

(12) PATENT
(19) AUSTRALIAN PATENT OFFICE

(11) Application No. AU 199869204 B2
(10) Patent No. 731315

(54) Title
Process and dispensing device for washing laundry in a washing machine

(51)⁷ International Patent Classification(s)
D06F 039/02

(21) Application No: **199869204** (22) Application Date: **1998.03.02**

(87) WIPO No: **WO98/40550**

(30) Priority Data

(31) Number	(32) Date	(33) Country
9704782	1997.03.07	GB

(43) Publication Date : **1998.09.29**
(43) Publication Journal Date : **1998.11.12**
(44) Accepted Journal Date : **2001.03.29**

(71) Applicant(s)
Unilever PLC

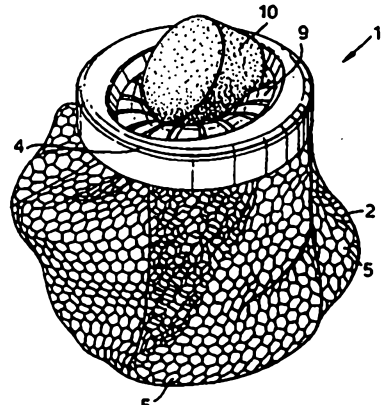
(72) Inventor(s)
George Thomas Dawson; Francois Delwel; James William Gordon; Albert Cornelis Theodorus De Jong; Colin Watt Kerr; Edwin Leo Mario Lempers; Loic Marie Olivier Tardy

(74) Agent/Attorney
DAVIES COLLISON CAVE,GPO Box 3876,SYDNEY NSW 2001

(56) Related Art
EP 0343069
EP 0576234
EP 0479711



IN

(51) International Patent Classification ⁶ : D06F 39/02		A1	(11) International Publication Number: WO 98/40550	
			(43) International Publication Date: 17 September 1998 (17.09.98)	
(21) International Application Number: PCT/EP98/01288 (22) International Filing Date: 2 March 1998 (02.03.98) (30) Priority Data: 9704782.3 7 March 1997 (07.03.97) GB (71) Applicant (for AU BB CA GB GH GM IE IL KE LC LK LS MN MW NZ SD SG SL SZ TT UG ZW only): UNILEVER PLC [GB/GB]; Unilever House, Blackfriars, London EC4P 4BQ (GB). (71) Applicant (for all designated States except AU BB CA GB GH GM IE IL KE LC LK LS MN MW NZ SD SG SL SZ TT UG ZW): UNILEVER N.V. [NL/NL]; Weena 455, NL-3013 AL Rotterdam (NL). (72) Inventors: DAWSON, George, Thomas; Lever Brothers Ltd., Lever Development Centre, P.O. Box 69, Port Sunlight, Wirral, Merseyside L62 4ZD (GB). DELWEL, Francois; Unilever Research Vlaardingen Lab, Olivier van Noortlaan 120, NL-3133 AT Vlaardingen (NL). GORDON, James, William; Lever Development Centre, Unilever Research Vlaardingen Lab, Olivier van Noortlaan 120, NL-3133 AT Vlaardingen (NL). DE JONG, Albert, Cornelis, Theodorus; Lever Development Centre, Unilever Research Vlaardingen			(74) Agent: MOLE, Peter, Geoffrey; Unilever plc, Patent Division, Colworth House, Sharnbrook, Bedford MK44 1LQ (GB). (81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, GW, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).	
Published With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.				
(54) Title: PROCESS AND DISPENSING DEVICE FOR WASHING LAUNDRY IN A WASHING MACHINE				
(57) Abstract A process for washing laundry in a washing machine employs a receptacle (1) for dispensing detergent tablets. The receptacle comprises a loosely fitting net bag (6) having apertures (5) with an average mesh size of between 1 and 10 mm. One or more tablets (10) are placed in the dispensing receptacle (1) before being placed into a washing machine along with laundry to be washed and a washing operation is carried. After the washing operation, the device is removed from the machine and stored for subsequent use. Moreover, the invention relates to a dispensing device for carrying out this process and a use of the device in laundry washing.				
				

ABSTRACT

5 A process for washing laundry in a washing machine
employs a receptacle^(A) for dispensing detergent tablets.
The receptacle comprises a loosely fitting net bag^(B) having
apertures^(S) with an average mesh size of between 1 and 10
mm. One or more tablets^(C) are placed in the dispensing
10 receptacle^(A) before being placed into a washing machine
along with laundry to be washed and a washing operation
is carried. After the washing operation, the device is
removed from the machine and stored for subsequent use.

15 Moreover, the invention relates to a dispensing device
for carrying out this process and a use of the device in
laundry washing.

- 1 -

PROCESS AND DISPENSING DEVICE FOR WASHING LAUNDRY
IN A WASHING MACHINE

5 INTRODUCTION

The invention relates to a process for washing laundry in a washing machine by employing a receptacle for dispensing at least one detergent tablet, the receptacle comprising a net
10 structure having a plurality of apertures for permitting the passage of an aqueous solution there through, the process comprising the steps of placing the dispensing receptacle having at least one detergent tablet contained therein in a washing machine together with the laundry to be washed, and
15 carrying out a washing operation. The invention also relates to a dispensing device for carrying out the above process.

Dispensing devices for detergent tablet compositions are
20 known. For example DK-B-165 759 discloses a dispensing device having a flexible fluid permeable sleeve arranged in an enclosing manner about a rigid hollow body forming an annular chamber between the sleeve and the body, the body having an inlet opening for insertion of the tablet. EP-A1-
25 0628 652 describes a similar dispensing device. Both of these devices include relatively complicated means for delivering a tablet from the opening in the hollow body to the annular chamber, are expensive to make and complicated in use.

30

EP-A1-0-473-532 discloses a further dispensing device for use with detergent tablets which comprises a water permeable

- 2 -

5 fabric bag having a slotted opening and a freely movable body within the bag to effect the disintegration of the tablet. If, however, the fabric bag described above was analysed after a washing operation, a large number of detergent residues would be embedded in the material of the bag. This results in detergent being wasted and the bag having decreased water permeability.

10 EP O 699 410 discloses a dispenser for, primarily machine dishwash, detergent tablets which comprises an open topped rigid cage having pincers for picking up tablets. A problem with this device is that the apertures in the cage appear quite large and thus would allow large undissolved tablet particle escape into the wash to cause dye damage to the clothes. Further problems are the rather complicated structure and the noise which results from the use of such a rigid device in washing machines.

20 EP O 479 711 describes a further device comprising a two-part rigid sleeve having an outer sleeve of flexible water permeable material. In use a tablet is inserted between the rigid and flexible sleeves before the device is placed in a washing machine. Again this device is of quite complicated construction. Further it requires considerable dexterity for successful positioning of the tablet between the two sleeves.

30 EP O 691 102 describes a cage dispenser for tablets having a child resistant closure. The apertures in the cage are quite large and would allow sizeable detergent particle escape into the wash. Further, the dispenser would suffer from noise problems.

- 3 -

EP O 610 535 discloses a fabric bag dispenser for powdered detergents, the bag having holes of a size sufficient to allow water penetrate but preventing the powder escape. The use of such a bag with detergent tablets would likely lead to poor break-up and dissolution of the tablet and result in a high level of residues left in the bag.

EP O 576 234 describes a tablet dispenser comprising an elastic net sleeve which, upon insertion of the tablets, conforms tightly to the tablets. A number of problems are associated with this dispenser. First, as the tablets are held by the sleeve in a face to face configuration, less of the tablets surface area is exposed to the wash water. This leads to a decreased rate of dissolution of the tablets which results in a greater level of detergent residues left in the machine after the wash. A consequence of this is an increased incidence of dye fading due to detergent residues or particles coming into direct contact with clothes. Second, as the net conforms tightly to the tablets, the tablets are firmly pushed against the net resulting in parts of the tablet being exposed through the net to the clothes in the wash. Such exposure will lead to increased levels dye damage. Furthermore, as the elastic net prevents the tablets moving around the net, mechanical disintegration of the tablets is reduced. Finally, as the net is elastic, the mouth of the sleeve tends to be quite small which makes insertion of the tablets difficult.

It is an object of the present invention to provide a dispensing device and washing process which overcomes at least some of the above problems.

- 4 -

Statements of Invention

5 According to the invention, there is provided a laundry washing process of the above type, the process being characterised in that the net structure is a loosely fitting net bag, wherein the apertures of the net have an average mesh size of between 1 mm and 10 mm.

10 Surprisingly, it has been found that as the mesh size of the net increases above 1mm, that the incidence of dye damage, ie. the effect of direct contact between the tablet and the clothes, decreases. It would have been expected that for net shuttles, as the size of the holes in the net increased,
15 the greater the dye damage would be due to the greater exposure of the tablet through the holes in the net. In practice, the opposite effect has been observed when the process of the invention is carried out.

20 A further surprising effect of the process of the present invention is that the incidence of detergent tablet residues remaining in the machine after a washing operation decreases. This is quite unexpected in so far as it would be assumed that, as the mesh size of the net increases, the
25 greater the number of undissolved residues within the net would escape into the wash. However, again, the opposite effect has been observed with the process of the invention.

30 The mesh size of the net in the present invention is limited to less than 10 mm. Mesh sizes above this figure result in

- 5 -

large particles escaping into the wash. This is undesirable due to the increased incidence of dye damage which results.

5 The use of a loosely fitting net bag has a number of advantages. Firstly, the greater volume of the bag (when compared with an elastic sleeve), results in a decreased incidence of the bag becoming lodged in the port hole of the machine during washing. Secondly, the fact that the bag is
10 loosely fitting allows tablets contained within the bag to mechanically act against each other thereby improving the rate of dissolution of the tablet. Thirdly, with the loosely fitting bag of the invention, the tablets are not held in a tightly conforming arrangement (as is the case with an elastic net sleeve), thus a greater surface area of
15 the tablets is exposed to the wash water.

In one embodiment of the process, the average mesh size of the net is at least 2mm, ideally at least 3mm, more preferably at least 4mm and most preferably approximately
20 5mm. Typically, the average mesh size of the net is at most 9mm, ideally at most 8mm, preferably at most 7mm, and most preferably at most 6mm.

25 Preferably the net bag apertures with an average mesh size of approximately 5mm.

In one embodiment of the invention, the detergent tablet comprises a tripolyphosphate composition, typically comprising a compacted particulate detergent composition
30 containing one or more detergent-active compounds together with sodium tripolyphosphate and other ingredients, and in which the tablet or a region thereof comprises particles which contain sodium tripolyphosphate with a content of the

- 6 -

phase 1 form which is more than 40% by weight of the sodium tripolyphosphate in said particles, wherein the sodium tripolyphosphate in said particles contains water of hydration distributed throughout the tripolyphosphate in an amount between 1% and 5% by weight of the sodium tripolyphosphate in the particles.

Alternatively, the detergent tablet may comprise sodium acetate trihydrate, optionally together with sodium citrate dihydrate. Such a composition may for example comprise a compacted particulate composition in which the tablet or a region thereof comprises from 15% to 93% by weight of a water-softening agent, wherein the tablet or a region thereof contains 2% to 35% by weight of a salt which is sodium acetate trihydrate, potassium acetate or mixture thereof, optionally together with sodium citrate dihydrate, such that the total quantity of sodium acetate trihydrate, potassium acetate and sodium citrate dihydrate is from 7% to 50% by weight of the tablet or a region thereof.

Typically, the net bag is reusable and comprises an opening for reception of the or each detergent tablet and closure means for closing the opening to prevent the passage of the or each tablet out of the receptacle through the opening, the process including the initial step of placing one or more detergent tablets in the dispensing receptacle prior to closing the opening. In this manner it is a simple operation to opening the bag and place one or more tablets therein and subsequently close the bag.

In one embodiment of the process, the opening is defined by an annular support wherein the closure means comprises a

- 7 -

plurality of resiliently flexible members such as fingers mounted on the annular support, which members project radially at least partially across the opening.

Alternatively, the closure may comprise a diaphragm mounted across the support, which diaphragm includes an aperture for insertion of a tablet. Ideally, the diaphragm comprises a resiliently deformable material.

In a further embodiment of the process, the closure means comprises zip means. Alternatively the opening may be defined by a pair of lips, which lips are movable together and apart in a purse-like manner to open and close the opening. In a particularly preferred embodiment of the process, the closure comprises a drawstring arrangement, which ideally includes clamp means attached to the drawstring to lock the bag in an open or closed orientation.

Preferably, the net bag of the process of the invention will include a volume adding member. In many of the embodiments above, the volume adding member will be provided by the closure, such as for example the annular support at the mouth of the bag, or the pair of lips. Ideally, the volume adding member comprises a resiliently deformable ring attached to the base of the bag and preferably dimensioned to conform tightly to a perimeter of the base. The inclusion of such a volume adding member has been shown to decrease the incidence of lodging, facilitate the finding of the bag after a washing operation, and to favour water flow through the device.

Typically, the net bag is produced from a material capable of withstanding temperatures for the machine washing or drying of laundry, especially up to 150°C. Such a material

- 8 -

is sold under the trade name NETLON. However other materials capable of withstanding the above temperatures are envisaged.

5 The invention also seeks to provide a dispensing device for carrying out the above process, which device comprises a net bag for housing one or more detergent tablets, the net bag having a plurality of apertures for permitting the passage of an aqueous solution there through, the device being
10 characterised in that the net bag is a loosely fitting structure, wherein the apertures in the net have an average mesh size of between 1 and 10mm.

Preferably the device according to the invention includes a
15 net bag having apertures with an average mesh size of approximately 5mm.

Further, the invention provides a dispensing device according to the invention in combination with a detergent
20 in a solid, non powder form, ideally a tablet.

Detailed Description of the Invention

The invention will be more clearly understood from the
25 following description of some embodiments thereof, given by way of example only, with reference to the accompanying drawings in which:-

Figure 1 is a perspective view of a dispensing device
30 according to the invention;

Figure 2 is a top plan view of the device of Figure 1;

- 9 -

Figure 3 is a perspective view of the device of Figure 1 with a tablet partially inserted therein;

Figure 4 is a perspective view of a dispensing device according to an alternative embodiment of the invention in an open configuration;

Figure 5 is a top plan view of the device of Figure 4;

Figure 6 is a partially side-on perspective view of the device of Figure 4 in a closed orientation;

Figure 7 is a perspective view of an alternative embodiment of the invention having a draw-string closure in an open orientation;

Figure 8 is a perspective view of the device of Figure 7 with the draw-string closure in a closed orientation; and

Figure 9 is a perspective view of a device of Figure 7 with a pair of tablets inserted therein.

Referring to the drawings, and initially to Figures 1 and 3 thereof, there is illustrated a dispensing device according to the invention indicated generally by the reference numeral 1 and comprising a receptacle for detergent tablets in the form of a flexible, loosely fitting, net bag 2 having an open mouth 3, which is connected to and supported in an open configuration by a rigid annular support 4, and apertures 5 having an average mesh size of approximately 5 mm. A closure 8 for the mouth 3 comprises sixteen resiliently flexible fingers 9 mounted to the support 4 and extending radially across a portion of the mouth 3 of the

- 10 -

bag 2 this forming a partial barrier which is sufficient in size and of sufficient resiliency to prevent a detergent tablet 10 passing out of the bag 2 during a conventional operation.

5

In use and referring to Figure 3, a detergent tablet 10 is placed in the device 1 by pushing the tablet 10 against the barrier 8 until the radial fingers 9 bend sufficiently to allow the tablet 10 past the barrier 8. Generally two
10 tablets will be used in a convention operation. The device 1 and tablets 10 (only one shown) contained therein are then placed in a washing machine together with the laundry to be washed and a washing operation is carried out during which the detergent tablet(s) within the bag 2 will disintegrate
15 and dissolve. Any undissolved particulate disintegration products of the tablet of a size less than 5 mm will pass out of the bag 2 and be dissolved outside the bag 2. When the washing operation has been completed, the device 1 is removed from the machine and stored for subsequent use.

20

Referring to Figures 4 to 6, another embodiment of the invention is described in which parts similar to those described with reference to Figures 1 to 3 are given the same reference numerals. In this embodiment, the device,
25 indicated by the reference numeral 20, includes a purse type closure 21 connected to the mouth 3 of the bag 2, which closure 21 comprises a pair of rigid semi-circular lips 22a, 22b, hingedly connected at each end, and movable together and apart to open and close the mouth. A clip 23 is
30 provided on one of the lips 22a to lock the lips in a closed orientation. The use of this embodiment of the invention is similar to that described previously with the exception for

- 11 -

the operation of the closure means which will be readily apparent.

Referring to Figures 7 and 8, a further embodiment of the invention is described in which parts similar to those described with reference to Figures 1 to 3 are assigned the same reference numerals. In this embodiment, the device indicated by the reference numeral 30 includes a drawstring closure arrangement 31 having a toggle clamp 35 movable thereon, and a supporting ring 32 located on a base 33 of the device 30. The operation and construction of the drawstring closure will be apparent to those skilled in the art.

Figure 9 illustrates the device of Figure 7 having a pair of detergent tablets inserted therein.

When tablets are dosed in a washing machine and especially front loading machines without the use of a dosing device there is a substantial risk of lodging; ie tablets end up in porthole, primarily at the start of the wash. This happens in particular in machines where the space between the door and the drum is such that it can accommodate a tablet or pieces of tablets. The residence time of tablets in a porthole depends on water intake level. As the trend in new machines is to reduce levels of water, even to the extent that the level of water is below the porthole, it is understandable that in such machines tablets do not completely dissolve in the main wash. This will have an effect on performance and level of residues. As an example the Miele W918TM, AEG lavamatTM, HotpointTM, Zanussi JetTM and Bauknecht AllureTM show severe lodging in 50 to 75% of the washes.

- 12 -

When tablets are dosed via a device, developed such that there is a barrier which prevents that tablets falling out of the device, the problem of lodging is partially solved.

5 The prerequisite for such a device is that it should have some volume otherwise tablets together with device experience some lodging: ie. tablets dosed in just a small net show some incidence of lodging, although the problem is reduced to a great extent. To circumvent the low risk of
10 lodging, but also the make to make it more easier to find the dosing device after the wash and to favour the water flow through the net, present invention proposes a loosely fitting net bag, which optimally includes some plastic part giving it some volume. This plastic part can be part of the
15 opening system (e.g. a purse type opening with a click mechanism or a plastic system with a tablet push through mechanism) or is part of the net (e.g. a plastic ring attached to the bottom of the net). In the latter example the opening is reclosable by a rope or zipped mechanism.

20 When dosing tablets in nets it is unexpectedly observed (see Table 1) that there is a clear effect of mesh size of net on level of residue as found after the main wash. Apparently nets with less than 1 mm mesh size retard the tablet
25 dissolution significantly which result in residues in the net. This is judged to be unacceptable. Therefore mesh size of nets should be at least larger than 1mm. There is an optimal mesh size range; nets with too small a mesh size retard dissolution to an unacceptable level, whereas nets
30 with too large mesh size allow pieces of tablet to "escape" which will increase incidence of lodging and also cause dye damage as direct contact between tablet and load is more pronounced see (See Table 2).

- 13 -

Results also indicate that devices with some volume (for example a plastic ring) give less residue.

Table 1

5 30°C washes in four machines. Two tablets dosed in net. Program stopped after main wash and level of residues is scored by weight

	net (zipped) 5mm mesh size	net zipped 1 mm mesh size	net rope + plastic ring 5mm mesh size	net rope plastic ring 1 mm mesh size
Miele W918	-	...	+	...
Zanussi Jet	-	...	+	...
Whirlpool	+	...	+	...
Siemens	-	...	+	...

- 14 -

10 + Totally dissolved after end of main wash
 - Some small residues after end of main wash
 ... Between 2.5 and 9 gram after end of main wash

- 15 -

From the table below it is clear that concentrated powders (as are on the market) gives more dye fading than free tablets (See Table 2), despite levels of bleach being the same; this is surprising but it can be interpreted by assuming that powders when trapped will have a closer contact with load than tablets. Of course this mimics an extreme situation which is more realistic for a tablet than for a powder, i.e. inherently tablets will dissolve slower than powders.

Surprisingly there is decreasing dye damage upon increasing the mesh size. It was expected that the opposite would occur as one can expect that the larger the mesh size the closer the contact will be between the tablet and the load (see e.g. tablet without net, ie. infinite mesh size, having the most dye fading). Again it seems that there is an optimum in mesh size giving the lowest fading, however it is clear that as the mesh size of the net increases above 1mm, that dye fading decreases significantly.

As a side effect it was observed that tablets in a net give less residue on the black sachet cloth than when no net was used.

Table 2.

Combined 40°C and 60°C results. Concentrated powder or tablet (with or without net) placed in a small black sachet and a normal wash is conducted in Zanussi Jet™ machine. After a program, dye fading of the black sachet was measured:

	Delta E (dye fading)
Concentrated Powder	10.1
Tablet (no net)	6.0
Tablet (net, zipped) 1mm mesh size soft quality	3.9
Tablet (net, zipped) 3mm mesh size hard quality	2.5
Tablet (net zipped) 5 mm mesh size hard quality	2.0

To investigate the effect of using dosing devices on residues and dye damage on real load and complete wash cycles and to confirm the above findings the following exercise has been carried out:

A low agitation, low temperature program in a Miele™ washing machine with a load primarily of dark coloured fabrics is repeated a number of times. Products are dosed in the usual way; i.e. powder in scuttle on top of load and tablets on bottom of drum. After a number of washes incidences of

- 17 -

residue and dye damage on the load are visually scored (Table 3). N.B. note that with free tablet lodging was observed but tablets were returned to the load.

5 1mm mesh size net gives more residue than free tablet in line with above. Apparently tablet dissolution is retarded such that in the latter part of the wash, parts of tablet are still present giving a rise in incidences of residues and dye damage.

10 Nets with larger mesh sizes (3mm and 5mm) reduces the risk of residues and dye damage. It is particularly unexpected, but in line with above results, that the risk of dye damage is reduced.

15 Also unexpected is the clear better score on dye damage for the tablet in the 5mm sachet compared to NG Persil Powder (same bleach level).

Table 3.

Total incidences of residue and dye damage.

5

	Residue ¹	Dye Damage
Free Tablet ²	20	3
1 mm net ³	31	3
3 mm net	19	2
5 mm net	15	1
NG Persil Powder	22	4

¹ Total residue incidences including patches, particles and filming

10

² Lodging was observed (tablets were returned to the load)

15

³ The 1mm net retained product

Detergent Tablet CompositionsExample 1

Tablets for use in fabric washing were made, starting with a spray-dried base powder of the following composition:

Sodium linear alkylbenzene sulphonate	11.83%
Sodium tripolyphosphate, type 1A ¹	44.83%
Nonionic detergent ²	7.88%
Sodium silicate	11.83%
Soap	1.13%
Sodium carboxymethyl cellulose	0.9%
Acrylate/maleate copolymer	3.2%
Sodium sulphate and minor ingredients	3.0%
Water	balance to 100%

¹ This contained less than 30% of the phase I form of anhydrous sodium tripolyphosphate.

² C₁₃₋₁₅ fatty alcohol 7EO.

This powder was mixed with particles of sodium tripolyphosphate specified to contain 70% phase I form and contain 3.5% water of hydration (Rhodia-Phos HPA 3.5 available from Rhone-Poulenc) and other detergent ingredients as tabulated below. As a comparative

- 20 -

composition the base powder was mixed with urea and other detergent ingredients.

Two compositions thus contained the following percentages by weight.

	Example 1	Comparative A
Base Powder	63.25	63.25
Sodium perborate tetrahydrate	10.4	10.4
TAED granules	4.0	4.0
Anti-foam granule	2.0	2.0
Enzymes	0.85	0.85
Phosphonate	0.5	0.5
Sodium carbonate	3.6	3.6
HPA Sodium tripolyphosphate	15.0	---
Urea	---	15.0

35g portions of each composition were made into cylindrical tablets of 44mm diameter, using a Carver hand press.

The strength of these tablets was measured using an Instron universal testing machine to compress a tablet until fracture. The value of diametral fracture stress (DFS) was then calculated using the equation.

$$\sigma = \frac{2P}{\pi Dt}$$

- 21 -

where σ is the diametral fracture stress in Pascals, P is the applied load in Newtons to cause fracture, D is the tablet diameter in metres and t is the tablet thickness in metres.

The break-up, dispersion and dissolution of tablets was measured by a test procedure in which a tablet is placed on a plastic sieve with 2 mm mesh size which was immersed in 9 litres of demineralised water at ambient temperature of 22°C and rotated at 200 rpm. The water conductivity was monitored until it reached a constant value.

The time for break up and dispersion of the tables was taken as the time (T_{90}) for change in the water conductivity to reach 90% of its final magnitude. This was also confirmed by visual observation of the material remaining on the rotating sieve.

The results were:

	Example 1	Comparative A
Tablet strength (kPa)	19.5	21.9
Tablet dissolution T_{90} (min)	3.35	13.4

- 22 -

This shows that tablets of this Example dissolved much faster than the comparative tablets of similar strength made with urea.

5 Example 2

Tablets for use in fabric washing were made, starting with a base powder of the following composition:

10	Coconut alkyl sulphate ¹	2.9%
	Zeolite A24 ²	52.9%
	Sodium carbonate	0.7%
	Nonionic detergent ³	25.9%
	Soap	5.9%
15	Sodium carboxymethyl cellulose	1.4%
	Fluorescer	0.4%
	Acrylate/maleate copolymer	0.7%

1. The coconut alkyl sulphate was incorporated as
20 preformed granules containing 45% coconut alkyl sulphate,
35% zeolite, 11% sodium carbonate, balance water and other salts.

2. Maximum aluminium zeolite P from Crosfields.

25

3. C₁₃₋₁₅ fatty alcohol 7EO.

- 23 -

This powder was mixed with sodium acetate trihydrate (from Merck as used in Example 1) and other detergent ingredients as tabulated below. As a comparative composition the base powder was mixed with sodium citrate dihydrate and other detergent ingredients and then sprayed with polyethylene glycol (Molecular Weight 1500) at 80°C.

The two compositions thus contained:

	A (with Na-acetate 3aq). parts by weight	B (comparative) parts by weight
Base powder	53.02	53.02
Na-perborate 4aq.	19.99	19.99
TAED granules	4.49	4.49
Anti-foam granule	3.42	3.42
Enzymes	1.5	1.5
Phosphonate	1.0	1.0
Perfume	0.43	0.43
Na-acetate 3aq.	16.13	
Silicate-carbonate co-granule		5.5
Na-citrate 2aq.		8.03
PEG 1500		2.5

- 24 -

35g portions of each composition were made into cylindrical tablets of 44 mm diameter, using a Carver hand press with various levels of compaction force.

5

The strength of these tablets was measured using an Instron universal testing machine to compress a tablet until fracture. The value of diametral fracture stress (DFS) was then calculated using the equation

10
$$\diamond = \frac{2P}{\pi Dt}$$

where \diamond is the diametral fracture stress in Pascals, P is the applied load in Newtons to cause fracture, D is the tablet diameter in metres and t is the tablet thickness in metres.

15

The break-up, and dispersion of tablets was measured by the procedure of Example 1, using one tablet on the rotating sieve.

- 25 -

The results are set out in the following table:

Compaction Force (kN)	A Tablets with Acetate.3H ₂ O		B Comparative tablets with citrate and PEG	
	Strength (DFS in kPa)	T ₉₀ (minutes)	Strength (DFS in kPa)	T ₉₀ (minutes)
1	5.1	4.0	--	--
2	7.2	3.8	19.3	11.1
4	13.7	3.9	31	25
5	20.8	7.5	43	30

5

It can be seen that the tablets containing acetate trihydrate, made with 5kN compaction force were almost equal in strength to the comparative tablets made at 2kN force, but dispersed faster and did not require a process step of spraying polymer onto the powder.

10

In this specification the term "mesh size" is understood that size of hole which would allow particles of equivalent size or diameter to pass through. Thus a net having a mesh size of 1mm will allow all particles of average diameter of 1mm or less to pass through.

15

Generally the net bag of the invention will be flexible, however, more rigid or resiliently deformable materials may be used within the scope of the invention.

5

The process and device of the invention may be varied in many ways without departing from the spirit of the invention.

Throughout this specification and the claims which follow, unless the context requires otherwise, the word "comprise", or variations such as "comprises" or "comprising", will be understood to imply the inclusion of a stated integer or step or group of integers or steps but not the exclusion of any other integer or step or group of integers or steps.

The reference to any prior art in this specification is not, and should not be taken as, an acknowledgment or any form of suggestion that that prior art forms part of the common general knowledge in Australia.



Claims

1. A process for washing laundry in a washing machine
5 by employing a receptacle for dispensing one or more
detergent tablets, the receptacle comprising a net
structure having a plurality of apertures for
permitting the passage of an aqueous solution there
through, the process comprising the steps of:-

10 - placing the dispensing receptacle having at
least one detergent tablet contained therein in
a washing machine together with the laundry to
be washed; and

15 - carrying out a washing operation,

the process being characterised in that the net
structure is a loosely fitting net bag, wherein
20 apertures of the net have an average mesh size of
between 1 and 10 mm.

2. A process as claimed in claim 1 in which the
apertures have an average mesh size of at least
25 3mm.

3. A process as claimed in claim 2 wherein the
apertures have an average mesh size of approximately
5 mm.

30 4. A process as claimed in any preceding claim in which
the detergent tablet comprises a tripolyphosphate
composition.

- 28 -

5. A process as claimed in claim 4 wherein the
detergent tablet comprises a compacted particulate
detergent composition containing one or more
5 detergent-active compounds together with sodium
tripolyphosphate and other ingredients, and in which
the tablet or a region thereof comprises particles
which contain sodium tripolyphosphate with a content
of the phase 1 form which is more than 40% by weight
10 of the sodium tripolyphosphate in said particles,
wherein the sodium tripolyphosphate in said
particles contains water of hydration distributed
throughout the tripolyphosphate in an amount between
1% and 5% by weight of the sodium tripolyphosphate
15 in the particles.

6. A process as claimed in any of claims 1 to 3 in
which the detergent tablet comprises sodium acetate
trihydrate, optionally together with sodium citrate
20 dihydrate.

7. A process as claimed in claim 6 wherein the
detergent tablet comprises a compacted particulate
composition in which the tablet or a region thereof
25 comprises 2% to 35% by weight of a salt which is
sodium acetate trihydrate, potassium acetate or
mixture thereof, optionally together with sodium
citrate dihydrate, such that the total quantity of
sodium acetate trihydrate and potassium acetate
30 sodium citrate dihydrate is from 7% to 50% by weight
of the tablet or a region thereof.

- 29 -

8. A process as claimed in any preceding claim wherein the net bag is reusable and comprises an opening for reception of the or each detergent tablet and closure means for closing the opening to prevent the passage of the or each tablet out of the receptacle through the opening, the process including the initial step of placing one or more detergent tablets in the dispensing receptacle prior to closing the opening.
9. A process as claimed in claim 8 in which the opening is defined by a annular support and in which the closure means comprises a plurality of resiliently flexible members such as fingers mounted on the annular support, which members project radially at least partially across the opening.
10. A process as claimed in claim 8 in which the opening is defined by an annular support, the closure means comprising a diaphragm mounted across the support, which diaphragm includes an aperture for insertion of a tablet.
11. A process as claimed in claim 10 in which the diaphragm comprises a resiliently deformable material.
12. A process as claimed in claim 8 in which the closure means comprises zip means.

- 30 -

13. A process as claimed in claim 8 in which the opening is defined by a pair of lips, which lips are movable together and apart in a purse like manner to open and close the opening.

14. A process as claimed in any of claim 8 in which the closure means comprises a drawstring arrangement.

15. A process as claimed in claim 14 in which the drawstring arrangement includes clamp means to lock the bag in an open or closed orientation.

16. A process as claimed in any preceding claim wherein the net bag further includes a volume adding member.

17. A process as claimed in claim 16 in which the volume adding member comprises an annular ring, which is optionally fixed to base of the bag.

18. A process as claimed in any preceding claim in which the net bag is produced from a material capable of withstanding temperatures for the machine washing or drying of laundry, especially up to 150°C.

19. A process substantially as hereinbefore described with reference to the accompanying examples and drawings.

20. A dispensing device for carrying out the process of any of claims 1 to 19 and comprising a net bag for housing one or more detergent tablets, the net bag

having a plurality of apertures for permitting the passage of an aqueous solution there through, the device being characterised in that the net bag is a loosely fitting structure, wherein the apertures in the net have an average dimension equivalent to a mesh size of between 1 and 10 mm.

21. A dispensing device as claimed in claim 20 in combination with a detergent in a solid, non powder form.
22. A dispensing device as claimed in claim 20 in combination with a detergent tablet.
23. A dispensing device substantially as hereinbefore described with reference to the accompanying drawings.
24. Use of a device as claimed in any one of claims 20 to 23 in the machine washing of laundry.

DATED THIS 16th day of January, 2001.

UNILEVER PLC

By Its Patent Attorneys

DAVIES COLLISON CAVE



1 / 7

Fig.1.

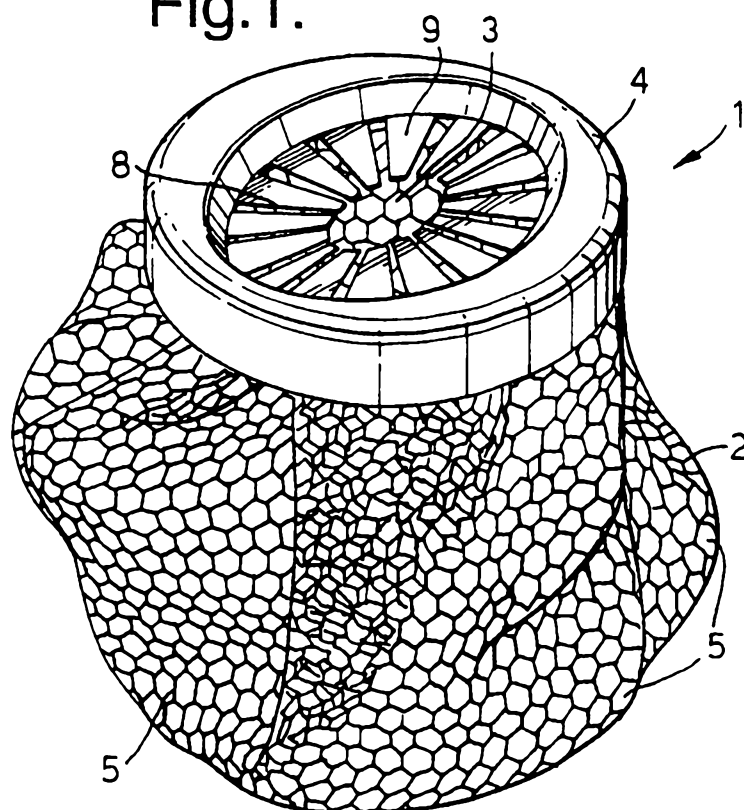
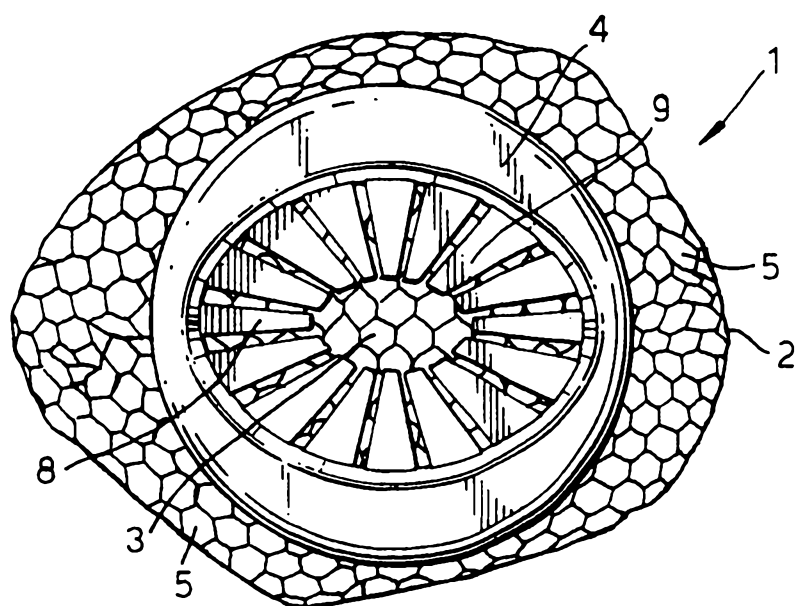


Fig.2.



2 / 7

Fig.3.

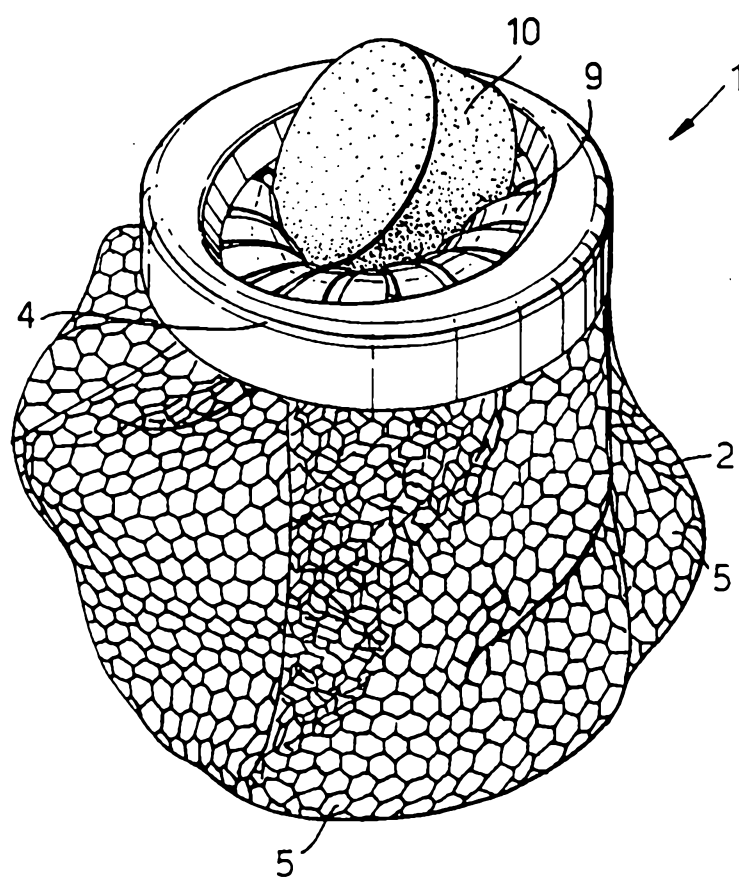
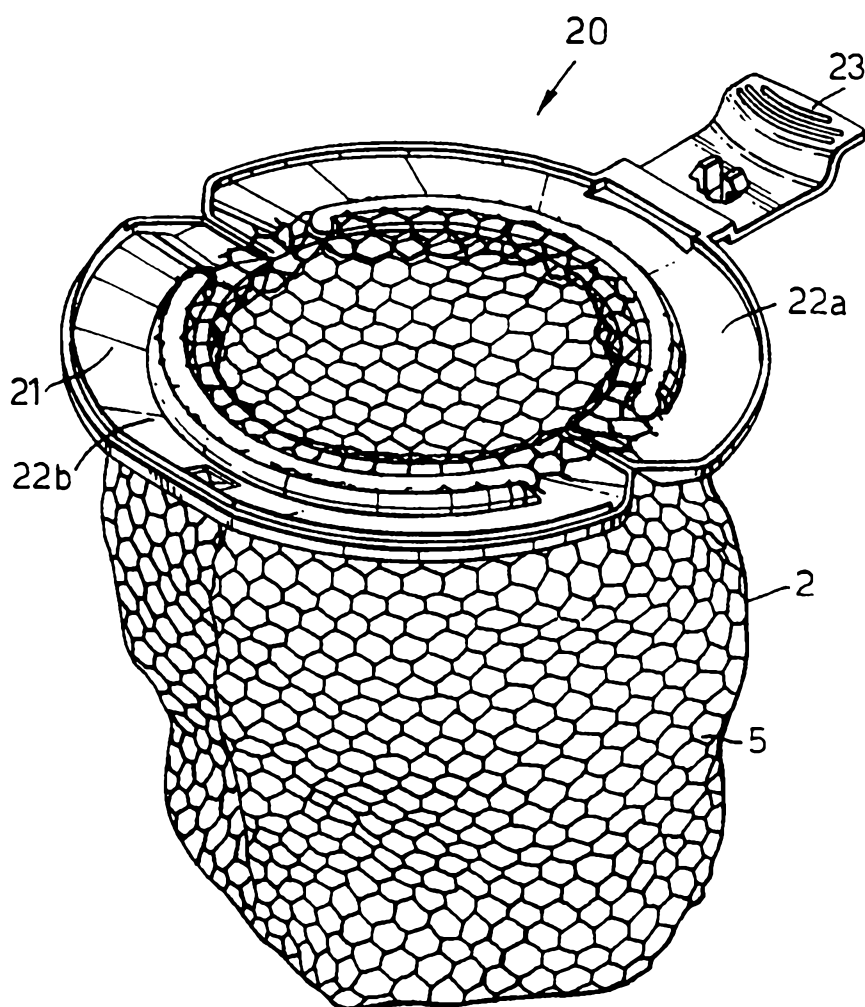
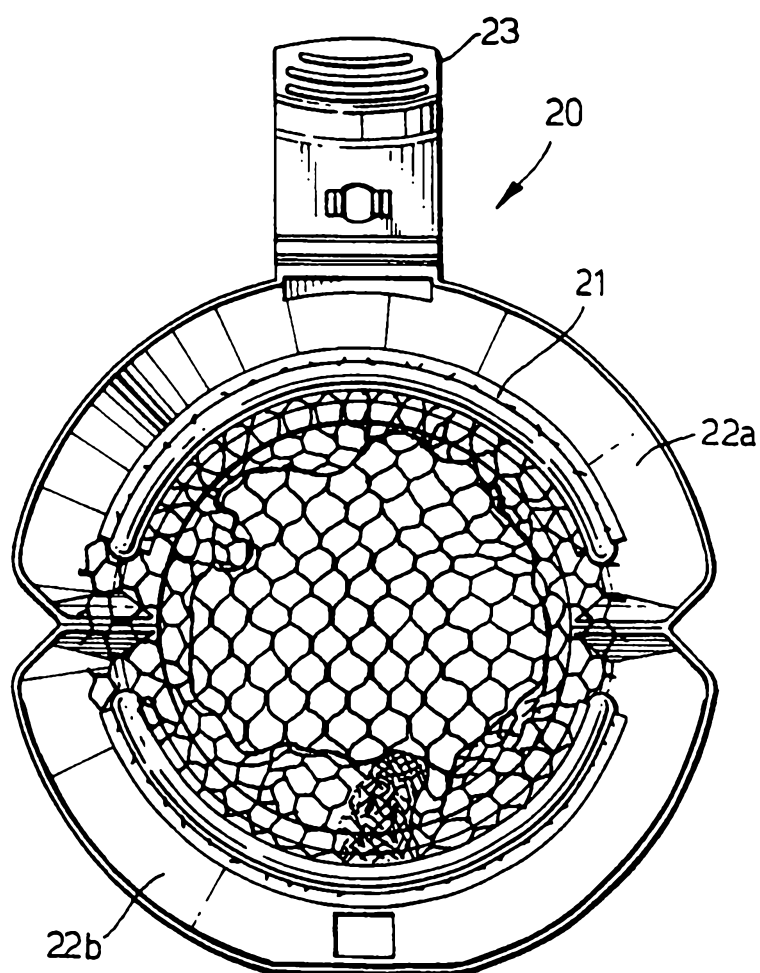


Fig.4.



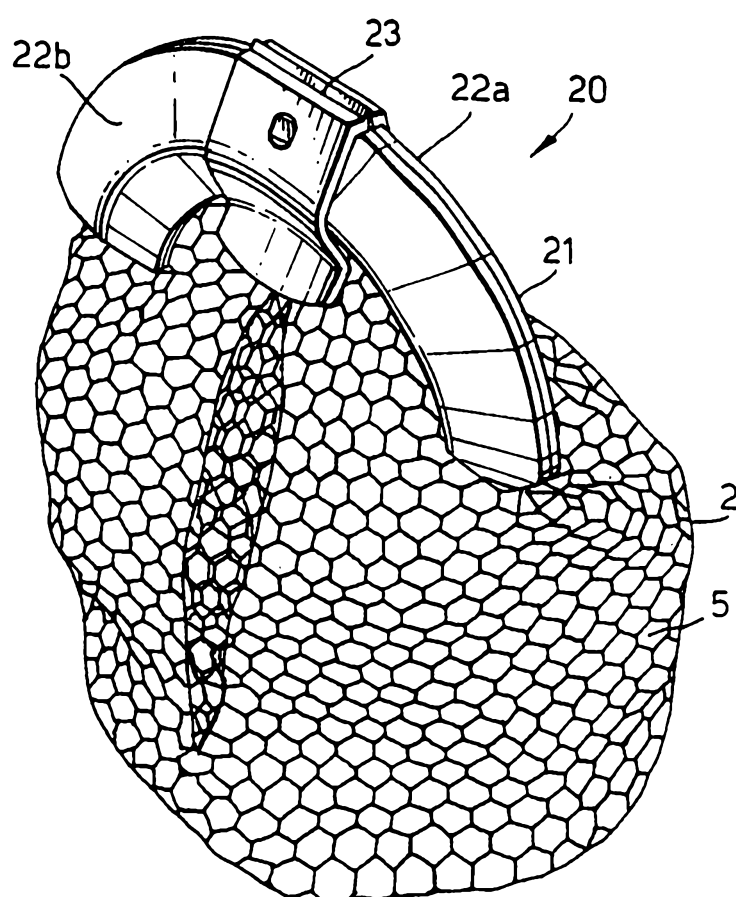
4 / 7

Fig.5.



5 / 7

Fig.6.



6 / 7

Fig.7.

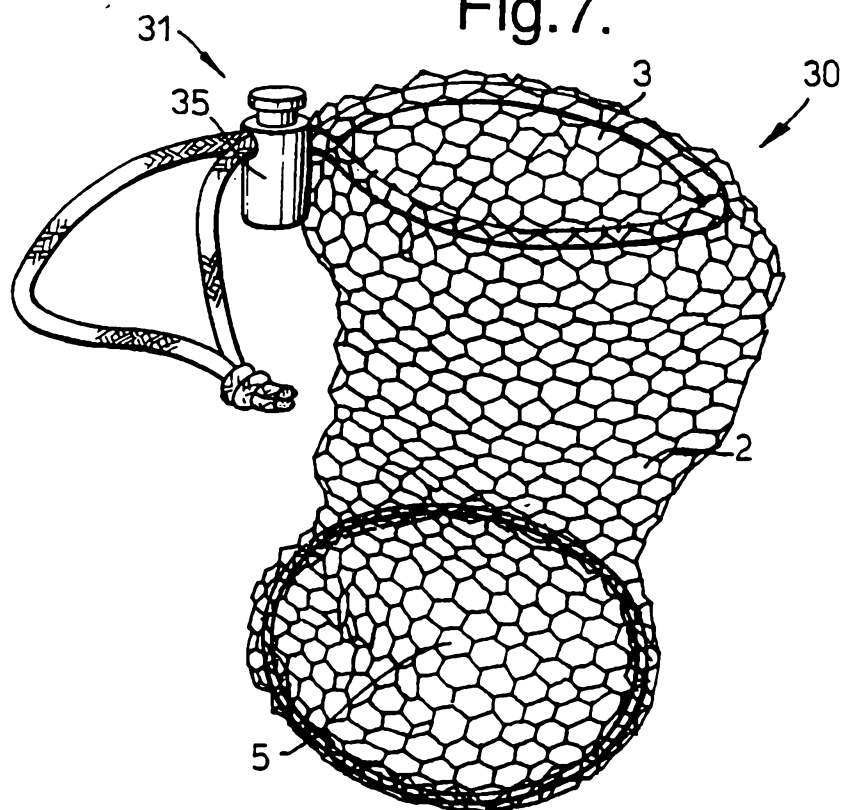


Fig.8.

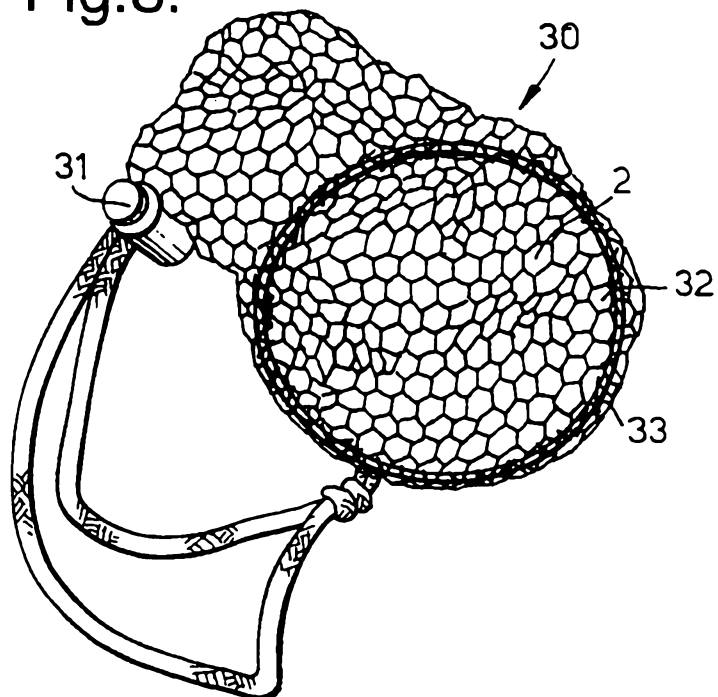


Fig. 9.

