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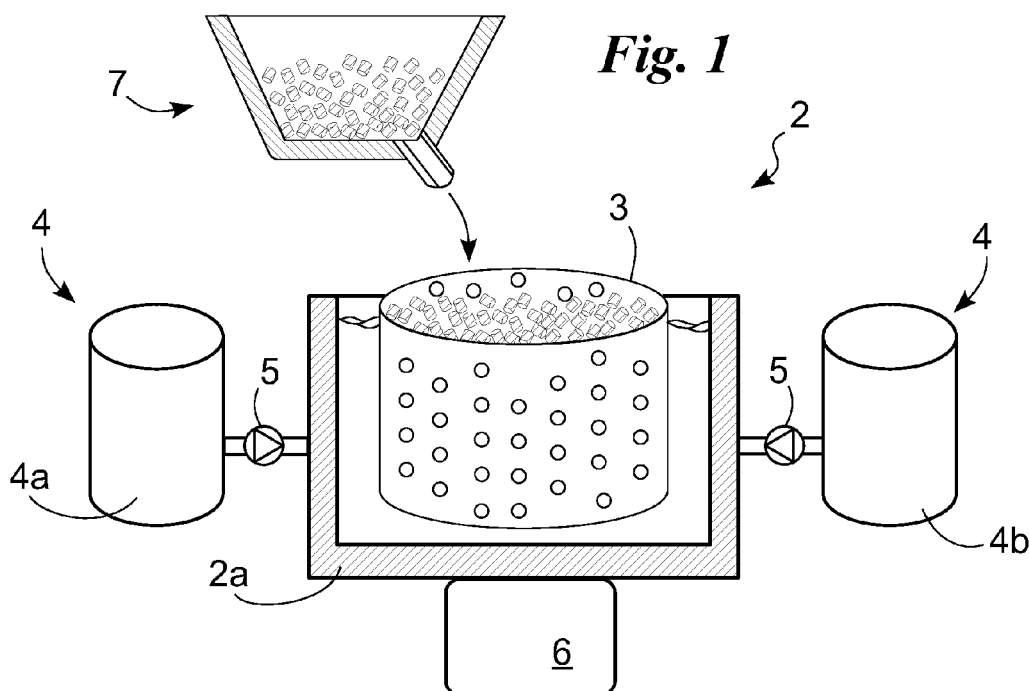
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(54) **Process for recycling cigarette butts and the like**

(57) It is provided a process for recycling cigarette butts and the like to enable reuse of a butt (1), comprising a filter (1 a) adapted to partly retain the harmful substances produced by said cigarette, residual tobacco (1c) and an envelope (1 b) adapted to partly surround said filter

(1 a) and consisting in: a step (10) of removing at least said residual tobacco (1 c) from the butt (1) and a step (30) of washing the butt (1), at least partly removing the harmful substances from the butt (1) deprived of the residual tobacco (1 c).



## Description

**[0001]** The present invention relates to a process for recycling cigarette butts and the like, of the type pointed out in the preamble of the first claim.

**[0002]** Therefore, the process is suitable for recycling the cigarette portion remaining at the end of a cigarette after use, which consists of the filter and an envelope and, in some cases, of a tobacco portion adapted to be removed before recycling. Smoke from a cigarette introduces more than 4000 chemical substances having an irritating, noxious, toxic, mutagenic and cancerogenic action into the surrounding environment. In particular, these substances enter the smoker's respiratory system.

**[0003]** For the above reason, each cigarette is provided with a filter fastened to a cigarette end and adapted to at least partly retain the aforesaid chemical substances. In greater detail, when the cigarette is being smoked, the filter is adapted to be placed at least partly inside the smoker's mouth so that smoke is forced to pass through the filter before reaching the smoker's lungs.

**[0004]** Therefore, part of these chemical substances remain in the filter and contaminate the unsmoked cigarette portion, usually referred to as cigarette butt. That is why in butts many contaminants or pollutants are present, among which nicotine, benzene, toxic gases, radioactive compounds (such as polonium 210) and cellulose acetate, i.e. the plastic material of which filter is made.

**[0005]** Finally, the decomposition time of a cigarette butt varies from one to eight years; in fact, in spite of the fact that tobacco and paper dissolve in few months, the filter resists the bacterium enzymes for several years.

**[0006]** The known art mentioned above has some important drawbacks.

**[0007]** Cigarette butts, as pointed out by ENEA (A domestic agency for new technologies, energy and sustainable economic development) are classified as dangerous waste for the environment. In fact, a recent research of the United States has proved that butts are part of the main waste suffocating the Mediterranean sea.

**[0008]** Accordingly, it is an important problem to carry out recycling of the cigarette butts, preventing them from remaining dispersed in the environment for years.

**[0009]** Under this situation, the technical task underlying the present invention is to conceive a process for recycling cigarette butts and the like capable of substantially obviating the mentioned drawbacks.

**[0010]** Within the scope of this technical task it is an important aim of the invention to provide a process enabling the cigarette butts to be recycled allowing reuse of same.

**[0011]** It is a further aim of the invention to create a simple and cheap process for recycling of cigarette butts.

**[0012]** The technical task mentioned and the aims specified are achieved by a process for recycling cigarette butts and the like as claimed in the appended Claim 1. Preferred embodiments are highlighted in the sub-

claims.

**[0013]** The features and advantages of the invention are hereinafter clarified by the detailed description of a preferred embodiment of the invention, with reference to the accompanying drawings, in which:

**Fig. 1** shows a device adapted to put into practice the process according to the invention;

**Fig. 2** shows an element adapted to be processed by the aforesaid device; and

**Fig. 3** is a diagrammatic representation of the process.

**[0014]** With reference to the drawings, the process for recycling cigarette butts and the like according to the invention is generally identified by reference numeral **100**.

**[0015]** This process is therefore adapted to enable reuse of the cigarette butts **1**, i.e. the cigarette portion remaining after the cigarette use. Butts **1**, as shown in Fig. 2, include a filter **1a**, which is employed for retaining at least part of the harmful substances produced by the cigarette, an envelope **1b** usually made of paper material and adapted to surround the whole cigarette, and a residual tobacco portion **1c**. In greater detail, process **100** is suitable to enable reuse of filters **1a**, which are usually made of cellulose acetate, paper, cotton or mixed cotton and paper.

**[0016]** Process **100** is preferably obtained through use of a device **2** adapted to perform extraction of the harmful substances from butt **1**. In detail, device **2** comprises a container **2a** defining an inner chamber adapted to house a basket **3** for receiving a plurality of butts **1**, and at least one vessel **4** adapted to be brought into connection for fluid passage with basket **3** through pipes or similar elements not shown in the figure. Preferably, as shown in Fig. 1, there are at least two vessels: the first vessel **4a** containing water possibly with addition of a suitable detergent; and a second vessel **4b** containing hydrogen peroxide.

**[0017]** In particular, the detergent contained in vessel **4a** consists of 5% sodium hypochlorite, while the second vessel **4b** contains 30% hydrogen peroxide. Furthermore, the second vessel can advantageously contain, in addition to hydrogen peroxide, colouring matter or dyes for colouring butt **1**, and/or perfumed substances such as sweet-smelling oils, adapted to enable the recycled butt **1** to have a pleasant smell.

**[0018]** Finally, device **2** preferably includes a fluid actuating system **5** adapted to cause movement of said fluids, and a motor **6** for actuation of basket **3**. Motor **6** drives said basket **3** in rotation relative to container **2a** ensuring both a high washing quality and an appropriate drying of butts **1** by centrifugation.

**[0019]** In detail, the actuating system **5** allows the fluids contained in vessels **4** to flow into the inner chamber of container **2a** filling it at least partly, and to be then evacuated from said chamber during the final steps of the recycling process **1**. In greater detail, the system can be

therefore advantageously obtained by a pump and a series of pipes.

**[0020]** Finally, device 2 can advantageously comprise a filling unit 7 adapted to store butts 1 and enable basket 3 to be filled. The filling unit 7 can therefore advantageously consist of a hopper, i.e. a container in the form of a truncated pyramid or cone turned upside down, provided with a hole at the bottom with a controlled opening allowing butts 1 to come out therethrough, so as to fill basket 3. The invention, i.e. process 100 for cigarette butt and other product recycling consists in the following sequence of operations, shown in Fig. 3: a removing step 10, a loading step 20, a washing step 30, a rinsing step 40.

**[0021]** The removing step 10 contemplates elimination of at least tobacco 1c from butt 1. Therefore tobacco 1c is removed and separated from the rest of butt 1 which, at this point, consists of filter 1 a and envelope 1 b. Alternatively, during the removing step, envelope 1 b can be also removed together with tobacco 1 c, so that the filter alone is submitted to process 1.

**[0022]** This removing step 10 preferably takes place by dipping the butts in hot water, i.e. at a temperature included between 30°C and 90°C, over a period of time preferably in the range of 3 to 30 hours.

**[0023]** At the end of this step, butt 1 is introduced into unit 7.

**[0024]** In the following loading step 20 unit 7 is activated so that it fills basket 3 with butts 1, said basket 3 being subsequently disposed inside container 2a. Alternatively, unit 7 can advantageously fill basket 3 when said basket is placed in container 2a. When step 20 has been completed, the washing step 30 is carried out. The fluid actuating system 5 is activated and it allows the detergent, or substantially the clear water, contained in vessel 4a to fill the inner chamber of container 2a at least partly.

**[0025]** Motor 6 sets basket 3 in rotation enabling the detergent to come into contact with all butts 1 contained in basket 3. In particular, the detergent is absorbed by filter 1 a and by envelope 1b, if present.

**[0026]** Then motor 6 submits butts 1 to centrifugation, i.e. it sets the basket in rotation at such a speed that all detergent is ejected from each butt 1. In detail, said operation allows not only the detergent to be removed from said butt, but also a first portion of the polluting substances present in filter 1a to be taken out. This operation is made possible by system 5 extracting the detergent from container 2a and promoting removal of said detergent from butt 1.

**[0027]** Process 100 is then completed by a rinsing step 40. During this step 40, the fluid actuating system 5 introduces the fluid coming from vessel 4b into container 2a, which fluid is thus absorbed by butt 1. The fluid, as previously described, is preferably made up of sweet-smelling oils and hydrogen peroxide, said hydrogen peroxide enabling the foreign substances still present in the butt to be removed, i.e. the residual harmful substances and the detergent possibly still present after the preceding washing step 30.

**[0028]** Finally, process 100 and therefore the rinsing step 40 is completed by new activation of motor 1 centrifuging basket 3 again, thereby causing said fluid to come out from the butt, which is therefore almost free from polluting substances.

**[0029]** The invention allows achievement of important advantages.

**[0030]** In fact, process 100 enables butt 1 to be recycled in a simple and cheap manner. In addition, the process, due to use of the particular detergent, allows almost the whole of the harmful substances present in filter 1c to be eliminated.

**[0031]** Therefore, a butt, at the end of the above described process, can be reused for manufacturing handkerchiefs and the like.

**[0032]** Finally, it has been found that the liquid from washing 30, in particular when washing is carried out with water alone, or also resulting from the removal step 10 of the cigarette butts, contains nicotine and can therefore be utilised for eliminating deposits and oxidation from pipelines for oil and gas, in particular in case of petroleum and various hydrocarbons.

**[0033]** The invention is susceptible of variations falling within the inventive idea. All of the details can be replaced by equivalent elements and the materials, shapes and sizes can be of any nature and magnitude.

## Claims

1. A process for recycling cigarette butts and the like to enable reuse of a butt (1) comprising a filter (1a) adapted to partly retain the harmful substances produced by said cigarette, residual tobacco (1c) and an envelope (1 b) adapted to partly surround said filter (1a) and said tobacco (1c), **characterised in that** it consists in: a step (10) of removing at least said residual tobacco (1 c) from said butt (1) and a step (30) of washing said butt (1), at least partly removing the harmful substances from said butt (1) deprived of said residual tobacco (1 c).
2. A process as claimed in claim 1, wherein said washing step (30) contemplates use of a detergent.
3. A process as claimed in claim 2, wherein said detergent consists of 5% sodium hypochlorite.
4. A process as claimed in one or more of the preceding claims, wherein said washing step (30) takes place after said removing step (10).
5. A process as claimed in one or more of the preceding claims, comprising a rinsing step (40), taking place after said washing step (30), in which possible residual substances are removed from said butt (1).
6. A process as claimed in claim 5, wherein said rinsing

step (40) is carried out using a fluid including at least hydrogen peroxide.

7. A process as claimed in claim 6, wherein said fluid includes sweet-smelling oils adapted to perfume said butt (1). 5
8. A process as claimed in one or more of claims 6-7, wherein said fluid includes dyes adapted to colour said butt (1). 10

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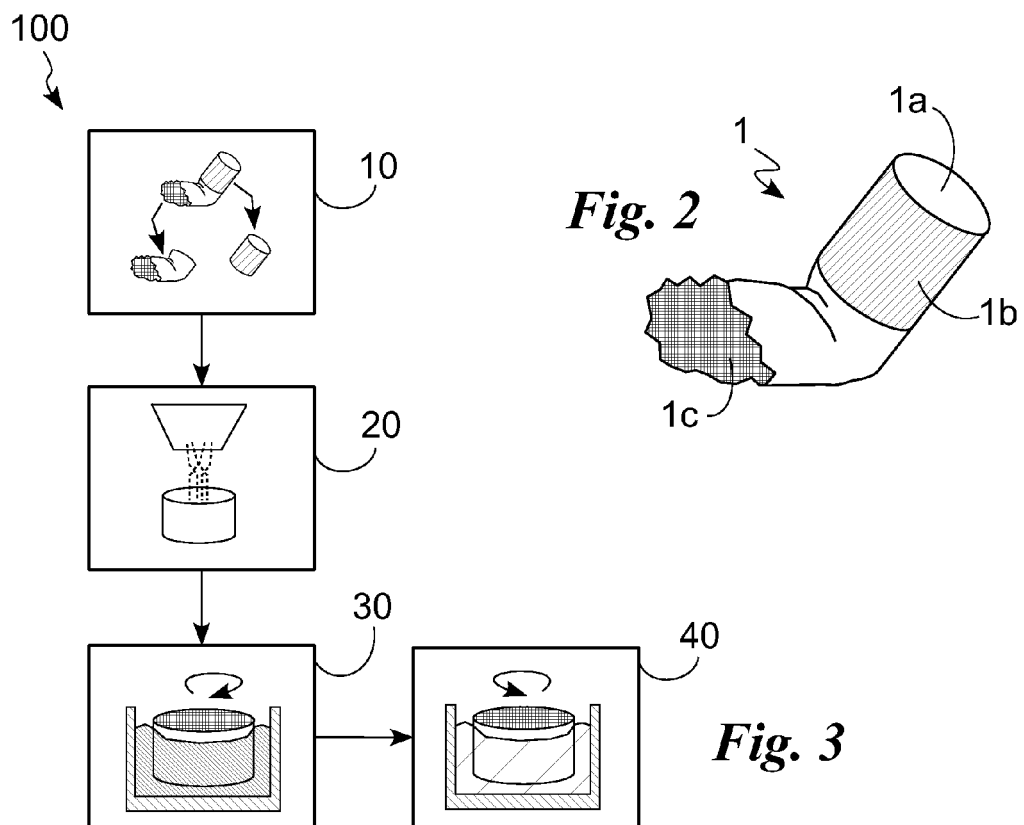
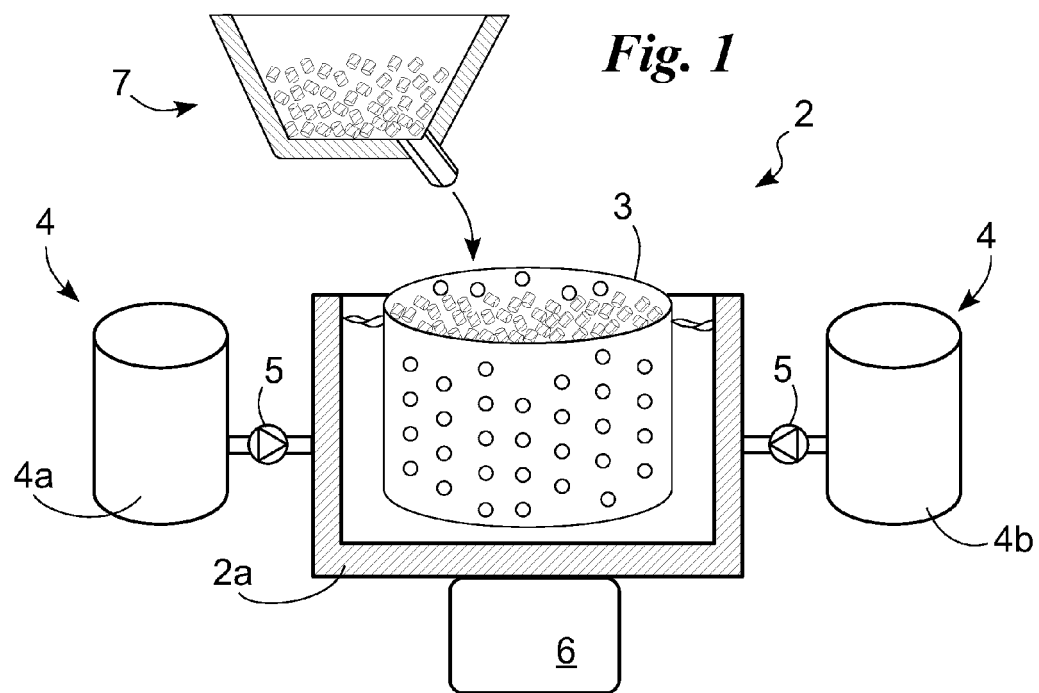
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## EUROPEAN SEARCH REPORT

Application Number  
EP 11 16 4437

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 5 504 120 A (HOPKINS JOHN B JR [US] ET AL) 2 April 1996 (1996-04-02) * column 2, line 63 - column 4, line 27; examples *	1-8	INV. A24C5/36 C08J11/06
X	----- WO 2007/035749 A2 (BURICH BLAKE [US]) 29 March 2007 (2007-03-29) * paragraphs [0004], [0012], [0014]; claims; figure 2 *	1-8	
A	----- US 5 662 773 A (FREDERICK TIM J [US] ET AL) 2 September 1997 (1997-09-02) * the whole document *	1	
			TECHNICAL FIELDS SEARCHED (IPC)
			A24C C08J
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 30 September 2011	Examiner Kock, Søren
CATEGORY OF CITED DOCUMENTS		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	
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			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 11 16 4437

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
The members are as contained in the European Patent Office EDP file on  
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30-09-2011

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