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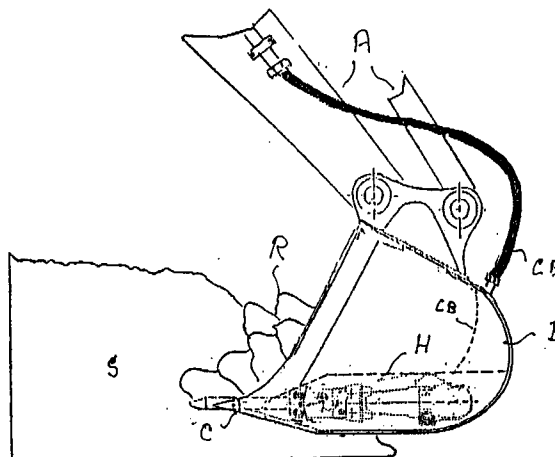
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Modiano, Josif, Pisanty & Staub,
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D-80469 München (DE)**(54) **Bucket with hydraulic hammer.**

(57) There is proposed, for use in connection with earth working machines, a bucket (B) on the bottom of which is provided a generally conventional pneumatic hammer (H) which is fixedly, but removably attached to the bucket (B). The hammer (H) is intended to fragmentize rock formation which impede the progress of the earth moving or digging machine.

*Fig. 1***EP 0 569 963 A1**

FIELD OF INVENTION

The present invention relates to earth working, loading and transporting machinery and devices. It is well known that the major part of earth working operations are accomplished with use of tractor propelled digging devices, such as all kinds of excavators equipped with buckets.

BACKGROUND OF INVENTION

It happens frequently that when the forward cutting edge of the bucket digs into the soil, it encounters a rock formation or a single large rock in relation to which the power delivered by the tractor's engine and other power units might be insufficient to overcome such an obstacle. Traditionally, the known remedy to such an occurrence is to tackle the obstructing rock by fragmenting it with the aid of a standard hydraulic or pneumatic hammer. This practice is rather complicated and time consuming and involves also the removal of the digging equipment and the tractor to which it is connected. In this practice the rocks are breaking but cannot be heaped into a bucket and loaded simultaneously in that operation.

It has already been suggested to equip the cutting edge of the bucket (which in that case is swingably linked to the bucket's main body) with a vibrator. This proposal does not seem to fully solve the problem referred to, insofar as mere vibration does not fragmentize rock to such degree that the bucket can continue work unimpededly.

OBJECT OF THE INVENTION

It is the main object of the invention to create means which allow uninterrupted continuation of the earth working, loading and moving operation even if the bucket strikes an obstacle of the kind referred to above. The invention creates means which allow breaking of hard soil while the material flows and is heaped into the bucket simultaneously. The same bucket also in a further step can load the material or move it to other locations on the site.

SHORT SUMMARY OF THE INVENTION

According to the invention the conventional bucket of each digging and moving equipment is provided with an integral hydraulic hammer device including a conventional chisel, positioned at the bottom of the bucket and securely affixed to it, means being provided to activate the hydraulic hammer whenever the cutting edge of the bucket encounters an obstacle which exerts pressure on the bucket larger than the pressure originating from

the action of the engine and possibly other power units actuating the respective equipment.

The said actuating means would comprise a sensor of generally known type which - whenever the bucket encounters an obstacle of the kind referred to issues a command to the hydraulic hammer to start operation of fragmentation of the obstructing rock formation by direct penetration of the chisel and thus applying original power of the hammer to full extent.

The said sensor may be of electric, electronic or electro/hydraulic type.

In the event that continuous hammer work is required in standard hydraulic hammer operation, the hammer is released from its position so that it extends from the bucket. In that case it is preferred to operate in two separate steps i.e. the breaking and the bucket filling operation as compared to the one step operation which simultaneously breaks and fills the bucket. In that case there would be no operation limitation to the bucket and/or to the hammer: the bucket can operate as a breaking and filling device simultaneously, and at loading as a further step, or this process can be divided for use in certain applications as will be explained further on.

After using the hammer in the position of (removed from bucket bottom) standard hydraulic hammer while sliding back the hammer mechanism to former inner position, the bucket can be used to load or move the material which had been broken in the extended position.

These and further features of the invention will become clear from the detailed description which refers to the annexed drawings, wherein:

SHORT DESCRIPTION OF DRAWINGS

Fig. 1 is a fragmentary, partly sectional view of an impact bucket in the cavity of which an hydraulic hammer is placed.

Fig. 2 is a diagrammatic view of the working elements of an arrangement including the bucket of an earth working and moving assembly, provided with a hammer.

Figs. 3, 4 and 5 show details.

Turning first to Fig. 1, there is shown the conventional bucket B linked to a pair of arms A which extend in a known manner from any excavators or backhoe tractor or wheel loader or other truck and wheel excavation machine excavators. The bucket is shown in a position of having penetrated the soil S and having met an agglomeration of rocks R. On the bottom wall of bucket B is positioned the hydraulic hammer H, from the leading end of which extends a chisel C. On meeting the obstructing rock formation a signal establishing this fact is transmitted (as will become clear later)

to a command center, whereupon a command is issued which via cable CB activates the hammer H to break up and fragmentize the rock formation R. The operation of the hammer will automatically stop when no longer needed.

Figs. 2, 3, 4 and 5 illustrate the manner in which hammer H is held in and released from bucket B, when the separate operation of the hammer is required for hard rocks or for demolition jobs. For any types of jobs that there is no need for the broken rock material to be moved into the bucket for loading or for carrying away - or required for any use hammer H is mounted with a pair of guide rails 3 and 4, and secured by means of two hydraulic pistons 5 which when activated causes attraction of a pin 6. The hammer will then slide out of the bucket by its own weight. At the end of its stroke, pin 6 will penetrate into hole 7 enabling working with the now separate hammer in the extended position. The hammer is placed back to its inner position in a reverse manner.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the scope of each element identified by way of example by such reference signs.

Claims

1. Earth working machinery comprising a tractor or like propelling means to which a bucket member is swingingly linked, characterised thereby that the said bucket is provided with at least one integral hydraulic hammer device including a chisel and positioned at the bottom of the bucket and securely affixed to it, means being provided to activate the hydraulic hammer whenever the cutting edge of the bucket encounters an obstacle which exerts pressure on the bucket larger than the pressure originating from the action of the engine and possibly other power units actuating the respective equipment.
2. The arrangement of claim 1 wherein the said actuating means comprise a sensor of generally known type which - whenever the bucket encounters an obstacle of the kind referred to issues a command to the hydraulic hammer to start operation of fragmentation of the obstructing rock formation by direct penetration of the hammer chisel and thus applying original power of the hammer to full extent.

3. A bucket for earth working machinery characterised thereby that said bucket is equipped with means which enable partial release of said hammer from said bucket.

4. The arrangement of claim 1 wherein the hammer is fully detachable from the bucket for separate use of commonly known standard operation.

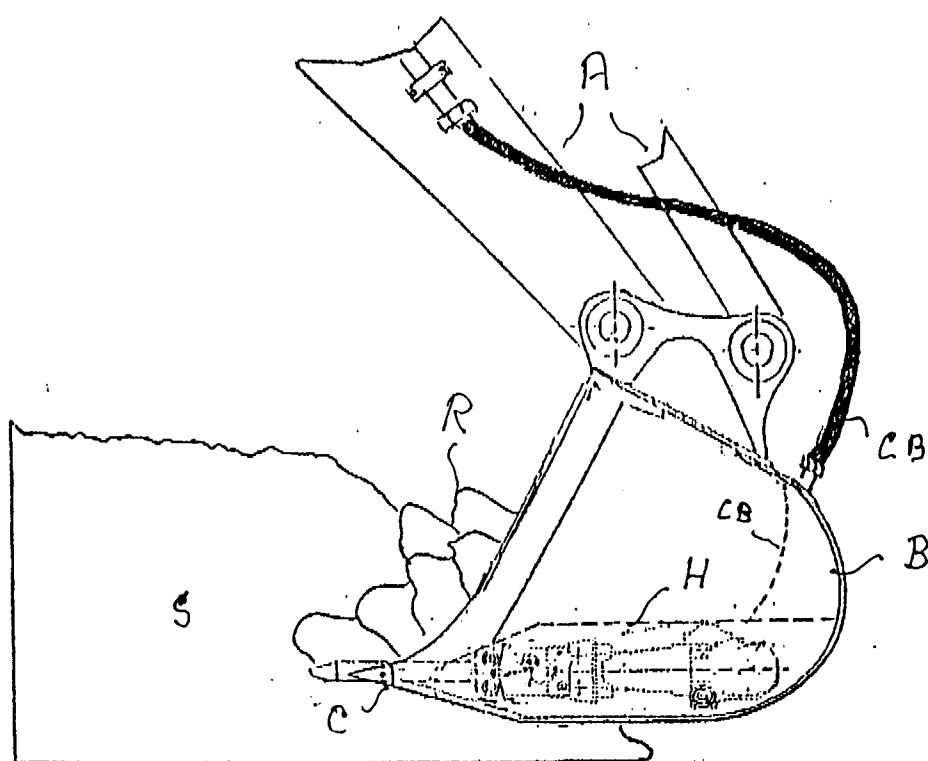


Fig. 1

FIG. 2

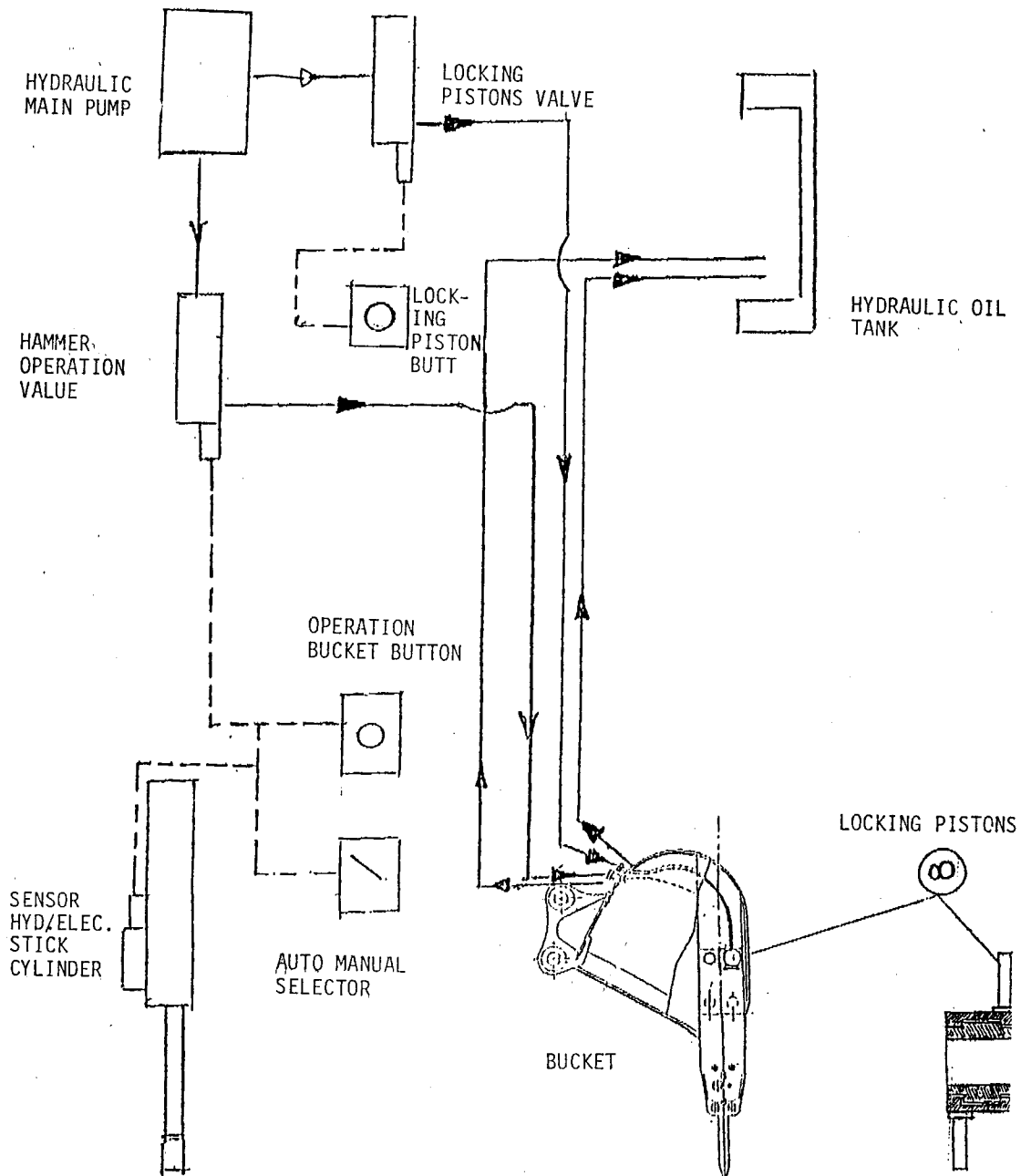


FIG. 5

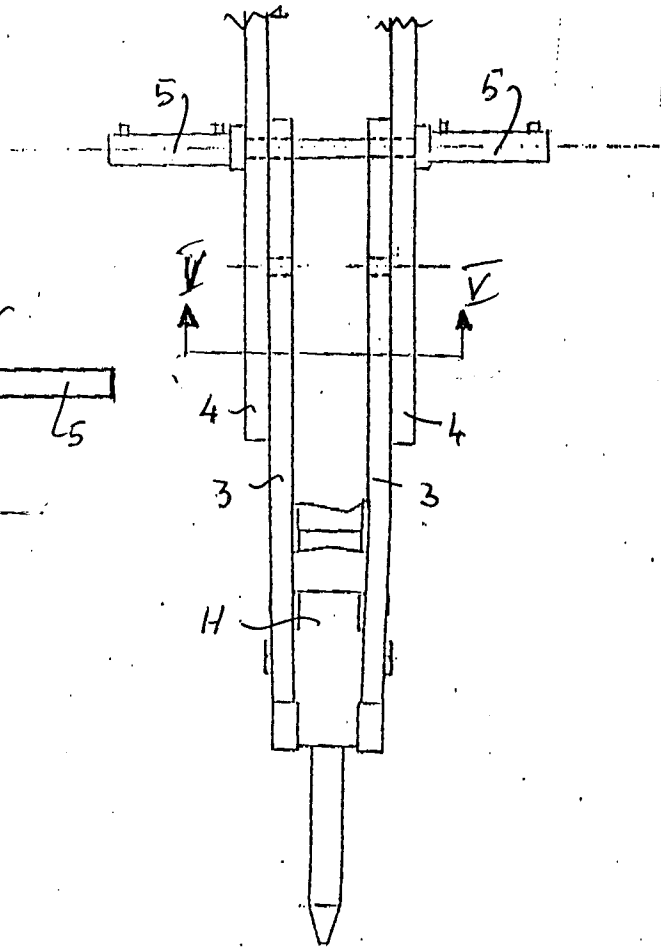
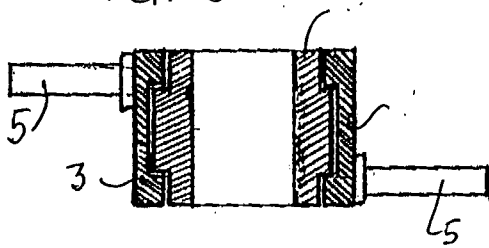


FIG. 4

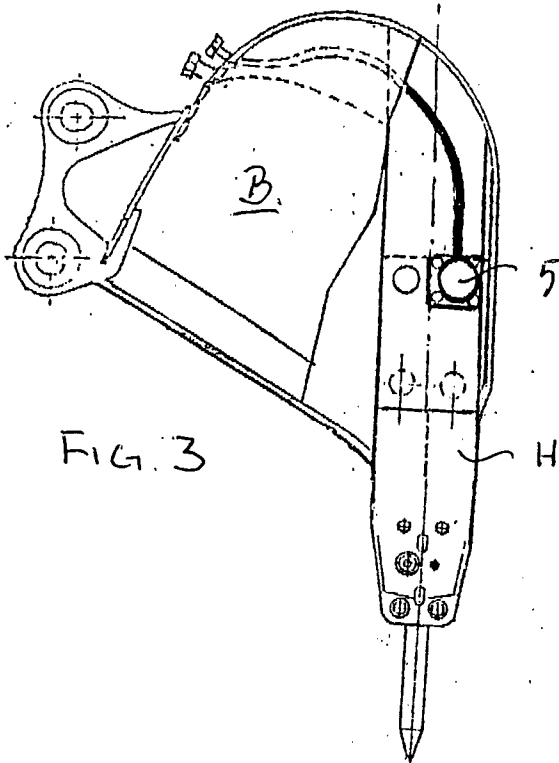


FIG. 3



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EUROPEAN SEARCH REPORT

Application Number

EP 93 10 7733

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	WO-A-9 010 756 (CATERPILLAR INC.)	1, 3, 4	E02F3/40
Y	* the whole document *	2	E02F3/96
	---		E02F9/22
Y	PATENT ABSTRACTS OF JAPAN vol. 8, no. 174 (M-316)(1611) 10 August 1984 & JP-A-59 68 446 (KAYABA KOGYO K.K.) * abstract *	2	

			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			E02F
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 13 AUGUST 1993	Examiner ESTRELA Y CALPE J.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			