Dec. 6, 1966 N. B. EMERY 3,289,866

BACK HOE DIPPER ATTACHMENT FOR DIGGING LATERALLY SLOPED EXCAVATIONS

Filed Feb. 23, 1965

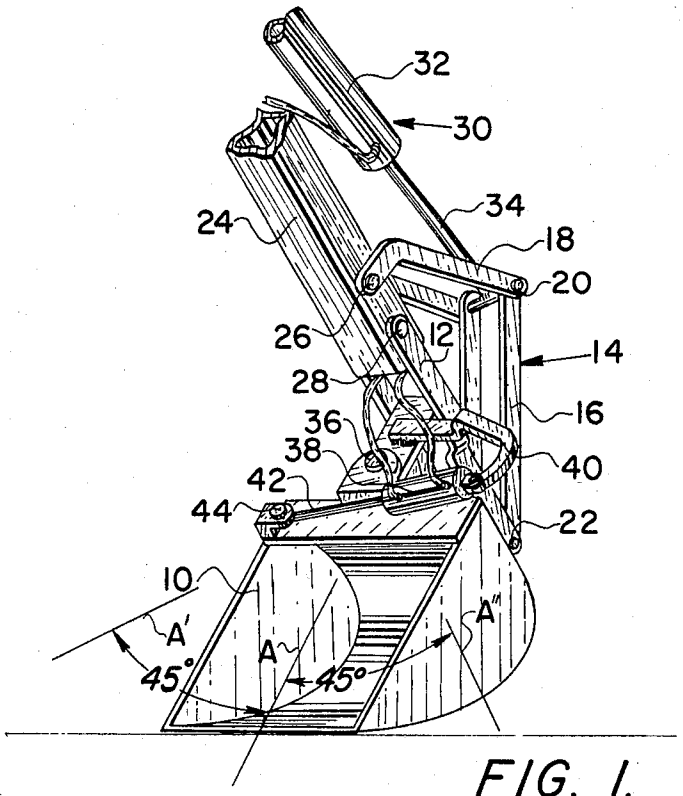


FIG. 1.

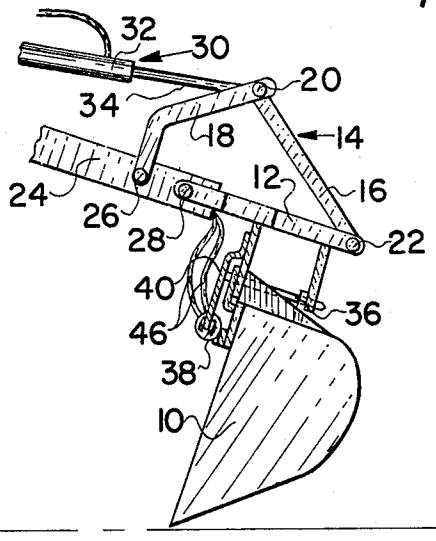


FIG. 2.

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BACK HOE DIPPER ATTACHMENT FOR DIGGING LATERALLY SLOPED EXCAVATIONS

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1 Claim. (Cl. 214—138)

This invention relates to new and useful improvements in material-handling attachments for excavating machines, and more particularly to dippers of the power operated type for changing their lateral tilt relative to the axial plane of the excavation.

The conventional excavating machine is normally equipped with a dipper which can be actuated either toward or way from the machine by pivoting the dipper arm about a horizontal transverse pivot at the end of the boom and/or by pivoting the dipper about a horizontal transverse pivot at the end of the dipper arm. The latter motion is known as a "wrist action."

Improvements have already been made to equip the machine with means at the lower end of the dipper arm for rotating the dipper about the longitudinal axis of the dipper arm, to make it possible to change the direction of digging relative to the vertical plane through the boom, without moving the entire machine into line with the digging direction. This motion of the dipper is known as "angling."

The object of the present invention is to add a "tilting action" to the dipper which may have any type of suspension on the end of its arm, such as a wrist action linkage or angling action suspension, or both, in a manner which will tilt the dipper relative to the plane of the excavation without interfering with the operation of such actions and their independent controls, thus increasing the versatility of the machine, making it useful for transverse grading operations and facilitating excavations requiring transversely sloping bottoms or sides as well as rectangular excavations.

Other and more specific objects will appear in the following detailed description of a preferred form of the invention, as illustrated in the accompanying drawing, wherein:

FIG. 1 is a low perspective view of the novel dipper hinge pivot mounting and the wrist action linkage at the lower end of the dipper arm on which it is mounted, and FIG. 2 is a side view thereof.

The drawing illustrates one form of the invention having direct hydraulically operated means mounted on the dipper support bracket for varying the tilt angle of the dipper. However, this means may be of any other power type, such as a worm and gear arrangement or other mechanical, electrical and/or hydraulic means of suitable design to effectively perform this tilting operation and control.

The specific form illustrated comprises a dipper **10** mounted on the bracket link **12** of the conventional wrist action linkage **14**, which includes links **16** and **18** pivoted together at **20** and to the outer end of the bracket link **12** at **22** and to the dipper arm **24** at **26**, respectively, bracket link **12** being pivoted to the dipper arm **14** at **28**. All these pivots have horizontal axes, whereas the hinge pivot **36** at the back of the dipper is in the axial plane of the dipper arm which is normal to these horizontal axes.

A conventional wrist action ram **30** is shown having a hydraulic cylinder **32**, and plunger rod **34** extending therefrom and connected to the pivot pin at **20** for actuating the wrist action linkage **14** to pivot the dipper about the horizontal pivot pin at **26** to the desired digging or scoop angle.

In the conventional excavating machine the dipper is

rigidly mounted on the bracket link **12**. In the present invention the dipper is given a tilting action made possible by providing a pivotal hinge **36** in the bracket mounting of the dipper on the bracket link **12**. In order to control this tilting action, a hydraulic cylinder **38** may be pivotally connected to an arm **40** extending from the bracket link **12**, and its plunger rod **42** may be pivotally connected to the dipper frame at **44**, to provide about up to 45° of tilting to each side of the normal dipper position on the bracket link. Hydraulic lines **46** feed the pressure fluid to the opposite ends of the power cylinder **38** in accordance with the operation of control valves of a conventional control system by lever means at the operator's station.

Obviously, various other suitable power control arrangements may be designed to perform this control operation for any desirable range of tilting action.

The present invention adds greatly to the versatility of the conventional excavating machine with a wrist action dipper, by providing a swivel hinge right in the dipper support means at the back of the dipper, which permits tilting of the dipper about an axis in the axial plane of the dipper arm which is perpendicular to the pivots of the wrist action linkage, this axis extending axially along the back of the dipper. Thus the longitudinal axis A of the dipper may be swung out of said axial plane about said axis to either side to tilt the dipper in accordance with the desired lateral slope of the bottom or sides of a trench to be graded by the dipper scoop in the final digging or lateral grading operations.

The range of tilting provided in the illustrated dipper is approximately up to 45° to either side of the axial plane, as shown by the positions A′ and A″ of the longitudinal axis A of the dipper, since rarely is a greater slope required in lateral grading or in embankments of a ditch or trench. However, this range of control may be varied to meet requirements.

Although only hydraulic plunger and rod control is illustrated in the drawing, it will be understood that any other suitable power controls may be used to hold the dipper in any desired position of tilt, without interfering with the wrist action controls for swinging the dipper about the horizontal pivot at **28** on the dipper arm. For example, a worm and gear arrangement of suitable design operated by hydraulic, electrical or mechanical means in any well known manner may be used, the principal requirements of any such design being that it will firmly hold the dipper in any desired tilt position without interfering with its wrist action.

Also, while only one type of wrist action linkage is illustrated in the drawing, the novel swivel support dipper may be equally applied to any other type of wrist action linkage. Where the back of the dipper itself forms the bracket link of the wrist action linkage, as shown e.g. in the Mork Patent No. 2,927,706, a separate bracket link, such as **12**, may be added, to which the novel dipper may be swivelled as herein disclosed, without interferring with the wrist action disclosed in said patent, or its "angling" support means for the dipper about the longitudinal axis of the dipper arm.

Many other obvious modifications in the details of construction and arrangement of parts may be made in the present device, without departing from the spirit and scope of the present invention, as defined in the appended claim.

What is claimed is:

In an excavating machine, a dipper arm and dipper assembly, comprising

a dipper arm,

a wrist action linkage at the lower end of said dipper arm, including a bracket link transversely pivoted

on a horizontal axis to the end of said dipper arm,

a dipper hinged on said bracket link axially along the back of the dipper and substantially parallel thereto, providing tilting of the dipper laterally out of the vertical plane of its hinge, and

power means for controlling the amount of said tilting,

said power control means comprising an arm extending laterally from said bracket link, a hydraulic cylinder pivoted at its outer end to said arm and a plunger rod extending from said cylinder and pivoted at its outer end to a point on said dipper suitably spaced from its hinge for hydraulically controlling said tilting.

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