(54) Title: AN APPARATUS FOR USE IN THE RUBBER DRYING PROCESS

(57) Abstract: The present invention relates to an apparatus for retaining the pelleted rubber in the drying process. The apparatus according to the present invention comprising a container with a receiving area for the receiving of pelleted rubber, wherein the receiving area is provided with a non-stick layer for facilitating removal of dried rubber therefrom. The non-stick layer of said receiving area according to the present invention can be formed by coating the surfaces of said receiving area with a non-stick material. Alternatively, the non-stick layer can be formed by inserting at least one receptacle having the inner surfaces coated with a non-stick material. The non-stick material according to the present invention is a halocarbon resin comprising any one of or a combination of polyltetrafluoroethylene (PTFE), tetrafluoroethylene-hexafluoropropylene copolymer (FEP), tetrafluoroethylene-ethylene copolymer (ETFE), fluorinated ethylene propylene, perfluoroalkyl polymer resin, chlorosulphonated polyethylene or chlorotrifluoro-poly-ethylene.
AN APPARATUS FOR USE IN THE RUBBER DRYING PROCESS

Field of the invention

5 The present invention relates generally to an apparatus for use in the rubber drying process.

Background of the invention

10 Since the introduction of pelletised rubber and the production and marketing of technically specified rubbers, many steps in the processing, drying and the production and presentation of block natural rubber have undergone significant changes. The conversion of latex and field coagula into pelletised or crumbed form for easy drying may employ hammermills, the Heveacrumb process or its present popular method employing shredders.

15 For conversion of field coagula into pelletised or crumbed form using a shredder, the field coagula is fed into the shredder to shred it into pellets or crumbs. However, the drying process especially deep bed drying process using hot air of 100°C in a hot chamber has undergone little or no changes other than the source of heat applied. The most common way of drying the pelletised rubber is by placing the pelletised rubber on a trolley, which is then placed in a hot chamber and the drying air is blown to the pelletised rubber to dry the pelletised rubber or to form the rubber bales. The rubber bales formed using the heat are normally strongly adhere to the trolley at their contact surfaces. Hence, the most labour and muscle intensive operation is the removal of the dried rubber or bales from the trolley after it emerges from the hot chamber. Adding to this problem are the remnants of the rubber that stick to the interior bottom and walls of the trolley upon removal of the dried rubber. The process of cleaning up the trolley to remove the sticky debris is time consuming, costly and labour intensive. The use of sodium hydroxide or its common name caustic soda is essential to dissolve the remnants to accomplish the cleaning process. Occasionally, the oxyacetylene torch is resorted to for burning off the remnants. In addition, the dry sticky rubber that remains or accumulates in the trolley may affect the plasticity retention index (PRI) of a new batch of rubber loaded onto the said trolley.
It is therefore a necessity to provide an apparatus that facilitates the removal of the dried rubber or rubber bales upon completion of the drying process and leave no remnants in the apparatus.

Summary of the Invention

An aspect of the present invention is to provide an apparatus for use in the rubber drying process specifically in facilitating the removal of dried rubber.

A further aspect of the present invention is to provide an apparatus where no dry sticky rubber debris remains or accumulates in the apparatus upon removal of the dried rubber therefrom.

Another aspect of the present invention is to provide an apparatus which is reusable without the necessity of repeat cleaning operations.

Still, another aspect of the present invention is to provide an apparatus comprising a container with a receiving area for the receiving of pelletised rubber, wherein said receiving area is provided with a non-stick layer for facilitating the removal of dried rubber therefrom.

An apparatus of the present invention comprising a container with a receiving area for the receiving of pelletised rubber, wherein the non-stick layer is formed by coating the surfaces of said receiving area with a non-stick material.

An apparatus of the present invention comprising a container with a receiving area for the receiving of pelletised rubber, wherein said non-stick layer is formed by inserting at least a receptacle having inner surfaces coated with a non-stick material. Preferably, the receptacle of the present invention is a cuboid receptacle with a perforated bottom.

According to the present invention, the non-stick material possesses a low co-efficient of friction and it is comprises of a non-reactive material or a combination of non-reactive materials.
An apparatus according to the present invention, wherein the apparatus is a drying trolley made from metal. The trolley has a perforated bottom and dividers which divide the trolley into a plurality of compartments.

According to the preferred embodiment of the present invention, the non-stick material is a halocarbon resin comprises any one or a combination of polytetrafluoroethylene (PTFE), tetrafluoroethylene-hexafluoropropylene copolymer (FEP), tetrafluoroethylene-ethylene copolymer (ETFE), fluorinated ethylene propylene, perfluoroalkyl polymer resin, chlorosulphonated polyethylene or chlorofluoro-poly-ethylene.

**Detailed description of preferred embodiments**

The present invention relates to an apparatus for use in the rubber drying process. The apparatus for the drying of pelletised rubber is made from metal preferably stainless steel or aluminum. The apparatus of the present invention comprises dividers which divides the apparatus into a plurality of compartments. In the preferred embodiment of the present invention, the dividers divide the apparatus into at least 16 compartments. The apparatus of the present invention further comprises a perforated bottom for the entry of hot air through the perforations.

According to the present invention an apparatus for use in the rubber drying process which comprises a container with a receiving area for the receiving of said rubber, wherein said receiving area is provided with a non-stick layer for facilitating removal of dried rubber therefrom.

In one embodiment of the present invention, the non-stick layer can be formed by coating the inner surfaces of said apparatus or more accurately the surfaces of the receiving area of said apparatus with a non-stick material.

Alternatively, the conventional apparatus for use in the rubber drying process may be modified and altered into a non-stick apparatus by inserting at least one receptacle, that has
a reception area coated with the non-stick material. Preferably, the receptacle is a cuboid receptacle with a perforated bottom.

The non-stick material used in the present invention has characteristics of a low coefficient of friction and is non-reactive or inert to most chemical materials.

In the preferred embodiment of the present invention, the non-stick material is a halocarbon resin comprises any one or a combination of polytetrafluoroethylene (PTFE), tetrafluoroethylene-hexafluoropropylene copolymer (FEP), tetrafluoroethylene-ethylene copolymer (ETFE), fluorinated ethylene propylene, perfluoroalkyl polymer resin, chlorosulphonated polyethylene or chlorofluoro-poly-ethylene.

More preferably, the halocarbon used in the present invention is polytetrafluoroethylene (PTFE). The use of PTFE in kitchenware is well known for its anti-stick properties under hot conditions. Furthermore, PTFE also has characteristics of being heat-resistant, low-temperature resistant, corrosion resistant, and self-moistening, as well as possessing a low coefficient of friction. PTFE is relatively inert to other chemical materials, so that it is hard for chemical materials to adhere on the surfaces coated with PTFE.

The non-stick layer provided on the inner surfaces of the apparatus enable easy removal of dried rubbers or bales from the apparatus with no rubber debris or remnants left behind. Thus, the apparatus is reusable without needing cleaning operations in between. As a result, it reduces the cost for the drying process and simplifies the drying process. Additionally, the drying process can be automated by simply circulating the non-stick apparatus of the present invention.

Remnants of dried rubber left in an apparatus have been known to contaminant and adversely affect the plasticity retention index (PRI) of further and new batches of rubber loaded onto the said apparatus.

The drying process using an apparatus of the present invention leave no remnants in the interior bottom and wall of the apparatus and thus ensuring no contamination and no
adverse effects to the plasticity retention index (PRI) of the dried rubber obtainable thereof.

One embodiment of the apparatus according to the present invention is a drying trolley for use in the drying of pelletised rubber.

While the initial capital cost for producing the non-stick apparatus of the present invention is significant, the savings in the cost of labour and materials for the regular cleaning up operation are substantial. In addition, the pelletised rubber dried using an apparatus of the present invention would substantially have a consistent plasticity retention index (PRI).

It will be understood that the above description does not limit the invention to the above given details. It will be apparent to those skilled in the art that various changes and modifications may be made therein without departing from the spirit of the invention or from the scope of the appended claims.
Claims

1. An apparatus for use in the rubber drying process comprising a container with a receiving area for the receiving of pelletised rubber, characterised in that the receiving area is provided with a non-stick layer for facilitating the removal of dried rubber therefrom.

2. An apparatus for use in the rubber drying process according to Claim 1, wherein the apparatus is a drying trolley.

3. An apparatus for use in the rubber drying process according to Claim 1, wherein the non-stick layer is formed by coating the surfaces of said receiving area with a non-stick material.

4. An apparatus for use in the rubber drying process according to Claim 1, wherein the non-stick layer is formed by inserting at least one receptacle having the inner surfaces coated with a non-stick material.

5. An apparatus for use in the rubber drying process according to Claim 4, wherein the receptacle is a cuboid receptacle with a perforated bottom.

6. An apparatus for use in the rubber drying process according to Claims 3 to 4, wherein the non-stick material is a material with low coefficient of friction.

7. An apparatus for use in the rubber drying process according to Claims 3 to 4, wherein the non-stick material is a non-reactive material.

8. An apparatus for use in the rubber drying process according to Claims 3 to 7, wherein the non-stick material is a halocarbon resin.

9. An apparatus for use in the rubber drying process according to Claim 9, wherein the halocarbon resin comprises any one or a combination of polytetrafluoroethylene (PTFE), tetrafluoroethylene-hexafluoropropylene copolymer (FEP), tetrafluoroethylene-ethylene copolymer (ETFE), fluorinated ethylene propylene, perfluoroalkyl polymer resin, chlorosulphonated polyethylene or chlorofluoro-poly-ethylene.
10. An apparatus for use in the rubber drying process according to Claim 9, wherein the halocarbon resin is preferably polytetrafluoroethylene (PTFE).

11. An apparatus for use in the rubber drying process according to any one of the preceding claims, wherein said apparatus comprises dividers which divide the container of said apparatus into a plurality of compartments.

12. An apparatus for use in the rubber drying process according to Claim 11, wherein said dividers divide the container of said apparatus into at least 16 compartments.

13. An apparatus for use in the rubber drying process according to any one of the preceding claims, wherein said apparatus comprises a perforated bottom for the passage of hot air through the perforations.

14. An apparatus for use in the rubber drying process according to any one of the preceding claims, wherein said apparatus is made from metal.

15. An apparatus for use in the rubber drying process according to Claim 14, wherein the metal is preferably stainless steel or aluminium.

16. A process for the drying of rubber using an apparatus according to any one of the preceding claims.
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl.

B29B 13/06 (2006.01)  B65D 25/14 (2006.01)  C08C 3/00 (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
WPIDS, JAPIO, espacenet, USPTO, CAPLUS: PTFE or teflon or fluoro*; container or tray or plate or pan; coat*; rubber and PTFE or teflon and dry* etc.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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<td>GB 2262217 A (GEORGE WILKINSON (BURNLEY) LIMITED) 16 June 1993 See abstract, Figures</td>
<td>1, 3, 6-10, 13-15</td>
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<tr>
<td>X</td>
<td>EP 0177262 A2 (LEWIN, DAVID) 9 April 1986 See abstract, p4, p7 line 16-20</td>
<td>1, 3, 6-10, 13-15</td>
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<td>US 3739485 (TAILOR) 19 June 1973 See abstract, Figure 5-6</td>
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<td>EP 1184148 A2 (LINATEX RUBBER PRODUCTS) 6 March 2002 See abstract, [0021], [0027]</td>
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<td>Y</td>
<td>US 3898314 (CHURCH) 5 August 1975 See abstract</td>
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