Nov. 8, 1966 P. DE BOSREDON 3,283,928

LATERAL OFFSET MOUNTING FOR POWER SHOVEL DIPPER ARM

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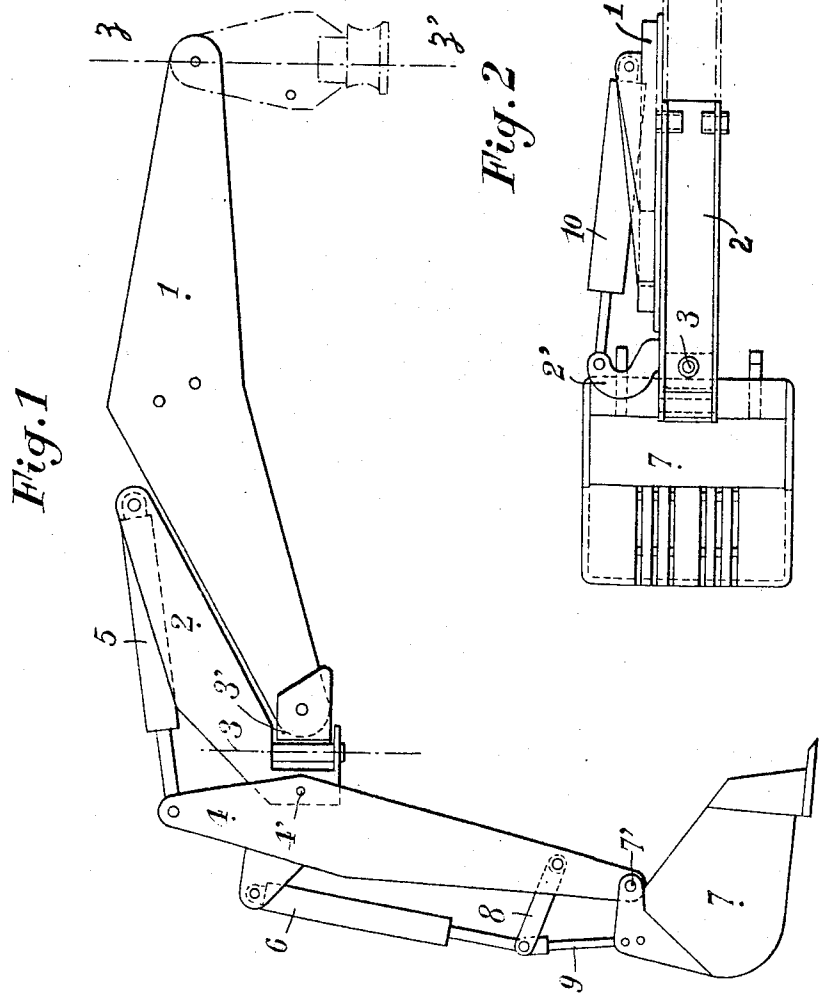


Fig. 1

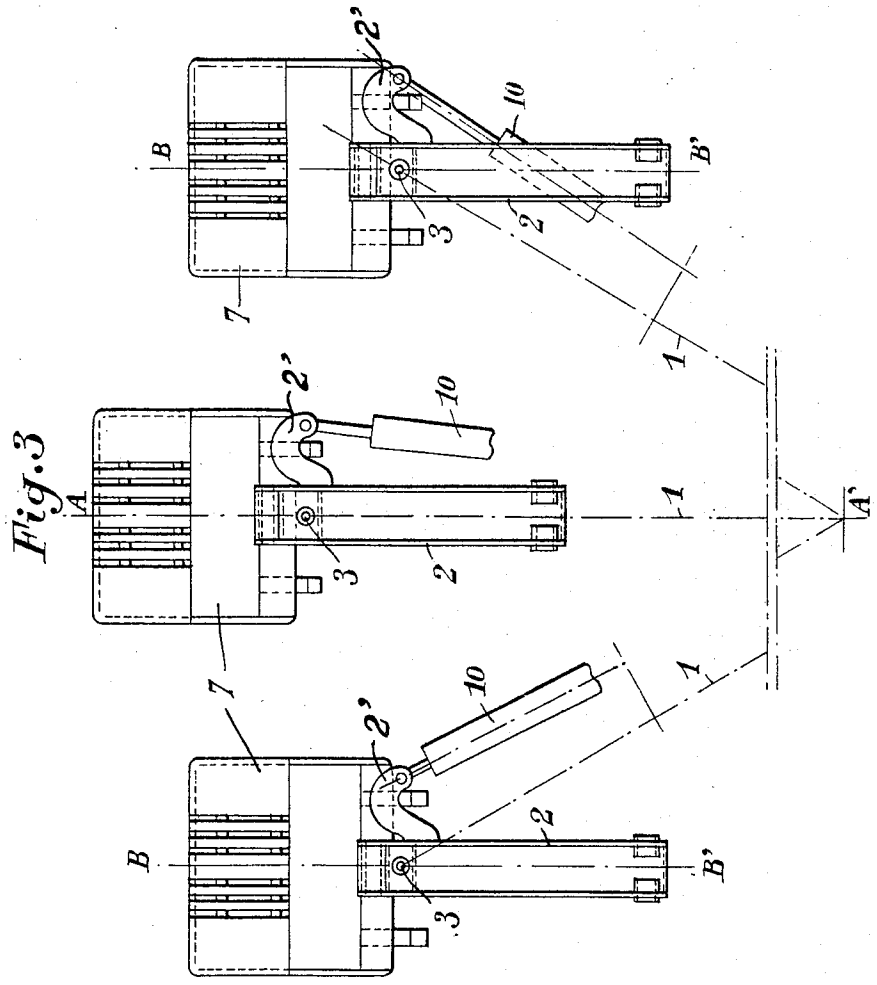
Fig. 2

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Fig. 3



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LATERAL OFFSET MOUNTING FOR POWER SHOVEL DIPPER ARM

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This invention relates in general to power shovels and has specific reference to an improved lateral offset mounting of the dipper or bucket arm of power shovels. It is already known to provide the jib or the dipper arm of a powershovel with pivotal mounting means permitting the operation of the bucket in lateral offset conditions. However, all existing mountings of this character are objectionable in that they create abnormal torsion stress in the jib, dipper arm or even in the frame structure of the power shovel.

It is the essential object of this invention to provide a lateral offset mounting for power shovel dipper arm whereby this detrimental stress is avoided by the use of a suitable arrangement such that the reactions and twisting efforts transmitted from the dipper arm mounted bucket to the jib and therefore to the main frame structure of the power shovel are reduced to a minimum or even to zero.

This mounting is applicable to a power shovel of the type comprising a jib, a dipper arm pivotally mounted on the outer or far end of the jib, a hydraulic cylinder controlling the movements of the dipper arm, a bucket pivotally mounted on the outer end of the dipper arm, and another hydraulic cylinder reacting against the dipper arm for controlling the digging or cutting movements of the bucket. The mounting according to this invention consists essentially, without altering the basic principles of operation and application of the hydraulic cylinders, in properly interposing between the jib and dipper arm an additional member also fulcrumed on the jib and responsive to a control cylinder. This additional member carries sidewise, as near as possible and at right angles to the pivot pin connecting same to the jib, another pivot pin on which the dipper arm is hingedly mounted; preferably but not compulsorily at right angles to said last-named pivot pin said additional member is adapted to receive another hydraulic cylinder for actuating the dipper arm. The other component elements of the power shovel remain unchanged.

The use of the mounting according to this invention is particularly advantageous in the case of trencher type power shovels in which the highest cutting stress required from the digging teeth is obtained by rotating the bucket proper.

The advantages and characteristic features of this invention will appear more clearly from the following description of a typical form of embodiment of a mounting made according to the teachings of the invention, reference being made to the accompanying drawings in which:

FIGURE 1 is a side elevational view of a power shovel equipped with the mounting of this invention, wherein the dipper arm is co-planar with the jib;

FIGURE 2 is a corresponding plan view with parts removed to simplify the drawing; and

FIGURE 3 is a plan view similar to FIGURE 2 but showing the supporting mounting of the dipper arm and bucket offset in two vertical planes on either side of the vertical plane of the jib.

On a power shovel jib **1** a support **2** is pivotally mounted on a pivot pin **3** in a strap **3'** attached to the jib. The axis of pivot pin **3** is substantially parallel to the axis of rotation *z'z* of a platform (not shown carrying the jib **1**. Hingedly mounted on this support **2** by means of a pivot pin **4'** is a dipper arm **4** the angular movements of which

are controlled by the operative end of a hydraulic cylinder **5** having its reaction end pivotally mounted on the support **2**. The dipper arm **4** carries as in conventional arrangements a hydraulic cylinder **6** controlling the movements of a dipper or bucket **7** by means of a relay link **8** and a connecting-rod **9**.

Another cylinder **10** shown in FIGURE 2 is pivoted on a support **1'** laterally rigid with the jib **1** and has its piston rod pivoted on a crank arm **2'** laterally rigid with the support **2**; thus, by actuating the cylinder **10** the assembly comprising the support **2**, dipper arm **4** and bucket **7** can be moved to positions corresponding to any desired laterally-offset vertical planes as shown in FIGURE 3, with respect to the vertical plane of jib **1**.

Thus, for cutting trenches or digging ditches in a laterally offset position in relation to the vertical central plane AA' of the power shovel, the jib **1** and support **2** are oriented in the proper positions so that the vertical plane of operation of the dipper-arm and bucket assembly BB' lies parallel to the aforesaid vertical central plane AA' of the power shovel.

In order fully to understand the essential advantage of the present invention it is necessary to consider the exact bucket position affording the best possible conditions of operation.

In a hydraulically-operated power shovel the maximum effort corresponding to the optimum bucket operation is obtained by rotating the bucket **7** about its hinge pin **7'** as a consequence of the operation of cylinder **6** and its relay means **8**, **9**, or any other mechanical means substituted therefor. This rotation of bucket **7** is produced functionally as the dipper arm **4** is in a substantially vertical position and therefore parallel to the axis of support **2**, the bucket teeth or, in other words, the leading edge of the bucket being then substantially in vertical alignment with this axis. In this operative position the reaction produced by the cutting efforts of the bucket teeth is absorbed directly by the jib without creating a torsion component as in hitherto known lateral offset bucket mountings.

Although the present invention has been described in conjunction with a preferred embodiment, it is to be understood that modifications and variations may be resorted to without departing from the spirit and scope of the invention, as those skilled in the art will readily understand. Such modifications and variations are considered to be within the purview and scope of the invention and appended claims.

What I claim is:

1. Power shovel adapted to operate under laterally offset conditions, mounted on a swivelling platform, provided with a bucket and adapted, during the shovelling work, to avoid the development of oblique reactions on intermediate members disposed between said bucket and said platform, said power shovel comprising a jib having a supported end carried by said platform on the swivel axis of said platform and a head adapted to describe a horizontal circle about said swivel axis, a pivot pin carried by said head and having its axis substantially parallel to the swivel axis of said platform, a support mounted for free rotation on said pivot pin carried by said jib head, a crank arm extending laterally from, and rigid with, said support, a first hydraulic actuator having a bearing end laterally pivoted on said jib and a working end pivoted on said crank arm for controlling the pivotal movements of said support in relation to said jib, another pivot pin mounted on said support and having its axis disposed at right angles to the pivot axis of said support, a dipper arm fulcrumed on said other pivot pin, a second hydraulic actuator having a bearing end pivoted on said support and a working end pivoted on one end of said

dipper arm, for controlling the angular movements of said dipper arm in relation to said support about said other pivot pin, a bucket mounted on the opposite end of said dipper arm, and a third hydraulic actuator having a bearing end pivoted on said dipper arm and a working end pivoted on said bucket for controlling the pivotal movements of said buckets in relation to said dipper arm.

2. Power shovel as set forth in claim 1, wherein when the dipper arm is in a substantially vertical position the leading edge of the bucket is substantially in vertical alignment with the axis of the first mentioned pivot pin.

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