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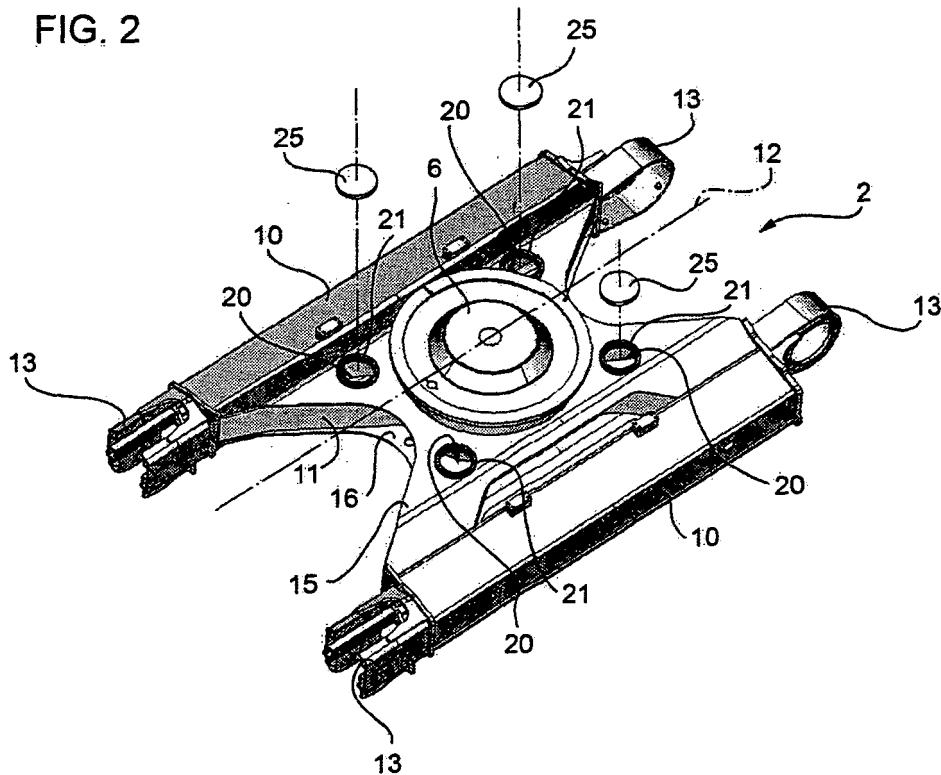
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### (54) Excavator bottom frame.

(57) A bottom frame (2) of an excavator has structural members (10, 11), at least some of which define a cavity

(20) having an inlet (21) for granular aggregate defining an inner counterweight, and an outlet (22) that can be opened to unload the material.

FIG. 2



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## Description

**[0001]** The present invention relates to an excavator bottom frame.

**[0002]** As is known, an excavator comprises three main parts : a bottom frame, or undercarriage, which moves over the ground on wheels or tracks; a top frame having an operator cab and connected to the bottom frame by a pivot to rotate about a vertical axis; and a front digging or lifting device, e.g. an arm and bucket, fitted to the top frame and operated from the operator cab.

**[0003]** The top frame is normally designed to support a counterweight in such a position as to ensure stability of the excavator when digging and/or lifting, and which is normally bolted removably to the top frame.

**[0004]** To ensure stability, currently marketed excavators have increasingly heavy counterweights which, for support, call for stronger counterweight-top frame attachments, a stronger or bigger pivot, reinforcing the structure of the top frame, etc., all of which are relatively expensive and increase the end cost of the excavator.

**[0005]** Moreover, for flexible operation of the excavator, a mass is needed that can be added to a main counterweight to enhance stability of the excavator, and can be removed when not required.

**[0006]** One solution to the above drawbacks is to provide a counterweight on the bottom frame in addition to or instead of the counterweight on the top frame.

**[0007]** In this connection, Patent Application DE10014933 describes a removable counterweight housed in a recess on the outside of a platform on the bottom frame, and which can be lifted out of the recess when the excavator travels along highway and the load on the axle of the excavator exceeds the maximum allowable.

**[0008]** The above known solution is relatively complicated, by requiring a specially designed platform with an external recess in which to house the counterweight.

**[0009]** It is an object of the present invention to provide an excavator bottom frame designed to provide a straightforward, low-cost solution to the above problems.

**[0010]** According to the present invention, there is provided a bottom frame of an excavator, comprising:

- a number of structural members, at least some of which define a cavity; and
- fastening means for wheels or tracks;

characterized in that said cavity has an inlet for material defining a counterweight inside the frame.

**[0011]** Said cavity is preferably filled at least partly with granular aggregate.

**[0012]** More specifically, said cavity has an outlet for unloading said material, and the bottom frame comprises movable closing means for opening/closing said outlet.

**[0013]** A non-limiting embodiment of the invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows a schematic side view of an excavator featuring a preferred embodiment of the bottom frame according to the present invention; Figures 2 and 3 show, respectively, larger-scale, top-side and underside views in perspective of the Figure 1 bottom frame.

**[0014]** Number 1 in Figure 1 indicates an excavator (shown schematically) comprising an undercarriage or bottom frame 2 which runs over the ground on tracks 3; a top frame 4 having an operator cab 5 and connected to bottom frame 2 by a pivot 6 to rotate about a vertical axis 7; and an arm 8 which is fitted on the end with a digging or lifting member, is fitted to frame 4, and is operated from operator cab 5.

**[0015]** With reference to Figures 2 and 3, frame 2 comprises structural members defined by two lateral longitudinal members 10 and by intermediate members 11. Longitudinal members 10 are parallel to a horizontal longitudinal axis 12 coincident with the travelling direction of excavator 1, and are fitted on the ends with known fastening devices 13, not described in detail, for connection of tracks 3. Members 11 connect longitudinal members 10 to each other, are located about pivot 6, and are enclosed by a substantially horizontal top plate 15 and bottom plate 16.

**[0016]** Members 11 and plates 15, 16 define a number of cavities 20, which can be filled with granular aggregate, in particular, sand, which serves as a removable inner counterweight for excavator 1, in addition to an existing counterweight (not shown) on frame 4.

**[0017]** Cavities 20 are four in number, are symmetrical with respect to axis 12, and define symmetrical volumes. More specifically, cavities 20 are arranged in diametrically opposite pairs with respect to axis 7.

**[0018]** Cavities 20 have respective inlets 21 formed in plate 15 to insert the granular material; and respective outlets 22 formed in plate 16, and in particular in two lateral portions 23 adjacent to longitudinal members 10.

**[0019]** Inlet 21 and outlet 22 of each cavity 20 are offset vertically, and are closed by plugs defined by respective flanged disks or bodies 25, 26 fixed to respective plates 15, 16 by bolts or screws (not shown) screwed about the circular edges of inlet 21 and outlet 22.

**[0020]** To increase the stability of excavator 1, particularly when digging/lifting using arm 8, frame 2 is loaded directly with granular aggregate fed into cavities 20 through inlets 21, with outlets 22 closed. Once the cavities are filled, inlets 21 are also closed.

**[0021]** Conversely, to reduce the weight of frame 2, e.g. when travelling along highway, outlets 22 are opened to unload the granular material from cavities 20.

**[0022]** The solution proposed therefore provides for applying additional weight without altering and/or reinforcing pivot 6 and/or frame 4, by virtue of the additional weight being applied to frame 2, as opposed to frame 4.

**[0023]** Filling the inside of frame 2 greatly increases the weight and lowers the centre of gravity, to effectively

enhance the stability, of excavator 1. More specifically, lowering the centre of gravity allows steeper uphill and downhill travel, as compared with known solutions with only one counterweight on frame 4.

[0024] Moreover, using sand is cheaper than the materials normally used for known counterweights.

[0025] The proposed solution is also extremely cheap by requiring no additional and/or specially designed component parts, such as supporting platforms, by which to fit the additional counterweight to frame 2, and by actually employing fillable volumes already available inside the bottom frames of excavators.

[0026] Clearly, changes may be made to frame 2 as described herein without, however, departing from the scope of the present invention as defined in the accompanying Claims.

[0027] More specifically, frame 2 may have attachments for wheel axles, as opposed to tracks.

[0028] Cavities 20 may also be filled with liquid (as opposed to sand), e.g. with a mixture of water and additives to prevent rusting of frame 2. In which case, sealing must be ensured, e.g. by means of seals, between outlets 22 and the plugs defined by disks 26.

vertically.

7. A frame as claimed in any one of the foregoing Claims, **characterized by** comprising a number of said cavities (20); said cavities being located symmetrically and defining symmetrical volumes with respect to a horizontal longitudinal axis (12) coincident with a travelling direction of said excavator (1).

10 8. A frame as claimed in any one of the foregoing Claims, **characterized by** comprising a number of said cavities (20); and a pivot (6) for support and rotation of a top frame (4) of said excavator (1); said cavities (20) being diametrically opposite each other about said pivot (6).

## Claims

1. A bottom frame (2) of an excavator, comprising:

- a number of structural members (10, 11), at 30
- least some of which define a cavity (20); and
- fastening means (13) for wheels or tracks;

**characterized in that** said cavity (20) has an inlet (21) for material defining a counterweight inside the 35 frame (2).

2. A frame as claimed in Claim 1, **characterized in that** said cavity (20) is filled at least partly with granular aggregate. 40

3. A frame as claimed in Claim 1 or 2, **characterized in that** said cavity (20) has an outlet (22) for unloading said material; and by comprising movable closing means (26) for opening/closing said 45 outlet (22).

4. A frame as claimed in Claim 3, **characterized in that** both said inlet (21) and said outlet (22) are closed by removable plugs (25, 26). 50

5. A frame as claimed in Claim 3 or 4, **characterized in that** said inlet (21) and said outlet (22) are formed in respective substantially horizontal walls (15, 16). 55

6. A frame as claimed in Claim 5, **characterized in that** said inlet (21) and said outlet (22) are offset

FIG. 1

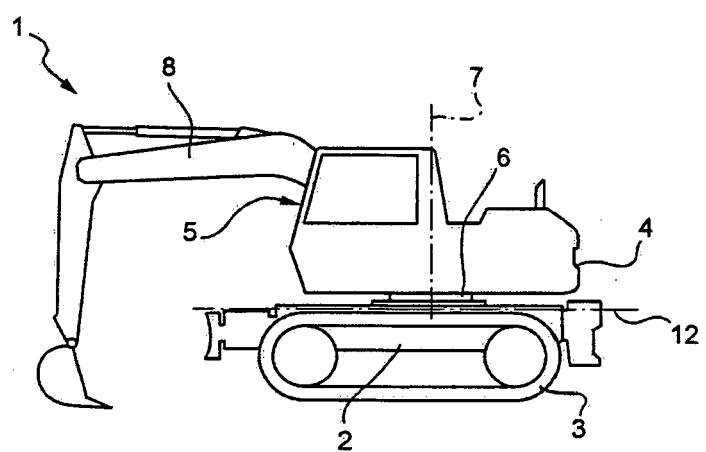


FIG. 2

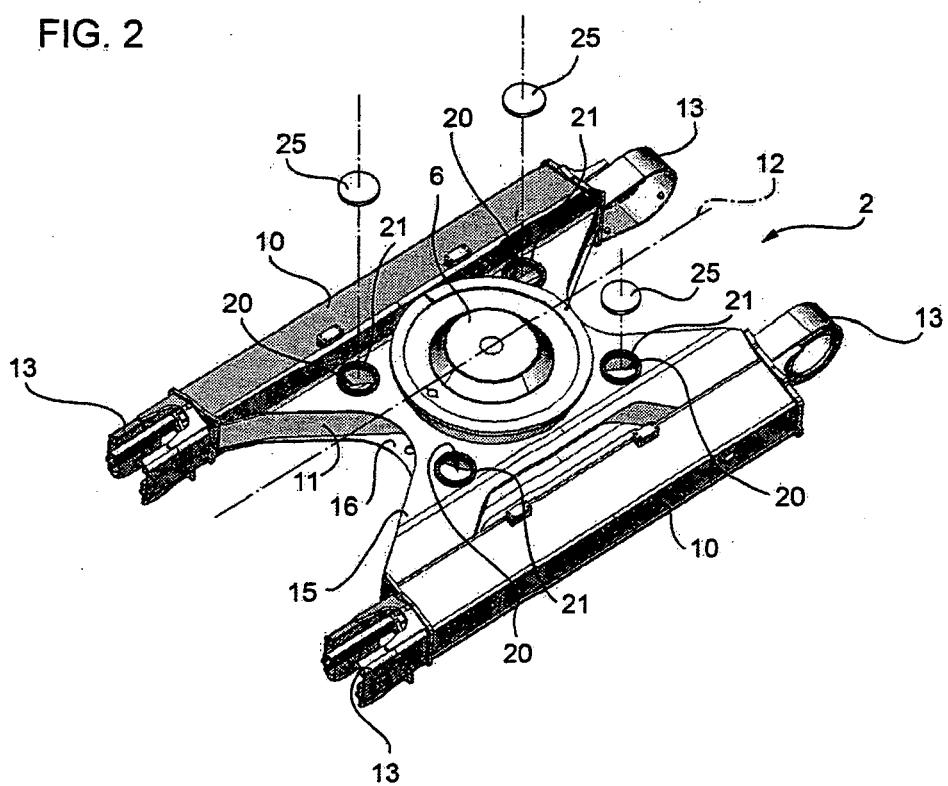
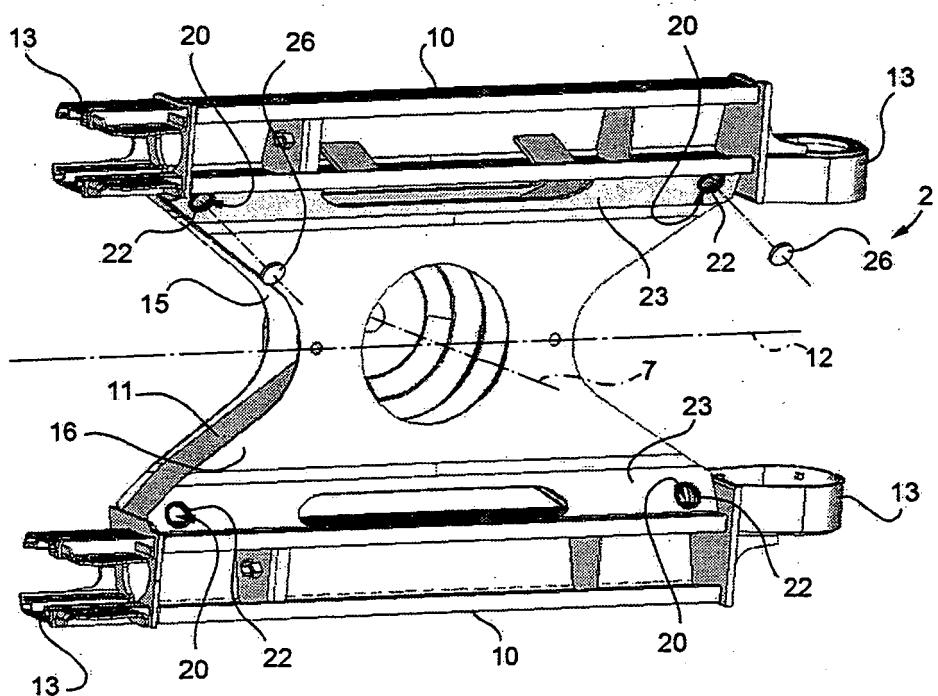


FIG. 3





DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (IPC)
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Y	* abstract; figures 1,2a,4,5a *	2	
	* paragraph [0036] - paragraph [0040] *		
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1	Place of search	Date of completion of the search	
	The Hague	29 January 2008	Examiner Guthmuller, Jacques
CATEGORY OF CITED DOCUMENTS			
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