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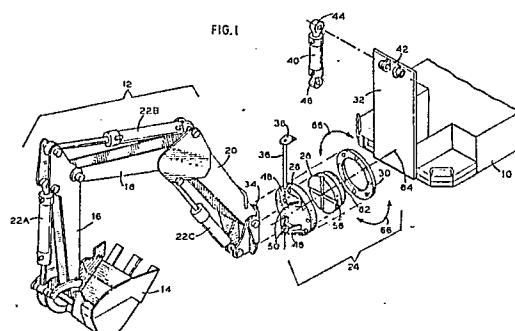
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⑤④ **Rotatable backhoe and use thereof for removing material from underneath a structure.**

⑤⑦ A backhoe (12) having a scoop (14) adapted to be rotated about a horizontal axis (64). A turntable group (24) disposed between the backhoe group (12) and the chassis (10) of the backhoe permits the rotation of the scoop. In particular by rotating the scoop (14) substantially parallel to the ground, the scoop may be used to remove material from underneath a structure.



Description

ROTATABLE BACKHOE AND USE THEREOF FOR REMOVING MATERIAL FROM UNDERNEATH A STRUCTURE

TECHNICAL FIELD

The instant invention relates to excavating apparatus in general and, more particularly, to a backhoe capable of being rotated about a horizontal axis.

BACKGROUND ART

A backhoe is a generic name for a common piece of construction equipment. They are generally self-propelled vehicles utilizing tires or tracks for locomotion. An articulated, downwardly pointed, swinging scoop is mounted at one end of the apparatus. Oftentimes a loading bucket is mounted at the opposite end.

Backhoes are usually used for trenching, digging and/or removing material. The scoop is repeatedly outwardly extended, brought into contact with the ground or the material and then retracted upwardly to generate the desired hole, trench or cause material removal.

The material is generally disposed along the side of the backhoe or into an adjacent conveyance for subsequent handling. The bucket, if so equipped, is used for leveling or removing material.

It should be appreciated that the backhoe action is limited to essentially vertical operations. The backhoe is mounted on the unit so as to sweep through a vertical axis that is essentially normal to the ground. Available backhoes cannot rotate their scoops so as to operate parallel to the ground.

In particular, the mining community utilizes large conveyor systems to transport material from one area to another. Oftentimes, for a variety of reasons some of the conveyed material (muck, ore, rock, fines, etc.) falls underneath the conveying systems. When the material collects, the conveyor system must actually be shut down and the material manually cleaned out so as not to interfere with proper operation of the conveyor. Depending on the type of material, assignee has experienced situations where the material actually oxidizes to form a hard intractable mass. Workers with chippers, hammers, picks, etc. must get under the conveyor and break up and remove the hardened material in order to maintain the maximum efficiency of the conveyor system. It goes without saying that under these circumstances the particular conveyor must be shut down for safety reasons while the manual cleaning operation is carried out.

Clearly a safer and quicker technique to clean beneath the conveyor system is desirable.

SUMMARY OF THE INVENTION

Accordingly, there is provided a backhoe having a rotatable turntable assembly. The turntable assembly

bly enables the boom on a backhoe to be rotated to a horizontal orientation. The turntable is affixed to the body of the apparatus. The backhoe assembly is attached to the turntable. By rotating the turntable, the boom and scoop are rotated simultaneously to any position.

This increased freedom to operate the scoop essentially in a plane parallel with the ground enables the operator to sweep under the conveyor assembly and horizontally pull the fallen material out toward him/her. The boom could then be returned to its usual vertical orientation so as to replace the material back onto the conveyor or remove it for subsequent handling.

BRIEF DESCRIPTION OF THE DRAWING

Figure 1 is a partially exploded view of an embodiment of the invention.

Figure 2 is a cross sectional elevation of an embodiment of the invention.

PREFERRED MODE FOR CARRYING OUT THE INVENTION

Figure 1 is a partially exploded overview of the relevant features of the invention, whereas Figure 2 provides a detailed cross sectional view of the means for rotating the backhoe.

Turning now to Figure 1. There is depicted backhoe chassis 10. The specific configuration of the backhoe chassis 10 is not relevant to this disclosure. Rather any suitable design (i.e. propelled, stationery, equipped with a loader, part of an additional piece of equipment, etc.) that functions as a mounting surface is adequate.

Similarly, the backhoe group 12 is of a conventional design and, except as modified, is not claimed per se.

The backhoe group 12 includes scoop 14 pivotally supported by first member 16. The first member 16 is pivotally supported by second member 18 which in turn is supported by boom 20. In order to impart the desired degree of movement to the scoop 14, hydraulic cylinders 22A, 22B and 22C are appropriately mounted on the members 16 and 18 and the boom 20. The associated pumps, hydraulic lines and controls are not shown. The cylinder 22C causes the scoop 14 to rise and fall by rising and lowering the members 16 and 18 and the boom 20. The cylinder 22B swings the scoop 14 forward and back. The cylinder 22A alters the angle of inclination of the scoop 14.

The backhoe group 12 includes socket 34 (partially obscured) which is sized to accommodate rod 36. The rod 36 includes bracket 38.

Fluid driven cylinder 40 is pinned to plate 32 through eyelets 42. A removable pin (not shown)

bridges the eyelets 42 and the head of the cylinder 44. The cylinder 40 is affixed to the boom 20 via bottom 46.

Turning now to Figure 2, the turntable group 24 is shown in greater detail. Pivot cap 26 includes two opposed brackets 48 having sleeved bores 50 therethrough. The sleeved bores 50 are sized to accommodate the rod 36 and are spaced apart so that the socket 34 may fit between them. A pair of apertures 52 receive suitable fasteners such as bolts, pins, etc (not shown) from the bracket 38.

The pivot cap 26 circumscribes trunnion 28 and is joined to pivot flange 30 by studs 56 and nuts 54. Access hole 60, normally sealed, permits the introduction of a lubricant such as grease into lubricant grooves 58.

To install the turntable group 24, the backhoe group 12 is removed from chassis 10 and the plate 32 is affixed to the chassis 10. The trunnion 28 and pivot flange 30 are assembled and back portion 62 of the trunnion 28 is welded to the plate 32. The pivot cap 26 is then bolted to the pivot flange 30. The backhoe group 12 is reattached to the chassis 10 by placing the socket 34 between the sleeved bores 50. The rod 36 is inserted into the sleeved bores 50 and the socket 34. The fasteners secure the bracket 38 to the apertures 52. The cylinder 40 is then connected to the boom 20 and the eyelets 42. Of course, all the hydraulic lines, couplings and control devices are reconnected as well.

The embodiment shown is a manually operated design. In order to rotate the backhoe group 12, through an arc about horizontal axis 64, the pin passing through the eyelets 42 and the head 44 is removed and the turntable group 24 caused to be rotated 90 degrees (directional arrow 66) thereby bringing the scoop 14 horizontal to the ground. A stop (not shown) prevents further rotation. The scoop 14 is then operated scooping and pulling material away from the targeted area. Upon completion of the task, the backhoe group 12 is brought back to the vertical, and the cylinder 40 reconnected. Essentially the entire backhoe group 12 rotates about the fixed trunnion 28. The cylinder 40 maintains the backhoe group 12 substantially vertical when the backhoe is in the vertical mode.

If the backhoe group 12 is relatively lightweight, the desired rotation and positioning may be accomplished by hand. Larger units may be remotely rotated to any position by appropriate power operated means (fluid driven cylinders, electric motors, etc.). Intermediate positions other than 90° may be utilized if conditions dictate.

Similarly, if desired, the backhoe group 12 could be mounted upside-down on the turntable group 24. This orientation would allow the toothed portion of the scoop 14 to be facing upwardly. With the freedom of rotation permitted by the turntable group 24 about the horizontal axis 64, the scoop 14 could easily swing through an upward facing arc. Indeed by employing suitable stops, the turntable group 24 may permit full 360° rotating movement about the horizontal axis 64.

The instant invention easily permits the safe and frequent clean out of a conveyor assembly without

the need to shut it down. The backhoe is oriented approximately perpendicular to the conveyor and the backhoe group 12 rotated to the horizontal position. The operator commences to clean out the space beneath the conveyor by operating the scoop 14 and removing the fallen material. After the cleaning process has been terminated, the backhoe group 12 is righted and may either return the scooped material to the conveyor or load it somewhere else.

Claims

1. A backhoe including a support chassis and a backhoe group, the chassis having a defined horizontal axis, the improvement comprising: a vertically oriented turntable disposed between the chassis and the backhoe group, the turntable adapted to rotate the backhoe group through an arc about the horizontal axis.

2. The backhoe according to claim 1 wherein the backhoe group is affixed to the turntable, and/or wherein the turntable is affixed to the chassis.

3. The backhoe according to claim 1 wherein the turntable includes means for affixing the turntable to the chassis, means for attaching the backhoe to the turntable and means for rotating the turntable.

4. The backhoe according to claim 1 wherein the turntable includes a cap rotatably mounted about a trunnion, the trunnion adapted to be secured to the chassis.

5. The backhoe according to claim 14 wherein the cap includes means for securing the backhoe group thereto, which means preferably includes a pair of opposed brackets, having bores therethrough, a socket attached to the backhoe group and inserted between the brackets, and a rod extending through the bores and the socket to secure the backhoe group to the cap.

6. The backhoe according to claim 4 wherein a flange secures the cap to the trunnion.

7. The backhoe according to claim 1 including means for securing the backhoe group in any selected position within the arc.

8. The backhoe according to claim 1 wherein the chassis is mobile and/or wherein a bucket is affixed to the chassis.

9. A method for removing material from underneath a structure supported on a surface using a backhoe unit having a defined horizontal axis and a backhoe group, the method comprising:

a) positioning a backhoe unit adjacent to the structure;

b) orienting the backhoe scoop so as to be substantially parallel with the surface; and

c) maneuvering the backhoe scoop underneath the structure and moving the material with the backhoe scoop.

10. The method according to claim 9 including rotating the backhoe scoop about the horizontal axis through an arc, optionally to a predetermined position and preferably the arc extends from a substantially vertical position to a substantially horizontal position.

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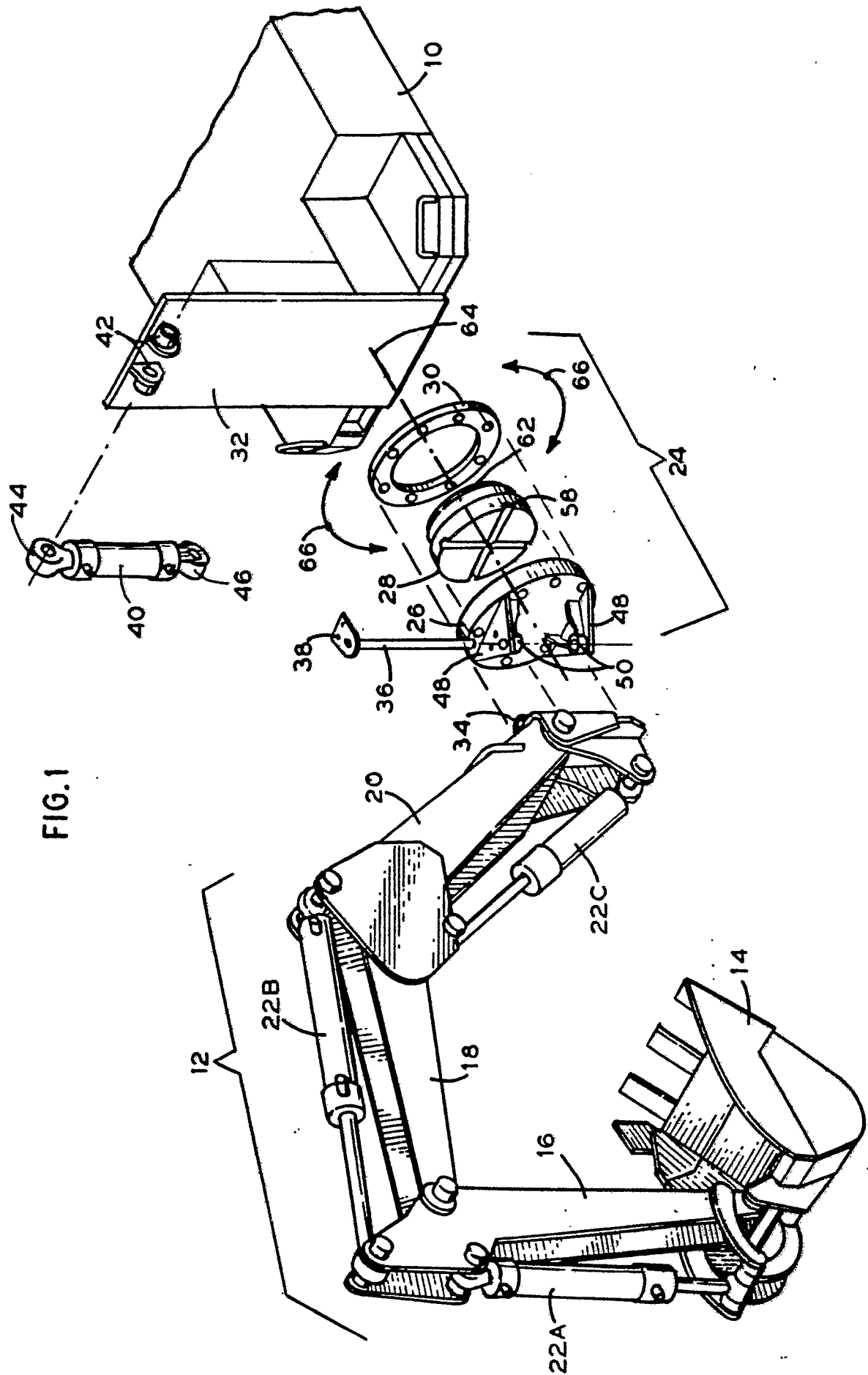
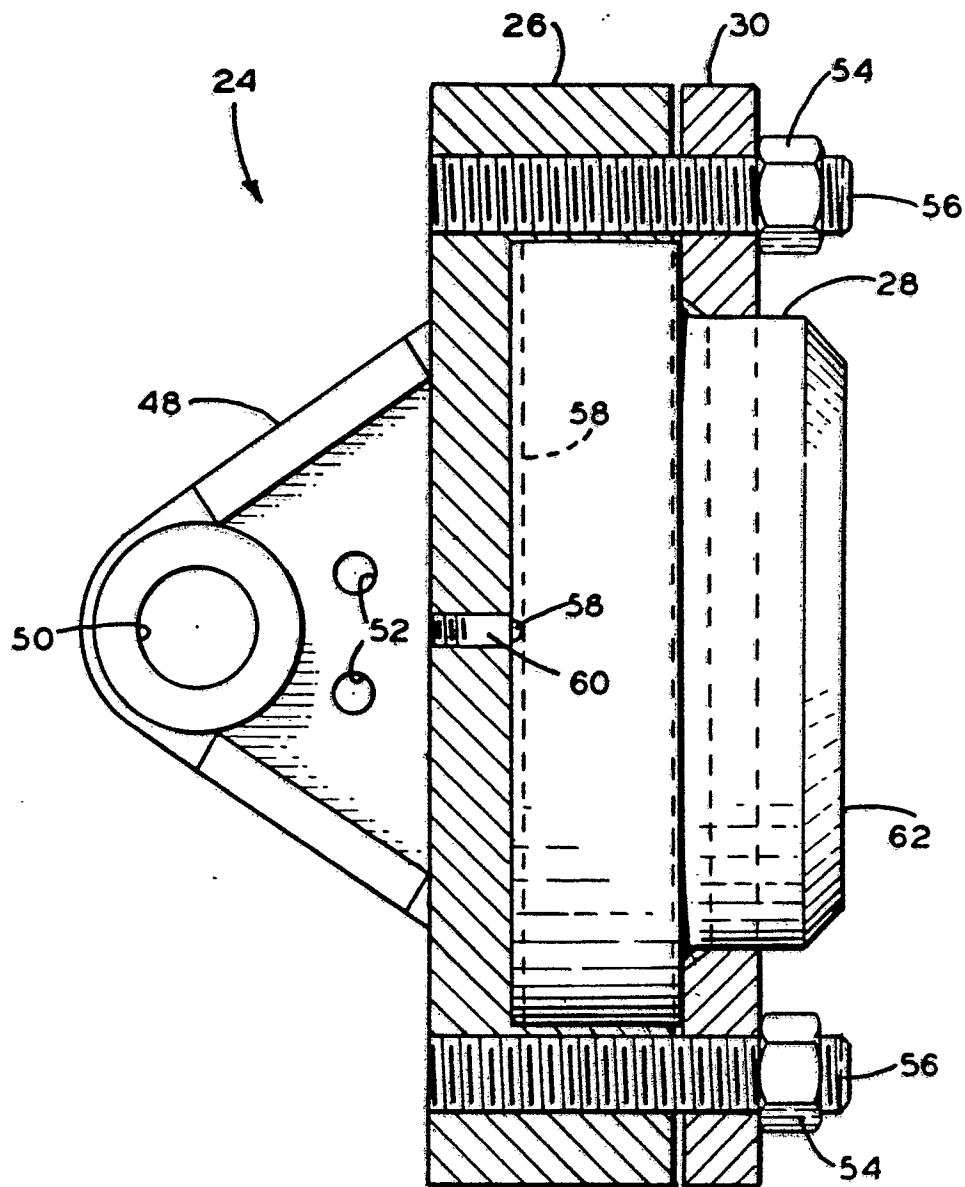


FIG. 2





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. 4)
X	US-A-3 463 336 (G.W.MORK) * The whole document * ---	1-10	E 02 F 3/38 E 02 F 3/32 E 02 F 9/14
X	FR-A-2 157 879 (ORENSTEIN & KOPPEL AG) * Claim; figures 1-6 * ---	1-4, 9, 10	
X	US-A-2 847 134 (L.SLATE) * The whole document * ---	1-4, 6, 8, 9, 10	
X	FR-A-1 167 295 (CLOWEZ) * The whole document * ---	1-4	
A		9, 10	
X	FR-A-1 379 708 (K.KLAUS) * Abstract; figures 1-3 * -----	1-4, 9, 10	
			TECHNICAL FIELDS SEARCHED (Int. Cl. 4)
			E 02 F
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 03-02-1989	Examiner ANGIUS P.
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	