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**B5A AB12 AB14 A1R214H A1R314C1X A1R314C3**  
**A1R420 A1R439X A2A1 A20T14**

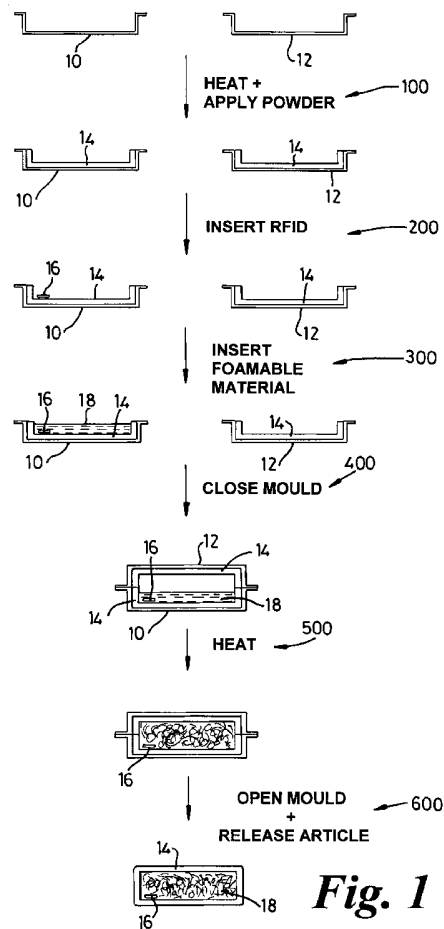
(56) Documents Cited:  
**US 5426719 A** **US 4606171 A**  
**US 20040238623 A**

(58) Field of Search:  
 UK CL (Edition X ) **B5A**  
 INT CL<sup>7</sup> **B29C, B29D, B65D**  
 Other: **Online & other databases: WPI EPODOC**

(54) Abstract Title: **Moulded transit or location article**

(57) An article comprises an electronic signalling device (RFID) 16 embedded in a foamed plastics material 18 to allow one or more of location, identification, tracking etc. of the article. The embedding provides thermal and mechanical protection and can be used to conceal the device from external view and/or surreptitious removal.

A plastics particulate material is applied to heated complementary mould portions 10,12 to form skins 14. Then, the device (RFID) 16 is located on the interior face of one of the skins 14. Foamable material 18 is applied to at least one of the exposed skins and the portions 10,12 are brought together to close the mould. Heat is applied to allow the material 18 to form and embed the device 16. The material may comprise recycled plastics material alone or mixed with other waste material.

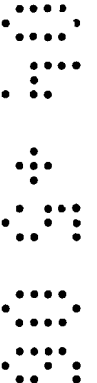
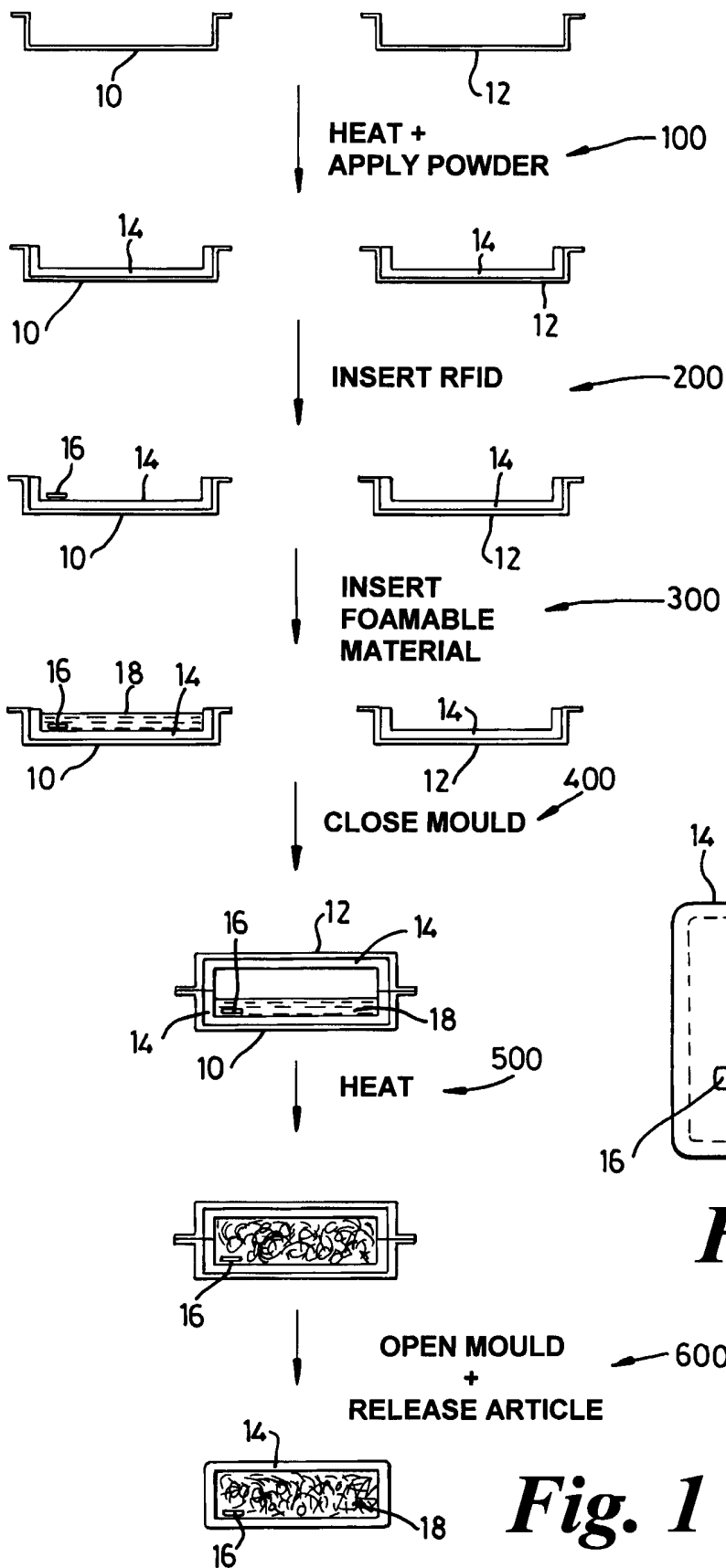


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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 1995

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Transit or Location Article

This invention relates to transit or location articles which accompany items in transit or location or in storage whether for e.g. retail distribution or for storage and transit of components in an assembly line. Thus typical examples of transit or location articles within the context of this specification are pallets, boxes and other containers.

It has been proposed to associate some form of electronic signalling device with such containers so as to signal their presence either actively or passively when interrogated by a suitable electronic signal. This form of electronic tagging can be for many different applications, for example security against theft, logging progress through an assembly line, locating the whereabouts of a container within a storage area and so on. We have found however that there are practical difficulties with such arrangements because, if the electronic device is externally visible or accessible, it may be prone to damage or illegitimate removal from the container. In addition, the device can be prone to physical or other damage.

There has been a proposal to fit a signalling device within a recess in a moulded plastics container but this does not provide a high level of security. It has also been proposed to position a radio frequency identification device (RFID) against the wall of an injection mould prior to admission into the mould of the injection plastics material. In this instance, the RFID is mounted at the surface of the injection moulded article and so is prone to damage/illegitimate removal, and potentially heat damage due to being located next to the metal surface of the mould.



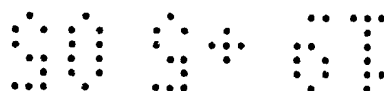
Accordingly, in one aspect, this invention provides a transit or location article comprising:-

a body portion at least part of the thickness of which is of foamed plastics material, and

5 an electronic signalling device integrally embedded in said foamed plastic material.

This arrangement has several advantages over those described above; embedding the electronic signalling device within the foamed plastics material renders it more resistant to illegitimate removal; embedding in foamed material provides good anti-shock and thermal insulating properties; in many applications embedding of the electronic signalling device in the foamed plastic material will render it invisible to external view and so someone illegitimately moving or handling the article will not know whether it contains an electronic signalling device and if so where that device is located; furthermore, even if the device is located its removal will require major disruption of the body thereby making the installation tamper evident.

In one embodiment, the body region is made up of spaced skin elements disposed to either side of a core of said foamed plastics material. This construction is light and stiff and the skin elements provide abrasion and weather protection for the foamed plastics material. The spaced skin elements are preferably integrally bonded to either side of said core. In a particularly preferred element, the body is made using a powder impression moulding process of the type set forth in WO02/062550.



The electronic signalling device may be a passive device which responds to a suitable interrogation signal which provides the power necessary for the device to return a response signal, but it may instead be active in terms of having its own power supply attached thereto. Thus the electronic signalling device may be an RFID device or it could comprise a communication module capable of communicating by radio with an external network such as the mobile telephone communications network or a locally set up radio network using e.g. short range radar links such as Bluetooth™ or DECT etc.

A transit or location article may take many forms such as a pallet, a container for shipment of retail goods and/or foodstuffs, or containers for transport of other goods.

In another aspect, this invention provides a method of producing a transit or location article, which method comprises the steps of:-

providing complementary mould portions designed to provide a mould cavity to form said body portion;

locating in said cavity an electronic signalling device, and

introducing a foamed or foamable plastics material into said cavity thereby to form a transit or location article having a body portion in which the electronic signalling device is integrally embedded in said foamed plastics material.

In one arrangement, the method includes the step of heating the complementary mould portions, applying a plastics particulate material to said heated mould portions so as to soften to form a skin after which said electronic signalling device is located in the interior of one of said skins, a foamable



plastics material is applied to at least one of the exposed skins and the mould then closed to allow the plastics material to foam and embed said electronic signalling device.

Whilst the invention has been described above, it extends to any inventive combination of the features set out above or in the following description.

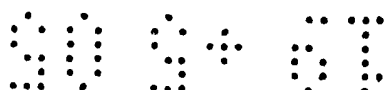
The invention may be performed in various ways and an embodiment thereof will now be described, by way of example only, reference being made to the accompanying drawings in which:-

Figure 1 is a schematic view of a method for producing a transit or location article in accordance with this invention, and

Figure 2 is a top plan view of a formed article.

In this particular example the transit or location article is shown as a single panel having embedded therein an RFID device; it will of course be appreciated that the transit or location article may take many different forms such as pallets, containers etc.

In order to produce the transit or location article a power impression moulding process is used which makes use of complementary moulds 10 and 12 which are shown in this arrangement as being of thin walled form but may be a much thicker cast and/or milled form in practice. Many of the steps in the process are similar to those of the power impression moulding process described in WO02/062550, the entire contents of which are incorporated herein by reference.



Thus the complementary moulds are first heated so that when a particulate thermoplastic powder material is applied at step 100, it melts to form a thin skin 14 on each of the moulds. In the next stage, 200, a radio frequency identification device, RFID 16 is located in the required position in what will be the lowermost mould 10. At stage 300 a foamable plastics material 18 is loaded into the lower mould 10 on top of the RFID 16. The foamable material may comprise or contain recycled plastics material alone or mixed with other waste material. The foamable material 18 contains a foaming agent which is activated by heat. The mould is then closed, 400, by inverting the mould 12 and placing it in registration with the lower mould 10. Heat is then applied, 500, to activate the firming agent so that the foamable material foams and expands to fill the entire cavity defined between the two skins 14 and bonding securely to each. The mould is then opened, 600, to release the article 20.

As seen in plan in Figure 2, the finished product has the RFID 16 embedded in a foam core 18 which itself is encased in a plastics skin 14.

In the finished article, the foam material serves to protect the RFID against shock and tampering. Its location away from the mould surface means that it is protected against exposure to high temperature that would be the case should the device be in contact with the metal mould in e.g. an injection moulding process. Furthermore, the location of the RFID in the mould can be varied between subsequent items. In addition, in certain applications, more than one RFID may be located in the mould.



## CLAIMS

1. A transit or location article comprising:

a body portion at least part of the thickness of which is of foamed plastics material, and

5 an electronic signalling device integrally embedded in said foamed plastics material.

2. A transit or location article according to Claim 1, wherein said body region is made up of spaced skin elements disposed to either side of a core of said foamed plastics material.

10 3. A transit or location article according to Claim 2, wherein said spaced skin elements are integrally provided to either side of said core.

4. A transit or location article according to any of the preceding claims including a plurality of electronic signalling device integrally embedded in said foamed plastics material.

15 5. A transit or location article according to any of the preceding claims wherein said body portion is made by a powder impression moulding process.

6. A transit or location article according to any of the preceding claims adapted for use as a pallet.

20 7. A transit or location article according to any of Claims 1 to 6, wherein said transit or location article is in the form of a container.

8. A method of producing a transit or location article, which method comprises the steps of:-

providing complementary mould portions designed to provide a mould cavity to form said body portion



;

locating in said cavity an electronic signalling device, and

introducing a foamed or foamable plastics material into said cavity  
thereby to form a transit or location article having a body portion in which the  
5 electronic signalling device is integrally embedded in said foamed plastics  
material.

9. A method according to Claim 8, which includes the step of heating the  
complementary mould portions, applying a plastics particulate material to said  
heated mould portions so as to soften to form a skin after which said electronic  
10 signalling device is located in the interior of one of said skins, a foamable  
plastics material is applied to at least one of the exposed skins and the mould  
then closed to allow the plastics material to foam and embed said electronic  
signalling device.





INVESTOR IN PEOPLE

Application No: GB0508396.9

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Examiner: Monty Siddique

Claims searched: 1-9

Date of search: 26 June 2005

## Patents Act 1977: Search Report under Section 17

### Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
Y	1-4, 6-8 at least	US2004/238623 A (ASP W) electronic tagging device integrally embedded in moulded plastics
Y	1-4, 6-8 at least	US5426719 A (US ARMY) loudspeaker 202 and input 204 are embedded in moulded foam
Y	1, 2, 6, 7 at least	US4606171 A (OHSHIMA K) electronic devices embedded in foam layer

### Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application

### Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC<sup>X</sup> :

B5A

Worldwide search of patent documents classified in the following areas of the IPC<sup>07</sup>

B29C; B29D; B65D

The following online and other databases have been used in the preparation of this search report

WPI EPODOC