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Mashuda

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[45] **Feb. 5, 1974**

[54] **PIPE CRADLER ATTACHMENT FOR EXCAVATOR BUCKET**

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[21] Appl. No.: **295,967**

[52] **U.S. Cl.** ..... **37/118 R**, 37/103, 37/117.5, 214/145

[51] **Int. Cl.** **E02f 3/60**

[58] **Field of Search** 214/145; 37/117.5, 118, 103

[56] **References Cited**

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2,660,323	11/1953	Carlesimo	214/145
3,161,306	12/1964	Granryd	214/145 X
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Assistant Examiner—Clifford D. Crowder
Attorney, Agent, or Firm—Buell, Blenko and Ziesenheim

[57] **ABSTRACT**

An excavating bucket, such as may be used on a backhoe for digging a trench. The bucket is provided with a recessed back in which is mounted adjacent the front edge a hinged template. The template is normally swung back into the recess but is optionally swung outward and forward by pressure operated cylinders at the back of the bucket under control of the operator. In its extended position below the front edge of the bucket, the template scoops a cradle or channel in the bottom of the trench for pipe to seat in.

7 Claims, 4 Drawing Figures

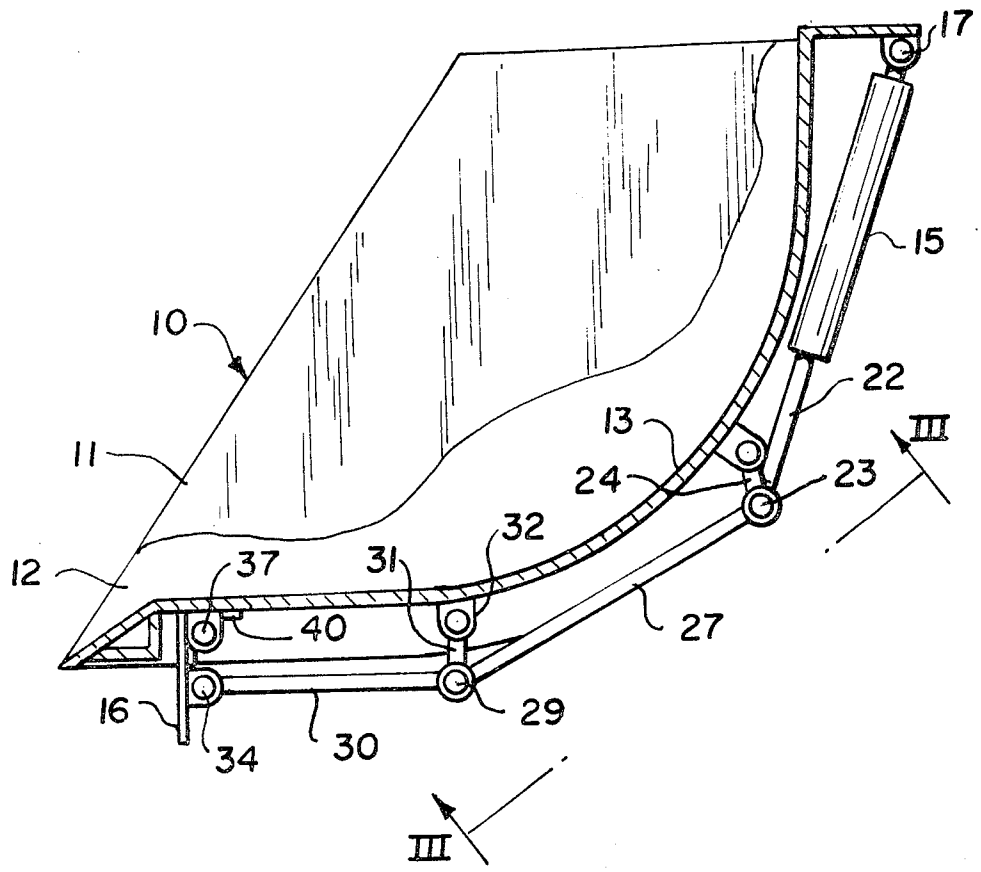


Fig.1.

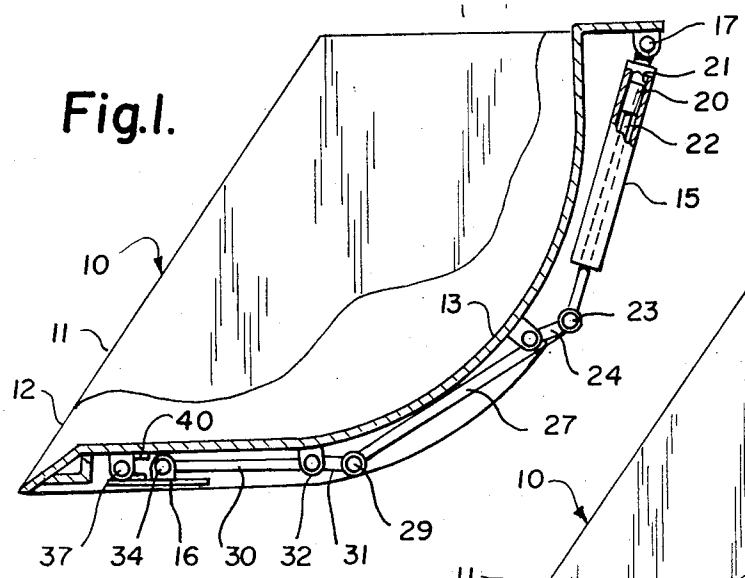


Fig.2.

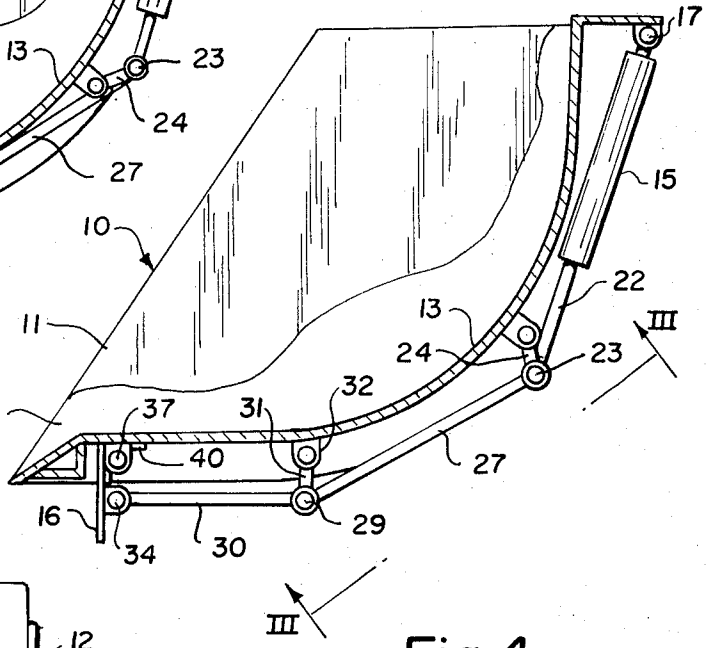


Fig.3.

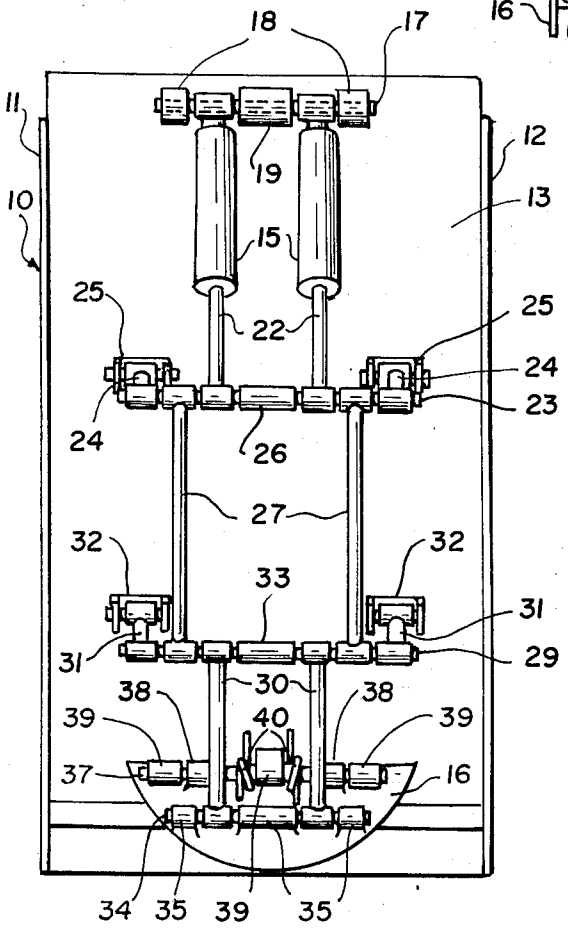
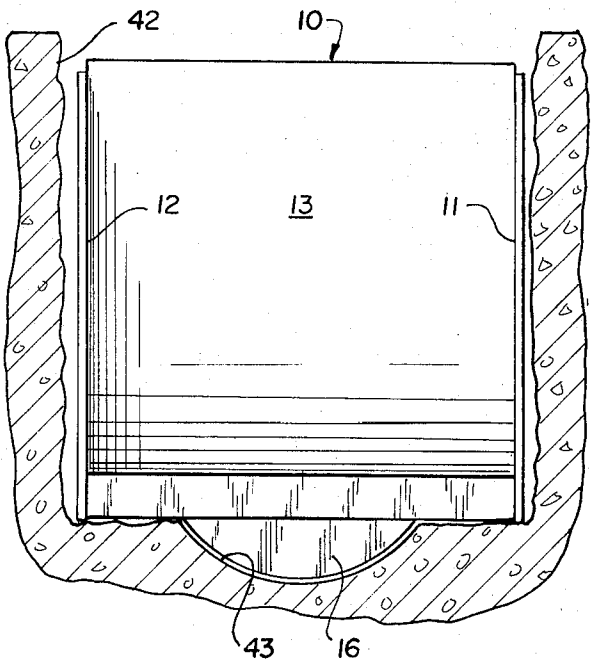


Fig.4.



PIPE CRADLER ATTACHMENT FOR EXCAVATOR BUCKET

THis invention relates to an excavating bucket of the type used on a back hoe for digging a trench in which to lay pipe. The bucket has a hinged template at the back which may be optionally swung down and rigidly held in a position below the front edge of the bucket. When so used, the template scrapes or scoops a cradle in the bottom of the trench for seating a pipe.

When laying pipe, especially large diameter pipe, in a pipe line trench it is customary to provide a so-called "cradle" or groove in the bottom of the trench in which the pipe is seated. This practice is resorted to so as to more firmly anchor the pipe in a trench and prevent shifting of the pipe laterally in the trench after the trench is refilled with earth. When first practiced, the so-called cradle was excavated by hand labor following excavation of the trench. An alternative practice was to dig a deeper trench than required, and then back fill the bottom of the trench to form the cradle.

In more recent years the mechanical devices have been resorted to for excavating the cradle after the trench was machine dug to its final depth. For example, in U.S. Pat. No. 2,742,003, issued Apr. 17, 1956, a trench excavator of the rotary wheel type has teeth attached to some of the scoops for cutting a central channel or cradle in the bottom of the trench. In U.S. Pat. No. 2,660,323, issued Nov. 24, 1953, a bucket of standard width and capacity is disclosed with a small auxiliary scoop on the bottom of the main scoop, which excavates a narrow channel below the bottom of the trench.

In the case of the rotary wheel scoop, the equipment is elaborate and costly and frequently has difficulty in attaining access to the trench. In the case of the auxiliary scoop on the main bucket, the auxiliary scoop deepens the trench unnecessarily when a cradle channel is not desired.

It is the purpose of this invention to provide an excavating scoop or bucket which may be optionally adapted by an extensible and retractable template to excavate a cradle or pipe supporting channel at the bottom of a trench only when desired.

More specifically, I provide an excavating bucket or scoop, having a hinged template transversely depending from a recess at the back of the bucket, and fluid pressure actuated cylinder means for extending or retracting the template when desired under the remote control of the operator. When held in its extended position the template depends sufficiently below the mouth of the bucket to scrape or scoop a cradle in the bottom of a trench excavated by the bucket itself. When the template is retracted, the bucket excavates a trench without producing a cradle, the same as any standard bucket.

A preferred form of excavating bucket embodying the invention is more fully described hereinafter in connection with the accompanying drawings, wherein:

FIG. 1 is a side elevational view, partly in section, showing the preferred form of excavating bucket with the cradle-forming template in retracted position;

FIG. 2 is a similar side elevational view, partly in secton, showing the bucket of FIG. 1 with the cradle-forming template in extended position;

FIG. 3 is a view of the back of the bucket, from a line indicated by the arrows III—III of FIG. 2; and

FIG. 4 is a cross-sectional view through a trench, showing a front view of the bucket of FIG. 2 with the cradle-forming template extended and also the cradle at the bottom of the trench formed thereby.

Referring to the drawings, the embodiment of the excavating bucket 10 shown therein is similar in general construction and appearance to conventional buckets used, for example, on a back hoe. Typically, it comprises two spaced side wall plates 11 and 12 and a curved bottom plate 13, riveted, welded or otherwise secured together. Adjacent its leading or front edge the bottom plate 13 is slanted downwardly to provide a lift to the soil being scooped as it enters the bucket. In order to provide a suitable recess at the back of the bucket, for a purpose later made apparent, the bottom plate 13 is inset from the lower or bottom edge of the side wall plates 11 and 12.

Referring now to FIG. 3, there is attached to the back of the bottom plate 13 a pair of double-acting cylinders 15 preferably of the hydraulic pressure actuated type, arranged to activate a hinged cradle-forming template 16. Template 16 is illustratively shown as a plate having a contour similar to the segment of a circle intersected by a chord. It will be seen that the radius of the curved edge of the template may be selected as desired according to the size of the cradle desired. Moreover, a number of different sizes of template may be stocked and employed selectively at different times.

Cylinders 15 are provided with bearing lugs for hingedly mounting the cylinders at one end in the recess at the back of the bucket. The cylinder lugs are pivotally connected to a hinge pin or rod 17 supported at its opposite ends in a pair of bearing brackets 18 attached as by welding to an angular extension of the bottom plate 13. A spacer collar 19 is carried on the hinge pin between the mounting lugs of the two cylinders to maintain appropriate transverse spacing of the cylinders. Hinge pin 17 is secured against endwise shifting by any conventional means, such as cotter pins, not shown. Other hinge pins later referred to are similarly secured against endwise shifting.

Each cylinder 15 has a piston 20 (FIG. 1) operating in a bore 21 of the cylinders and having a piston rod 22 attached thereto which extends out of the free end of the cylinder through a suitable bearing in the end cover. The two piston rods 22 have bearing lugs at their distal ends, by which the rods are pivotally connected to a hinge pin 23. Hinge pin 23 is supported at its opposite ends by two short cam links 24, each link in turn being hingedly attached to a bearing bracket 25 secured as by welding to the bottom plate 13. A spacer collar 26 is provided on the pin 23 between the piston rods 22.

Additional linkage is provided comprising a pair of push rods 27 connecting the hinge pin 23 to another hinge pin 29 and a second pair of push rods 30 connecting the hinge pin 29 to the template 16.

Hinge pin 29 is supported at its opposite ends in a pair of short cam links 31 pivotally mounted in bearing brackets 32 secured to the bottom plate. The push rods 30 are pivoted at one end on the hinge pin 29 with a spacer collar 33 therebetween and at their opposite ends on a hinge pin 34. Hinge pin 34 is supported in three bearing brackets 35 which are secured as by welding to the template 16. One of the brackets 35 intervenes between the push rods 30 and serves to maintain their parallel relation.

Template 16 is hinged to the bottom plate 13 by a hinge pin 37 which extends through a pair of spaced bearing lugs 38 attached to the template and three bearing brackets 39 attached to the bottom plate 13 in spaced relation. A pair of torsion springs 30 are provided on the hinge pin 37 with opposite ends bearing on the bottom plate 13 and on the template. The force of torsion springs 40 is thus exerted in a direction to bias the template 16 outwardly toward its extended position. As evident in FIG. 1, the push rods 30 are in parallel relation to the template 16 in the retracted position thereof. Thus torsion springs 40 serve to initiate turning movement of the template from its retracted or "dead center" position toward its extended position. It will be seen that the line of force exerted via the push rods 30 on the template in its retracted position would not provide a turning moment on the template.

While omitted in the drawings for simplicity, it should be understood that suitable hose lines are connected to cylinders 15 to selectively supply fluid pressure, such as hydraulic pressure, to the pressure chambers within the cylinders at opposite sides of the piston 20. Since excavating equipment such as a back hoe is customarily provided with hydraulic pressure equipment for operation thereof, the hose lines from the cylinders 15 are readily connected into the hydraulic pressure system subject to suitable operator controlled valves.

The manner in which the bucket 10 operates should be apparent fromthe foregoing description but a brief explanation is believed appropriate. Let it be assumed that it is desired to use the bucket 10 initially simply for the purpose of excavating a trench. In such case, the cylinders 15 are allowed to remain in the position in which they are shown in FIG. 1, wherein the template 16 is fully withdrawn into the recess at the back of the bucket. It will be noted that no part of the template 16 or its operating linkage projects below the bottom of the bucket. Consequently the template and its operating linkage do not interfere with the normal use of the bucket.

Having excavated a trench 42 as shown in FIG. 4, the operator may now, assuming that a cradle is desired in the trench, simply activate cylinders 15 by remote control from the operator's cab to cause extension of the template 16 to the position shown in FIG. 2, wherein the template hangs vertically below the leading edge of the bucket. It will be understood that, in consequence of the relief of the hydraulic pressure force on the pistons of the cylinders 15 in the direction to hold the template in its retracted position, the torsion springs 40 become effective to urge the template 16 toward the extended position. Once the template is turned out of its "dead center" position, the force of push rods 30 thereon exerts a force moment on the template 16 actuating it to its fully extended position. Moreover, the hydraulic pressure force exerted via push rods 27 and 30 holds the template rigidly in its extended position against the thrust force exerted thereon as the bucket is scraped along the bottom of the trench 42. Accordingly, the template forms a channel or cradle 43 in the bottom of the trench, as shown in FIG. 4. The scrapings of soil, gravel and the like gathered in front of the template are collected within the bucket itself and thereby removed from the trench as the bucket is raised out of the trench and dumped.

After completion of the cradle in the trench, the operator again by remote control simply restores the template to its retracted position within the recess at the back of the bucket.

While I have shown and described a preferred embodiment of the bucket herein, it will be seen that various modifications are possible within the terms of the following claims.

I claim:

1. An excavating bucket having two sides and a bottom plate member therebetween providing a bottom and back for the bucket, wherein the improvement comprises a cradle-forming template pivotally depending from the bottom of the bucket, and power cylinder means mounted on the back of said bucket for actuating said template.

2. An excavating bucket according to claim 1, wherein the said two sides and bottom plate cooperate to form a recess on the bottom and back of the bucket, said template having a retracted position in which it is positioned entirely within the said recess and having an extended position in which it projects out of said recess and below the bottom of the bucket.

3. An excavating bucket according to claim 2, wherein said power cylinder means is double-acting, said cylinder means being effective when actuated in one direction to move said template from its retracted to its extended position and effective when actuated in the opposite direction to move said template from its extended to its retracted position.

4. An excavating bucket according to claim 1, wherein said power cylinder means is pivotally mounted at one end on the back of the bucket, and has piston rod means projecting through the other end, and wherein mechanical linkage means connects said piston rod means and said template.

5. An excavating bucket according to claim 4, wherein said mechanical linkage means comprises a plurality of linkage rods, and a plurality of cam links pivotally attached to said bottom plate, by which cam links said linkage rods are supported.

6. An excavating bucket according to claim 1, wherein biasing spring means constantly urges said template toward an extended position.

7. An excavating bucket according to claim 1, wherein hinge means is provided for pivotally mounting said template on said bottom plate, said hinge means comprising a hinge pin attached to the bottom plate, and wherein torsion spring means is mounted coaxially with said hinge pin and constantly exerts a force urging said template toward an extended position.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,789,524 Dated February 5, 1974

Inventor(s) David Mashuda

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 1, line 4, "THis" should be --This--.

Column 3, line 5, "30" should be --40--.

Signed and sealed this 11th day of June 1974.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

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