

12

EUROPEAN PATENT APPLICATION

②¹ Application number: 82400085.5

Ⓢ Int. Cl.³: **E 02 F 9/18**
B 66 C 23/72

②② Date of filing: 18.01.82

③ Priority: 19.01.81 US 227021

④3 Date of publication of application:
28.07.82 Bulletin 82/30

⑧ Designated Contracting States:
CH DE GB LI

71 Applicant: THE WARNER AND SWASEY COMPANY
11000 Cedar Avenue
Cleveland Ohio 44106(US)

(72) Inventor: McRobie, Albert W.
411 Fuhr Street
Dennison Ohio 44621(US)

(72) Inventor: Hogan, Patrick T.
707 Ackey Street NW
New Philadelphia Ohio 44663(US)

(74) Representative: Brullé, Jean et al,
Service Brevets Bendix 44, rue François 1er
F-75008 Paris(FR)

⑤4 Material handling apparatus having a removable counterweight.

57) A material handling apparatus (10) having a removable counterweight (121) with means for removably attaching a counterweight to said material handling apparatus, characterized in that it comprises a first support means (161) affixed to said material handling apparatus, a second support means (162) affixed to said material handling apparatus in proximity to said first support means (161), a counterweight structure (121) having a first resting surface (131) and a second resting surface (136) wherein said first resting surface (131) is adapted to be supported by said first support means (161) and said second resting surface (136) is adapted to be supported adjacent said second support means (162).

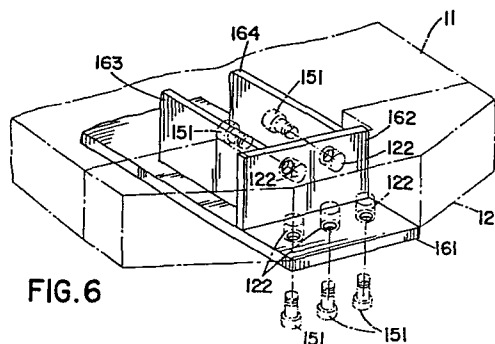


FIG. 6

MATERIAL HANDLING APPARATUS
HAVING A REMOVABLE COUNTERWEIGHT

This invention relates generally to a counterweight for a material handling or similar type of apparatus. More specifically, the instant invention relates to a counterweight comprising an enclosing structure filled with an iron ore and fixedly attached to the material
5 handling apparatus in two orthogonal planes.

Counterweights for material handling apparatus constructed using a filled containing structure are well known in the art as exemplified by U.S. Patent No. 860 205 to Fleming et al, U.S. Patent No. 4 032 016 to Graf, and U.S. Patent No. 2 763 385 to Harrison. The above
10 noted patents disclose material handling apparatus employing a counterweight which is constructed of a generally hollow member which is designed to receive a weighting means in order to provide the weight necessary for the proper operation of the material handling apparatus. The use of iron or an iron ore as a weighting substance is also well known in the
15 art as exemplified by U.S. Patent No. 87 209 to Shaw and U.S. Patent No. 3 008 389 ti Hicks. The patent to Hicks discloses the use of an iron ore as a ballast in earth compacting equipment.

The present invention proposes a material handling apparatus having a removable counterweight with means for removably attaching a
20 counterweight to said material handling apparatus, characterized in that it comprises a first support means affixed to said material handling apparatus, a second support means affixed to said material handling apparatus in proximity to said first support means, a counterweight structure having a first resting surface and a second resting surface
25 wherein said first resting surface is adapted to be supported by said first support means and said second resting surface is adapted to be supported adjacent said second support means.

The present invention relates to a counterweight structure comprised of a generally hollow structural member adapted to receive a
30 granular weighting means. The generally hollow structural member is, in the preferred embodiment, fabricated from steel plate and has means

for attaching the generally hollow structural member to a material handling apparatus in two orthogonal planes. The first plane for attaching the counterweight to the material handling apparatus is the bottom of the counterweight and the second plane for attaching the counterweight to the material handling apparatus is a plane orthogonal to the first plane and adjacent to both the counterweight and the material handling apparatus.

None of the prior art suggests the use of a generally hollow structural member containing an iron ore and fastened to a material handling apparatus in two orthogonal planes which provides an economical and safer counterweight means which is easier to mount on a material handling apparatus. It should also be readily appreciated that the weight of the counterweight may be varied by varying the amount of iron ore placed in the generally hollow structural member.

The invention will now be described with reference to the accompanying drawings wherein :

- Figure 1 is a rear perspective view of a material handling apparatus embodying the present invention ;
- Figure 2 is a perspective view of the counterweight, with portions broken away to show details of construction ;
- Figure 3 is an exploded perspective view of the counterweight of the instant invention ;
- Figure 4 is a cross sectional view taken along the line 4-4 shown in Figure 2 disclosing details of the lifting means of the instant invention ;
- Figure 5 is a cross sectional view taken along the lines 5-5 shown in Figure 2 showing details of the means used to attach the counterweight to a material handling apparatus ; and
- Figure 6 is a rear perspective view taken of a portion of a material handling apparatus showing the manner in which the counterweight is mounted to said material handling apparatus.

Referring now to Figure 1 of the drawings, there is disclosed a material handling apparatus 10 particularly adapted to excavate earth. The material handling apparatus is comprised of an upperstructure designated 11 and a carrier 12 having motive means. The upperstructure 11 is fixed to the carrier 12 in such a manner as to allow rotation of the upperstructure 11 on the carrier 12. The carrier 12 allows the material handling apparatus to be transported to various job locations under its

own power. The use of a carrier to transport a rotating upperstructure is well known in the art as exemplified by the Gradall Hydraulic Excavator manufactured by The Warner & Swasey Company, New Philadelphia, Ohio, and more fully disclosed in the Gradall Model G-660 Service Manual and the
5 Model G-1000 Service Manual, both of which are specifically incorporated by reference herein.

Referring now to Figure 2 of the drawings, there is shown the counterweight of the instant invention. The counterweight 121 is comprised of a generally hollow structural member comprised in the preferred embodiment of steel plates welded together. The counterweight 121
10 is generally elongated and is adapted to attach to a material handling apparatus by means of tapped bosses 122. The counterweight 121 may be moved utilizing lifting eyes 123. The generally hollow counterweight construction is provided with additional weight by means of filling the
15 counterweight 121 with an iron ore through opening 124, shown here with cover 125 welded over the opening 124.

Referring now to Figure 3 of the drawings, there are shown further details to the counterweight shown in Figure 2. The counterweight 121 is comprised of a bottom supporting plate 131 having three
20 tapped bosses 122 welded thereto. Welded to the bottom plate 131 is back plate 132 which has a portion thereof cut out to provide opening 124 through which the weighting material is put into the counterweight 121. After the weighting material has been placed in the counterweight 121 the opening 124 is shut with welded cover 125.

25 Attached to the bottom plate 131 and the back plate 132 is front plate 133. It should be noted that the front plate 133 has slots 134 provided therein for mounting lifting eyes 123 which are shown in more detail in Figure 4 of the drawings.

30 Affixed to the bottom plate 131 and the front plate 133 is mounting plate 136 which has two bosses welded thereto for securing the counterweight 121 to a material handling apparatus.

Referring now to Figure 4 of the drawings, there are shown further details of the lifting eye 123. The lifting eye is comprised of a somewhat T-shaped piece of steel plate adapted to fit in a slot 134 in
35 the top plate 133, with projections 135 extending past slot 134. The lifting eye 123 has an opening 137 therein in order to facilitate lifting of the counterweight. In the preferred embodiment, the lifting eye 123 is welded to the counterweight 121.

Further details of the tapped bosses are disclosed in Figure 5 of the drawings. The tapped bosses 122 are comprised of generally cylindrical pieces of steel having a reduced section on one end to facilitate mounting on a receiving hole in the counterweight 121.

5 In addition, there is a threaded hole 141 provided in the tapped bosses for coacting with correspondingly threaded bolts 151 to facilitate mounting the counterweight 121 to a material handling apparatus.

Referring now to Figure 6 of the drawings, there is shown
10 a portion of the rear of upperstructure 11 with parts shown in phantom to more fully disclose the frame of the upperstructure 11. The frame of the upperstructure 11 is comprised of a main bottom member 161 to which is affixed back plate 162. Affixed to both the back plate 162 and bottom member 161 are longitudinal plates 163 and 164. As may be readily seen,
15 there are holes in the back plate 162 and the bottom member 161 through which the threaded portion of bolts 151 may pass in order to engage the threaded holes 141 in tapped bosses 122 to secure the counterweight 121 to the upperstructure 11.

It should be appreciated that since the counterweight 121
20 is both bolted to the back plate 162 and rests on the bottom member 161, the instant invention provides a safer counterweight design over the conventional design wherein a solid cast iron member is bolted to a vertically disposed frame member.

Even further, it should be appreciated that having the
25 counterweight rest upon bottom member 121 greatly facilitates in the alignment of the holes in the upperstructure 11 frame and the corresponding holes of the appropriate tapped bosses 122, to thus aid in mounting the counterweight 121 on the upperstructure 11.

The weighting material which is used to fill the generally
30 hollow structural counterweight 121 is a specular hematite (iron ore) which is sold by the United States Steel Corporation of Pittsburgh, Pennsylvania under the name QCM Concentrate. The specular hematite has a crystalline structure which results in the particle surfaces being hard and smooth and not likely to absorb moisture. Even after exposure to
35 heavy precipitation, the moisture in the concentrate will drain off to about a three percent level in a relatively short time. The specific gravity of QCM Concentrate is in the range of 4.9 to 5.1. The compacted bulk density is approximately 3,4 tons per m³ (Cement has a bulk density

of approximately 2,3 tons per m³ and costs approximately twice as much per ton as specular hematite). Its hardness on the MOH scale ranges from 5.5. to 6.5. Since the specular hematite is a stable oxide of iron it does not react with water and will not further oxidize at normal

5 temperatures, nor is it corrosive to any container in which it might be placed. The specular hematite typically contains 2.3 percent plus 20 mesh and 2.1 percent minus 150 mesh material. It should be appreciated that the specular hematite may be mixed with cement or other weighting substances.

10 After the generally hollow structural member has been fabricated, the counterweight 121 is then stood on end and the specular hematite is poured into the counterweight in sufficient quantity to provide the weight desired. It may be noted that due to the nature of the weighting material, it is quite easy to vary the amount of material inserted
15 in the generally hollow structural member 121 and therefore the weight of the counterweight.

After the appropriate amount of weighting material has been poured into the generally hollow structural member 121, the rectangular opening 124 is then welded shut with a correspondingly shaped cover 125.

CLAIMS

1. A material handling apparatus (10) having a removable counterweight (121) with means for removably attaching a counterweight to said material handling apparatus, characterized in that it comprises
5 a first support means (161) affixed to said material handling apparatus, a second support means (162) affixed to said material handling apparatus in proximity to said first support means (161), a counterweight structure (121) having a first resting surface (131) and a second resting surface (136) wherein said first resting surface (131) is adapted to be supported
10 by said first support means (161) and said second resting surface (136) is adapted to be supported adjacent said second support means (162).

2. A material handling apparatus according to claim 1, characterized in that one of said support means (161, 162) has means (151) for engaging a threaded member (122) and one of said resting surfaces (131, 136) has a tapped boss (122) wherein said thread means is engaged with
15 said tapped boss in order to affix said counterweight to said material handling apparatus.

