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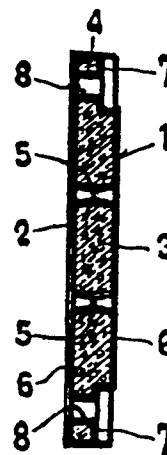
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(54) **An article of manufacture suitable to be used as a balancing mass in machines and a process for the production thereof.**

(57) An article of manufacture suitable to be used as a balancing mass in machines, in particular household appliances, and a process for the production thereof.

The article of manufacture (1; 10; 11) comprises a shell (2), preferably in plastic material, that encloses a body (3) formed by at least one composition which is cast in the fluid state inside the shell (2) and allowed to solidify, incorporating stiffening elements (5), thus obtaining the article of manufacture (1; 10; 11) in the finished state. Preferably the composition is a conglomerate comprising both inert and binder materials.

**FIG. 3****EP 0 623 436 A1**

The present invention relates to an article of manufacture suitable to be used as a balancing mass in machines, in particular household appliances, and a process for the production thereof.

In machines, for example household appliances, such as washing machines, dishwashers and the like, or like tractors and machine tools, masses are used, in particular counterweights, to balance statically and dynamically such machines.

Generally, these counterweights (i.e. balancing masses) are made from a conglomerate mixture. In particular, said conglomerate are made of an inert material such as sand, fine gravel and metal scalings, a binder, preferably of the enhanced cement type, and water. In some cases said counterweights are also provided with a reinforcement consisting of internal stiffeners.

The production cycle of said counterweights varies depending on the composition of the abovementioned mixture. However, it comprises essentially the following steps:

- preparing a fluid mixture,
- casting said mixture in the fluid state into moulds of metal or plastic, such as ABS, while vibrating for compacting the mixture in the mould,
- optionally pressing the semi-dry mixture,
- dismantling the mould, once the mixture has reached maturity, with manual opening of the half-shells of the mould and extracting a semi-finished mass,
- finishing the mass by removing the burrs formed by the seam of the half-shells of the mould.

These conventional methods have several drawbacks.

First of all the production cycle is fairly long, complex and expensive. In particular, they are affected by the operations required to prepare the reinforcement, the length of time ranging from one to two days for the mixture to mature and the subsequent manual operation of opening the half-shells of the mould.

Moreover, frequent changes in shape and dimensions are required for these masses thus involving additional working activities and costs.

Finished counterweights also exhibit a number of drawbacks.

In fact, the counterweights undergo breakages, pulverisation and/or crumbling which involve a reduction in the weight. A further drawback is the high dimensional difference shown by counterweights of the same type due to the different deformation of each mould, especially if made of plastic, which happen as a result of the continual stresses to which the moulds are subjected during the production process. Lastly the surface of the conventional counterweights is not smooth and

they are not pleasant-looking.

A first object of the present invention is to overcome the drawbacks and disadvantages of the conventional balancing masses (i.e. counterweights) and their production process.

In particular, the main object of the present invention is to provide an article of manufacture which has a very tight dimensional tolerance and does not undergo any reduction of weight in time.

Another object of the invention is to provide an article of manufacture having an agreeable appearance.

A further object of the invention is to provide a simple, quick and safe process for the production of said article of manufacture.

According to the invention, these objects are attained by an article of manufacture suitable to be used as a balancing mass for machines, particularly household appliances, characterized in that it comprises a shell enclosing a body formed by at least one composition solidified inside said shell from a fluid composition, so that said shell acts as an envelope of said body.

According to a preferred embodiment, said solidified composition is a conglomerate comprising both inert and binder materials.

According to another preferred embodiment said shell is made of a suitable plastic material.

Preferably said shell contains stiffening elements capable of reinforcing said body.

The abovementioned objects are also attained, according to the invention, by a process for the production of an article of manufacture suitable to be used as a balancing mass for machines, particularly household appliances, comprising

- preparing a fluid composition capable of becoming solid,
- selecting a suitable shell,
- casting said fluid composition inside said shell through an opening while the shell is shaken for compacting said composition inside it, and
- allowing said composition to become solid so as to form a solid body enveloped by said shell.

With this solution, several advantages are achieved. Mainly, the article of manufacture is endowed with a very tight dimensional tolerance, of the order of a few tenths of a millimeter per article, thanks to the shell. As regards the accuracy of the balancing masses made in this way, it is noteworthy that the shell is used only once. Therefore, the shell of this invention is not subject to the continuous wear and deformations affecting the conventional moulds and the dimensional differences in the balancing masses of this invention are negligible. In addition, the shell of this invention acts as a protective envelope capable of preserving

the solid mass contained therein from cracking, crumbling, breaking, and also improves the appearance of the article of manufacture. Most importantly, even when an article of manufacture of this invention crumbles, the envelope holds the crumbled material, thus maintaining unchanged its weight.

The production process is particularly effective and flexible, because it involves a reduced number of very simple steps. In fact it does not require the steps of equipping the moulds with stiffening elements, dismantling the moulds for extracting the balancing masses and of finishing the surface thereof which are required by the conventional processes. Lastly, changes in shape and dimensions of the articles of manufacture can be made at low cost, because, to produce shells with a new shape, it is sufficient to change only the master mould while, in the conventional methods, in addition to changing the master mould, it is also necessary to replace all the moulds used in the production of balancing masses made of conglomerate or the like.

Further features and advantages of the invention will now be apparent from non-limiting specific embodiments which are illustrated in the enclosed drawings, wherein:

Figs. 1 and 2 are front and top plan views, respectively, of an embodiment according to the invention;

Fig. 3 is a cross-sectional view taken along the plane III-III of Fig. 1;

Figs. 4 and 5 are front and top plan views, respectively, of a second embodiment according to the invention;

Fig. 6 is a cross-sectional view taken along the plane VI-VI of Fig. 4;

Figs. 7 and 8 are front and top plan views, respectively, of a further embodiment according to the invention;

Fig. 9 is a cross-sectional view taken along the plane IX-IX of Fig. 7.

In Figs. 1, 2 and 3 there is indicated as a whole with 1 an article of manufacture suitable to be used as a balancing mass in machines, particularly household appliances, such as washing machines, dishwashers and the like, or tractors and machine tools.

The article of manufacture 1 comprises a shell 2, substantially in the shape of a parallelepiped, and a body 3 enclosed by the shell 2. The shell 2 has an opening 4, clearly visible in Fig. 3, and stiffening elements 5, fastened to its walls 6 and incorporated in the body 3. The shell 2 has grooves 7 and holes 8 capable of housing nuts, not shown, that allow the article of manufacture 1 to be fastened to a machine that needs such a balancing mass.

The shell 2 is made of a material capable of forming an envelope for the body 3. Preferably it is made of a plastic material, for example a polyolefin such as polyethylene and PVC, and is obtained by blowing. The walls 6 of the shell 2 have a thickness of from 0.5 to 2 mm and their strength can be increased by means of ribs, corrugations and the like.

The body 3 is formed by a solidified composition and is reinforced by stiffening elements 5. The composition is preferably formed by a conglomerate comprising inert and binder materials. In the case of a cement conglomerate, the starting mixture consists of inert materials such as, for instance, sand, fine gravel, metal scalings, of an enhanced cement binder and water.

For example, a suitable cement conglomerate will, in the dry state, have the following composition: cement = 5-20%, additives = 0.05-0.25%, inert materials = 79.75-94.95%.

Examples of suitable types of additives for cement conglomerates are the accelerators.

A suitable non-cement conglomerate will, for example, include the same inert materials as the cement conglomerate but the binder will consist of resins or organic bonding agents.

The specific gravity value of the body 3 may vary depending on the ratios of the various components in the composition, so that balancing masses having different weights can be formed for the very same volume of the shell 2, in accordance with the needs.

To produce the article of manufacture 1, the starting composition in the fluid state is cast inside the shell 2 through the opening 4, while shaking the shell 2 to compact the composition inside it. The composition is then allowed to solidify inside the shell 2, so that the solid body 3 is enveloped by the shell 2 and the article of manufacture 1 is thus obtained in the finished state.

In Figs. 4, 5 and 6 there is indicated as a whole, with 10, another embodiment of the invention wherein the parts that are the same as those of the article of manufacture 1 are marked with the same numbers.

The article of manufacture 10 comprises a shell 2, substantially in the form of a parallelepiped, with one wall 6 partially arched.

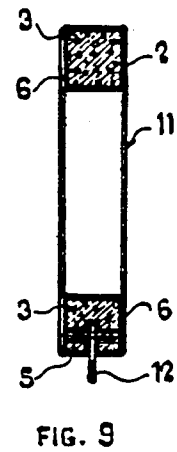
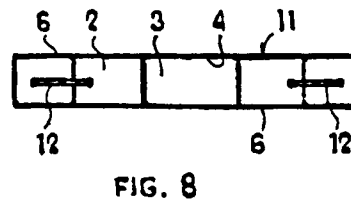
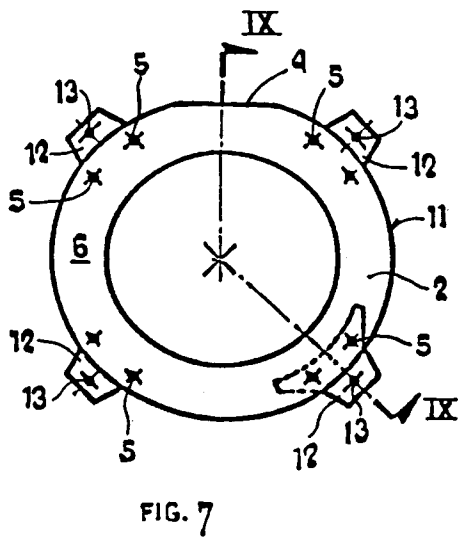
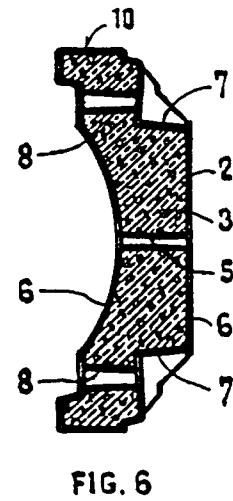
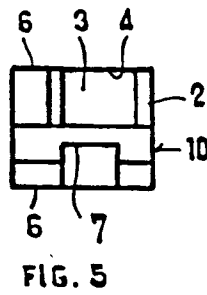
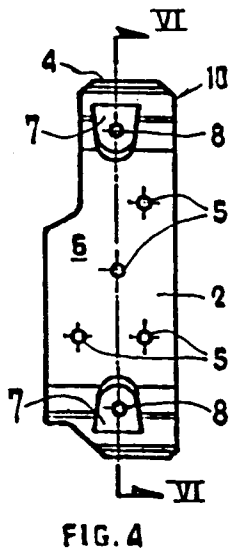
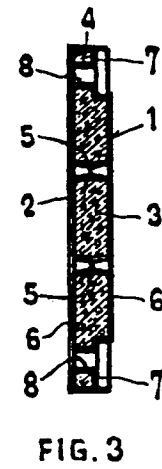
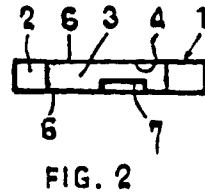
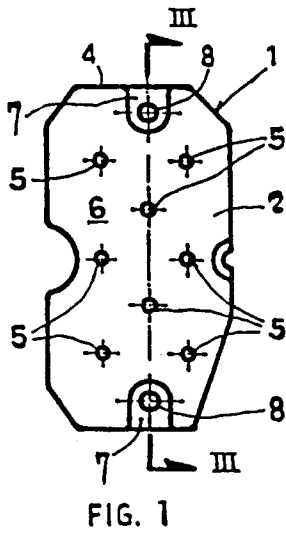
In Figs. 7, 8 and 9 there is indicated as a whole, with 11, a further embodiment of the invention, wherein the parts that are the same as those of the article of manufacture 1 are marked with the same numbers.

The article of manufacture 11 comprises a shell 2, substantially ring-like, endowed with connecting flanges 12, provided with holes 13, fastened to the walls 6 by means of pins 5.

The articles of manufacture 10 and 11 have substantially the same construction features as those of the article of manufacture 1 and are manufactured with the same production process.

Claims

1. An article of manufacture (1; 10; 11) suitable to be used as a balancing mass for machines, particularly household appliances, characterized in that it comprises a shell (2) enclosing a body (3) formed by at least one composition solidified inside said shell (2) from a fluid composition, so that said shell (2) acts as an envelope of said body (3). 5
2. An article of manufacture (1; 10; 11) according to claim 1, characterized in that said solidified composition is a conglomerate comprising both inert and binder materials. 10
3. An article of manufacture (1; 10; 11) according to claim 1, characterized in that said shell (2) is made of a suitable plastic material. 15
4. An article of manufacture (1; 10; 11) according to claim 3, characterized in that said shell (2) is made of a polyolefin. 20
5. An article of manufacture (1; 10; 11) according to claim 1, characterized in that said shell (2) is provided with an opening (4) fit for casting said fluid composition. 25
6. An article of manufacture (1; 10; 11) according to claim 1, characterized in that said shell (2) contains stiffening elements (5) capable of reinforcing said body (3). 30
7. An article of manufacture (1; 10; 11) according to claim 6, characterized in that said stiffening elements (5) are fastened to walls (6) of said shell (2). 35
8. A process for the production of an article of manufacture (1; 10; 11) suitable to be used as a balancing mass for machines, particularly household appliances, comprising
 - preparing a fluid composition capable of becoming solid, 40
 - selecting a suitable shell (2), 45
 - casting said fluid composition inside said shell (2) through an opening (4) while the shell (2) is shaken for compacting said composition inside it, and 50
 - allowing said composition to become solid so as to form a solid body (3) enveloped by said shell (2). 55
9. A process according to claim 8, characterized in that said solidified composition is a conglomerate comprising both inert and binder materials.
10. A process according to claim 8, characterized in that said shell (2) is made of a suitable plastic material.
11. A process according to claim 10, characterized in that said shell (2) is made of a polyolefin.
12. A process according to claim 8, characterized in that said shell (2) is provided with an opening (4) fit for casting said fluid composition.
13. A process according to claim 8, characterized in that said shell (2) contains stiffening elements (5) capable of reinforcing said body (3).
14. A process according to claim 13, characterized in that said stiffening elements (5) are fastened to walls (6) of said shell (2).





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EUROPEAN SEARCH REPORT

Application Number
EP 94 20 1041

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
X	US-A-4 502 303 (W. A. WASEMANN) * column 4, line 66 - column 6, line 19; figure 2 * ---	1-14	B28B19/00 D06F37/26
X	US-A-3 185 255 (M. S. BIRD) * the whole document * ---	1-3,5, 8-10,12	
X	GB-A-2 044 298 (INDUSTRIE ZANUSSI S.P.A.) * the whole document * ---	1,6,8,13	
X	FR-A-2 299 133 (R. PUTATTI) * the whole document * -----	1-3,8-10	
			TECHNICAL FIELDS SEARCHED (Int.Cl.5)
			B28B D06F F16F
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 9 August 1994	Examiner Gourier, P
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