1 or 2 wherein the elastomeric coating has a modulus of elasticity within the range 0.1 to 50 MPa.

9. A process for forming an elastomeric coating on a device for stamping a detergent bar, comprising

i) pretreating the device by chemical and/or mechanical means to form a bonding surface for said elastomeric coating; and

ii) applying said elastomeric coating, characterised in that the coating has a thickness of less than 200 µm.

10. A process according to claim 9 wherein the mechanical means is surface cleaning means selected from treatment with a wire brush, abrasive paper, blasting techniques, spark erosion, polishing and combinations thereof.

11. A process according to claim 9 wherein the chemical means is selected from solvent cleaning, acidic treatment, surface etching, application of a primer, application of an adhesive bonding chemical and combinations thereof.

12. A process for stamping a detergent bar using a device according to claim 1 or claim 2.

13. A process for stamping a detergent bar according to claim 12 comprising

i) forming an elastomeric coating of less than 200 µm on at least one bar stamping surface of a die

ii) feeding a detergent bar composition to the die of step i;

iii) stamping the composition in the die to form a stamped bar; and

iv) releasing the bar from the die such that a surface decoration can be applied to the bar in an easily reproducible manner.

14. A process according to claim 12 wherein the surface decoration is a logo, trade mark or similar.

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Fig.1.

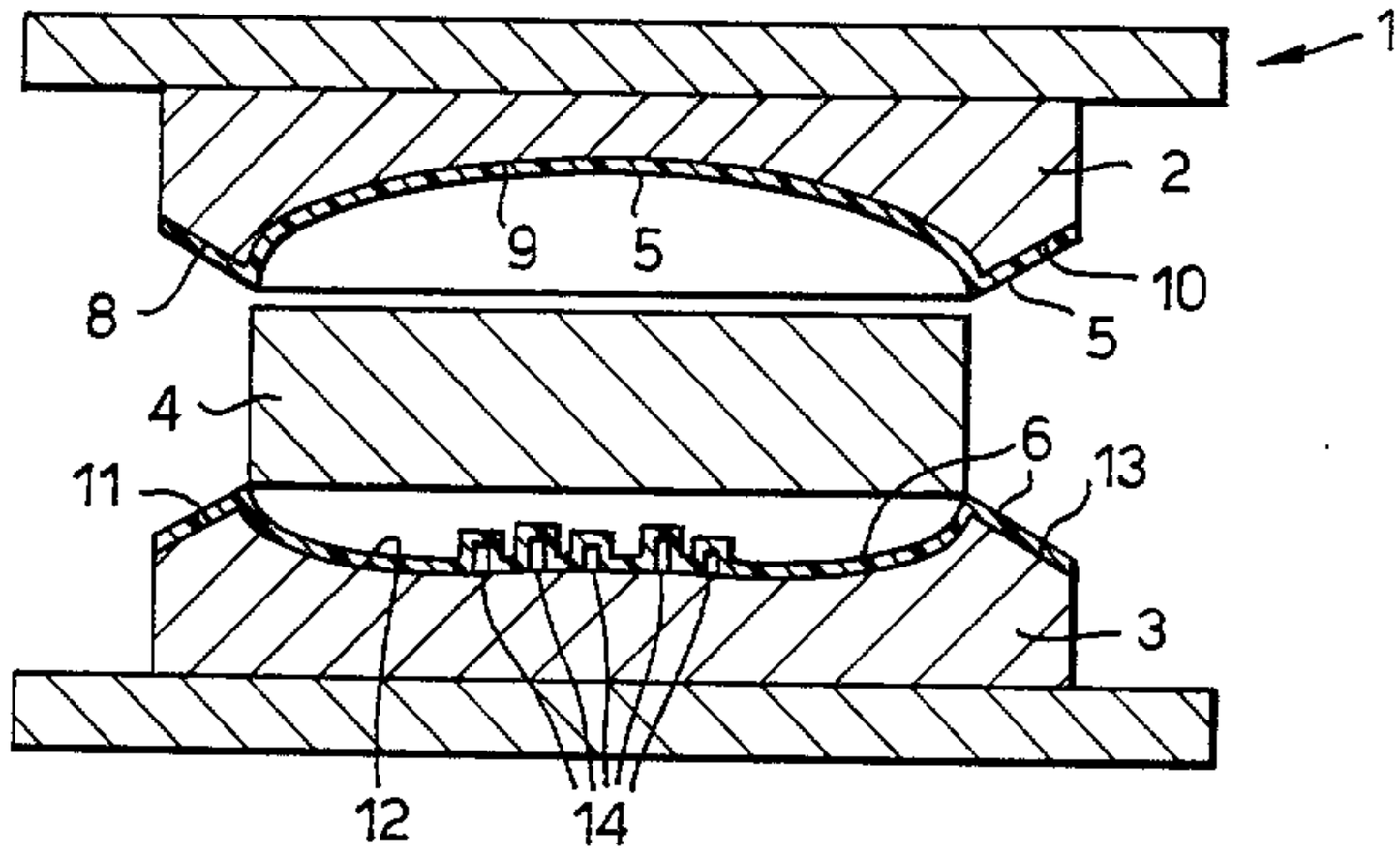


Fig.2.

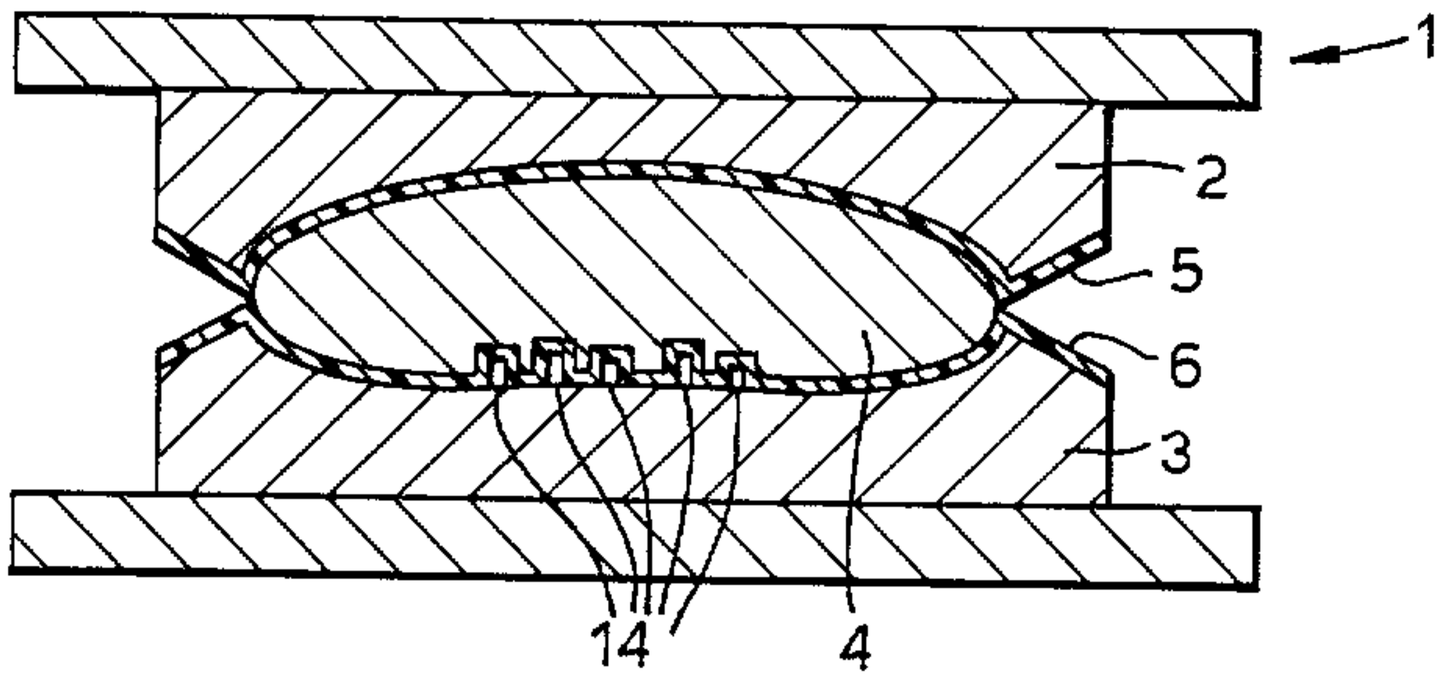


Fig.3.

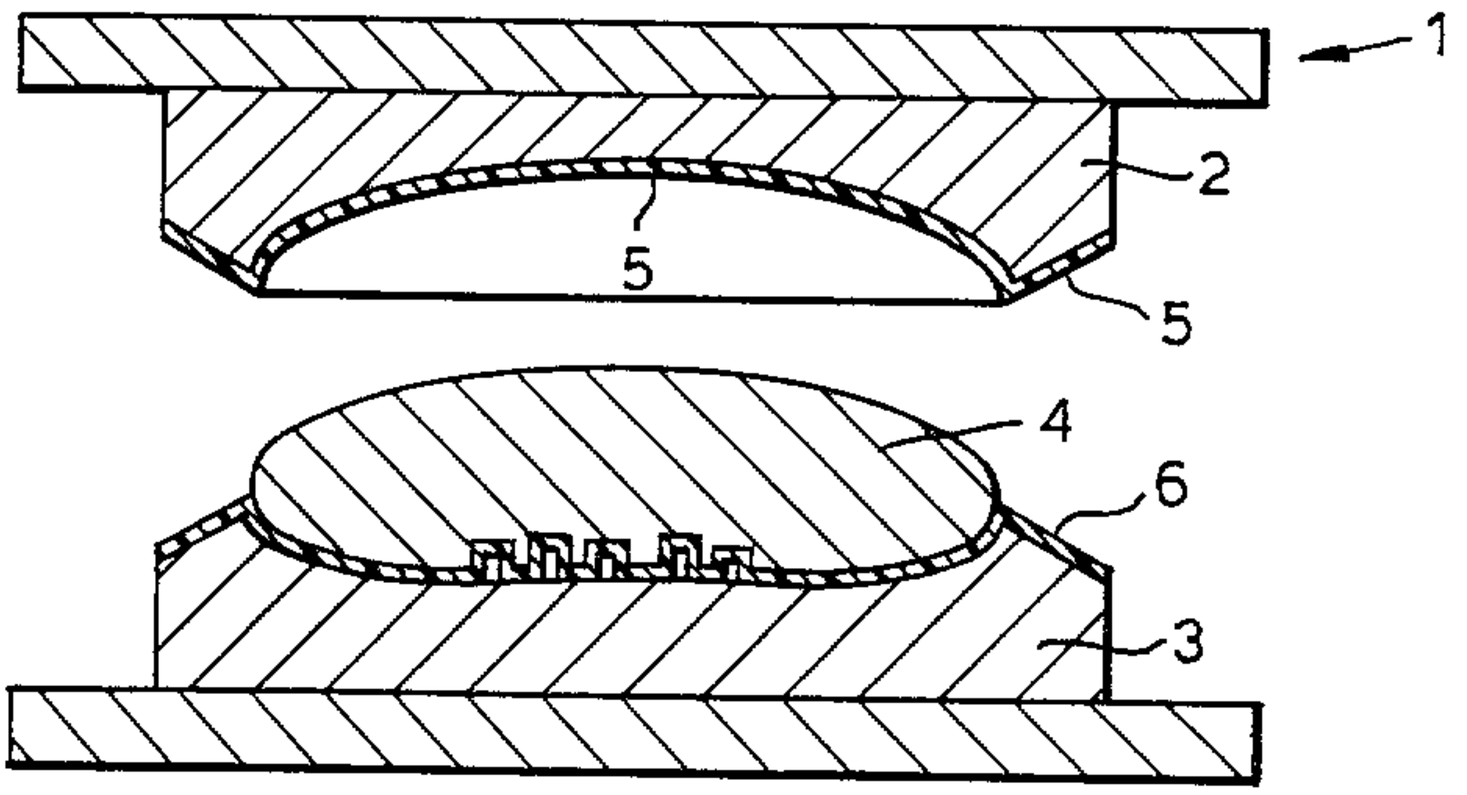


Fig.4.

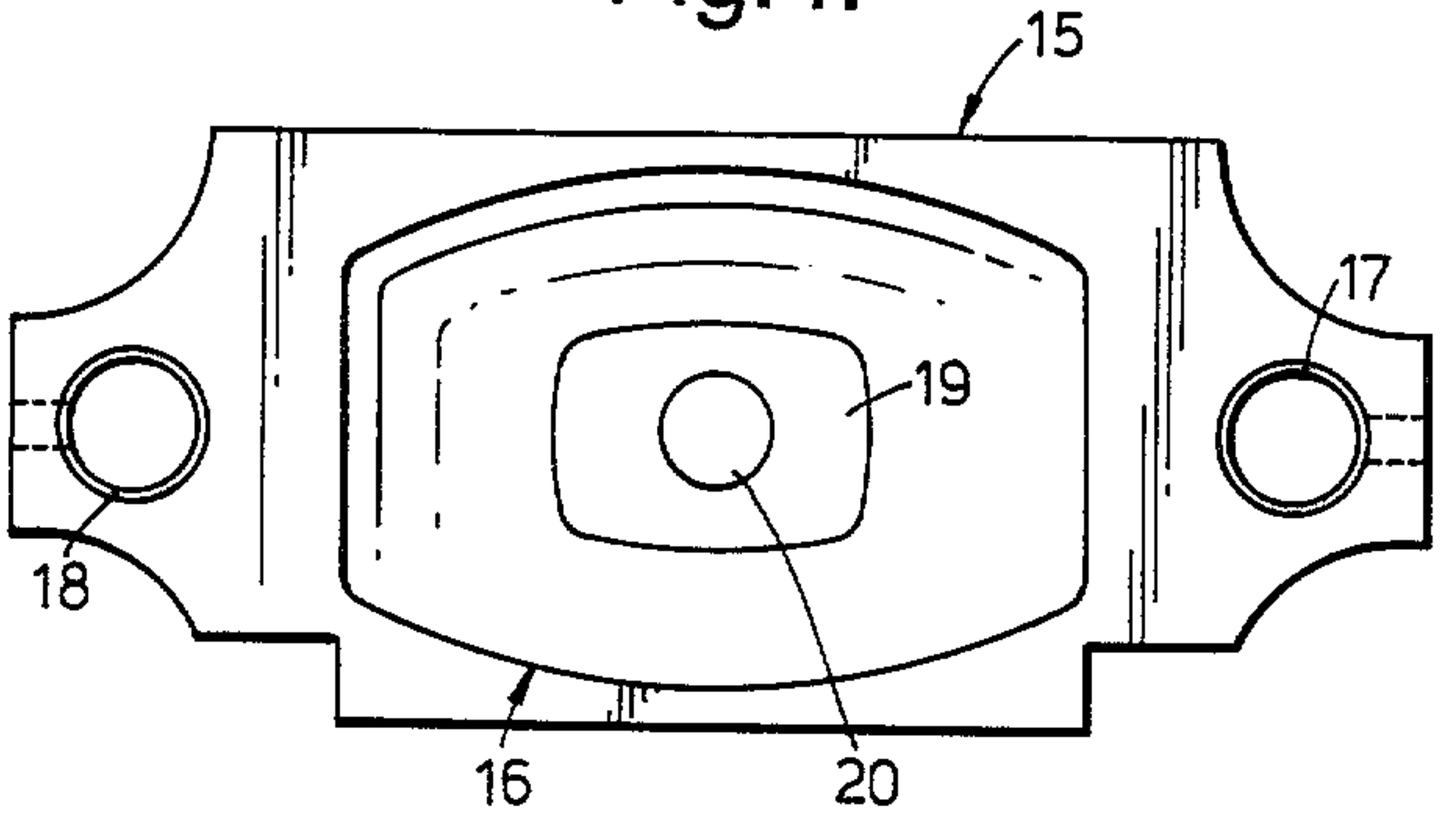


Fig.5.

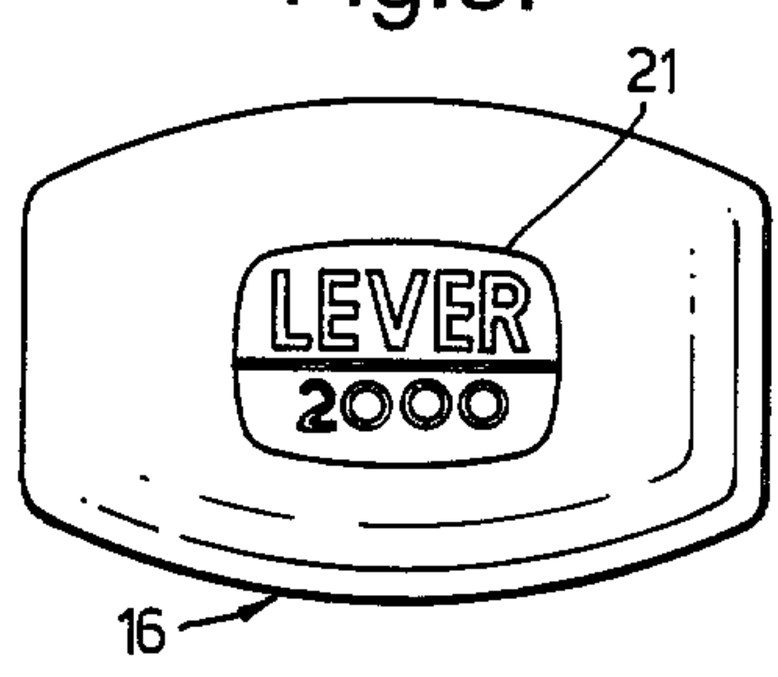
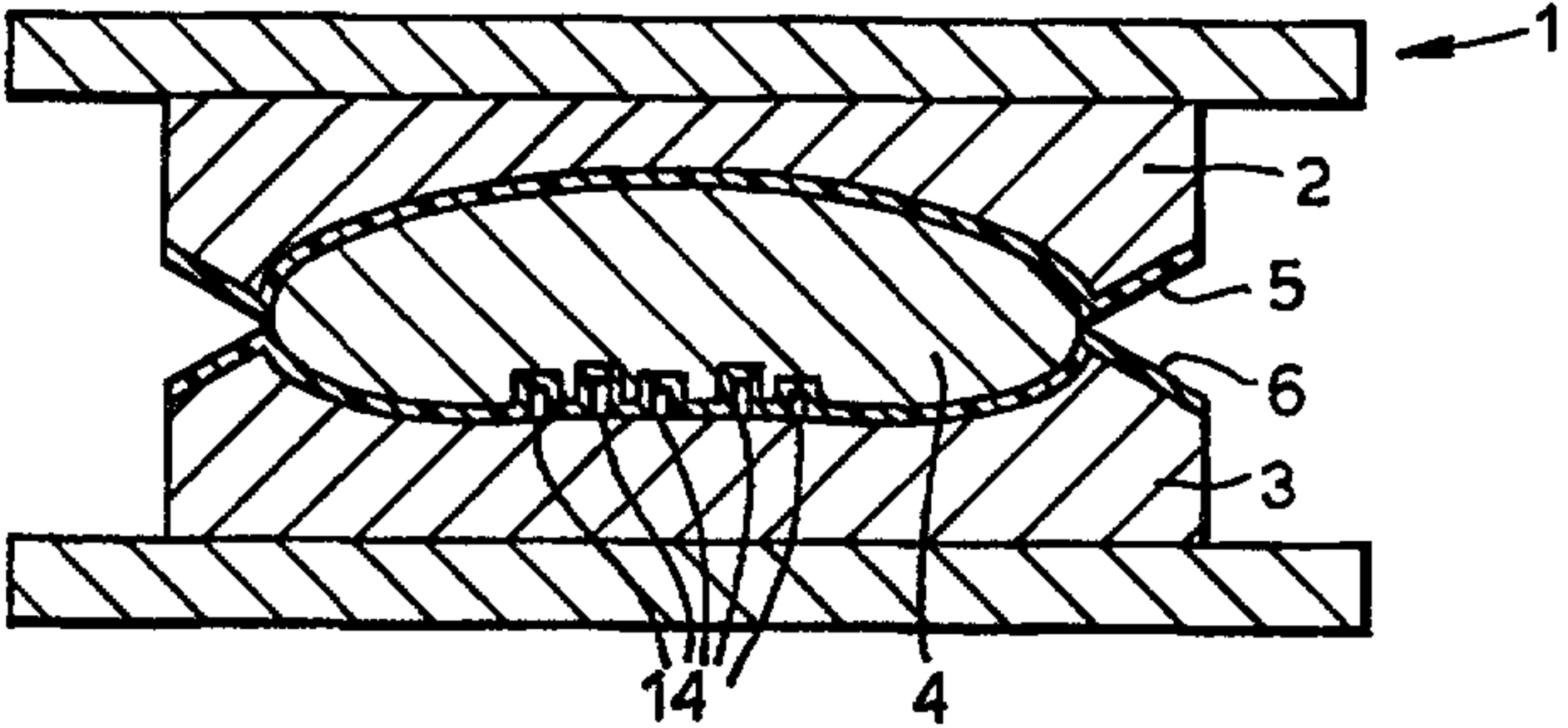


Fig.6.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