

Oct. 10, 1961

D. F. PRZYBYLSKI

3,003,649

TURNTABLE STRUCTURE FOR HYDRAULIC DIGGING MACHINES

Filed Oct. 23, 1957

5 Sheets-Sheet 1

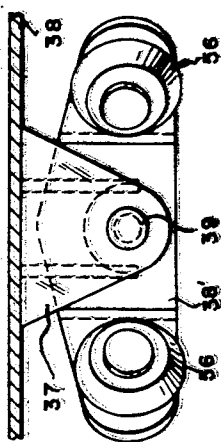


FIG-III

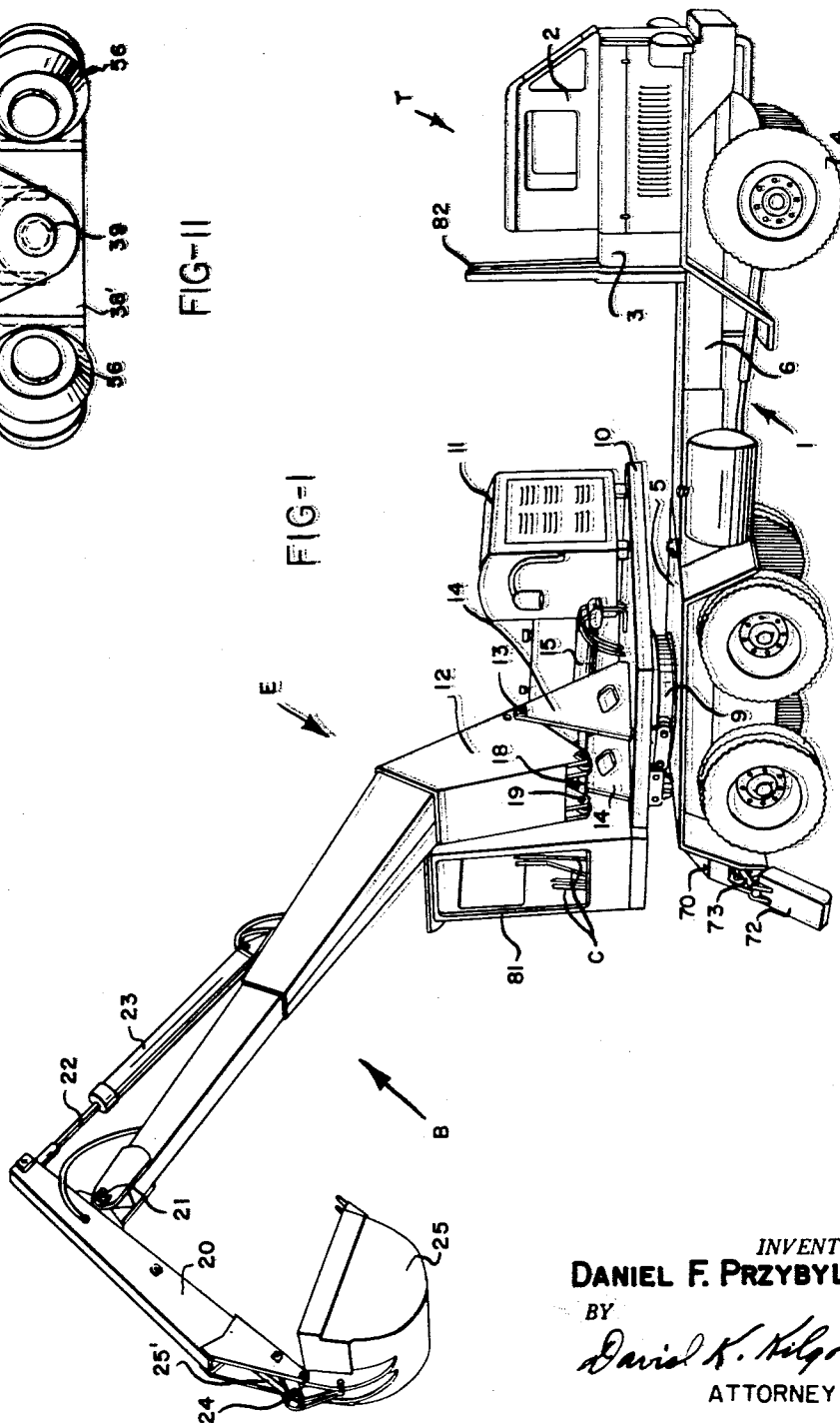


FIG-1

INVENTOR.
DANIEL F. PRZYBYLSKI
BY
Daniel H. Kilgore
ATTORNEY

Oct. 10, 1961

D. F. PRZYBYLSKI

3,003,649

TURNTABLE STRUCTURE FOR HYDRAULIC DIGGING MACHINES

Filed Oct. 23, 1957

5 Sheets-Sheet 2

ATTORNEY

Oct. 10, 1961

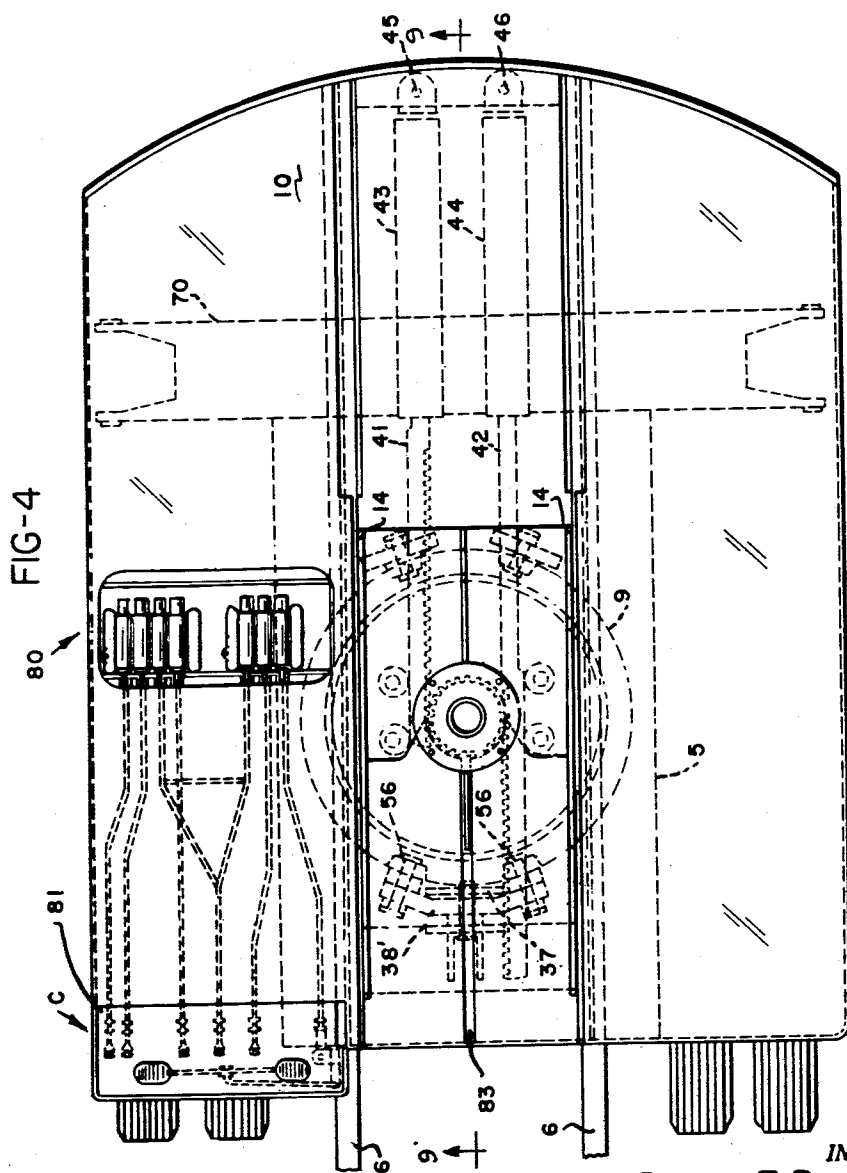
D. F. PRZYBYLSKI

3,003,649

TURNTABLE STRUCTURE FOR HYDRAULIC DIGGING MACHINES

Filed Oct. 23, 1957

5 Sheets-Sheet 3



INVENTOR.
DANIEL F. PRZYBYLSKI
BY *Daniel H. Kilgore*
ATTORNEY

Oct. 10, 1961

D. F. PRZYBYLSKI

3,003,649

TURNTABLE STRUCTURE FOR HYDRAULIC DIGGING MACHINES

Filed Oct. 23, 1957

5 Sheets-Sheet 4

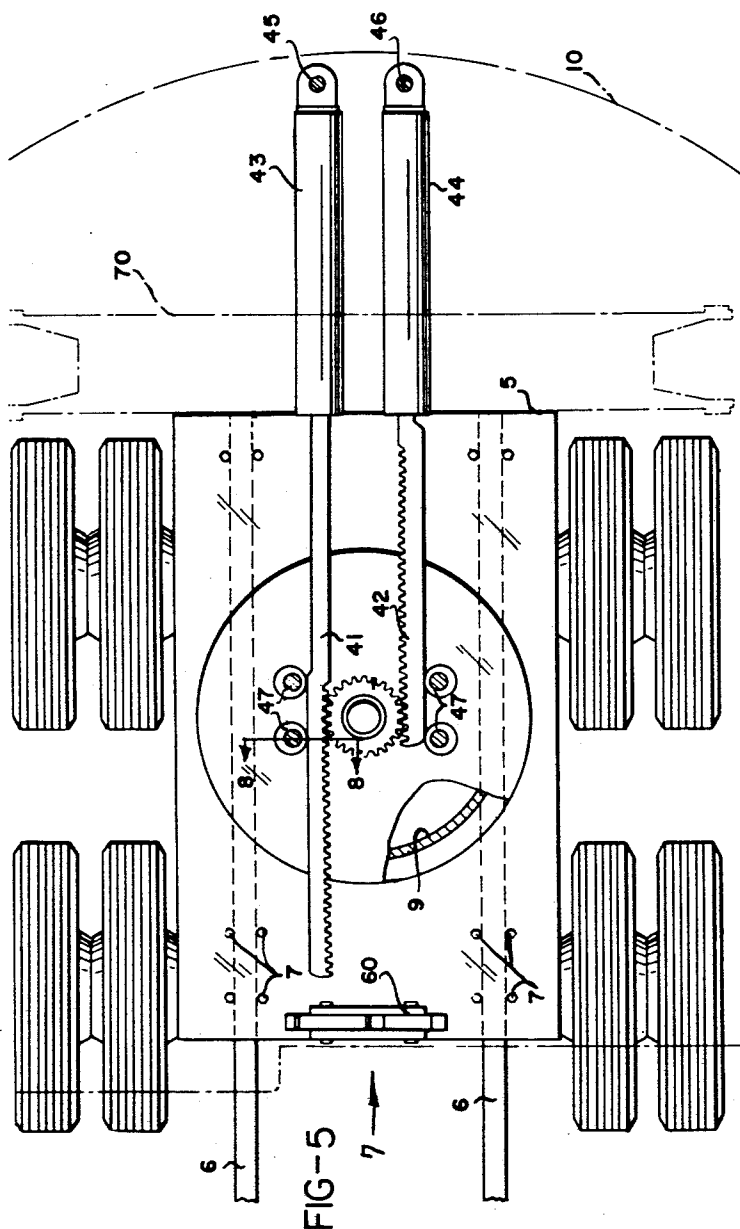


FIG-5

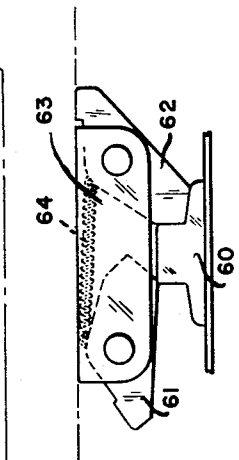


FIG-7

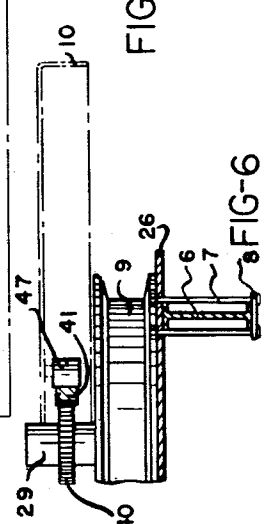


FIG-6

INVENTOR.
DANIEL F. PRZYBYLSKI
BY *David H. Kelyne*
ATTORNEY

Oct. 10, 1961

D. F. PRZYBYLSKI

3,003,649

TURNTABLE STRUCTURE FOR HYDRAULIC DIGGING MACHINES

Filed Oct. 23, 1957

5 Sheets-Sheet 5

FIG-8

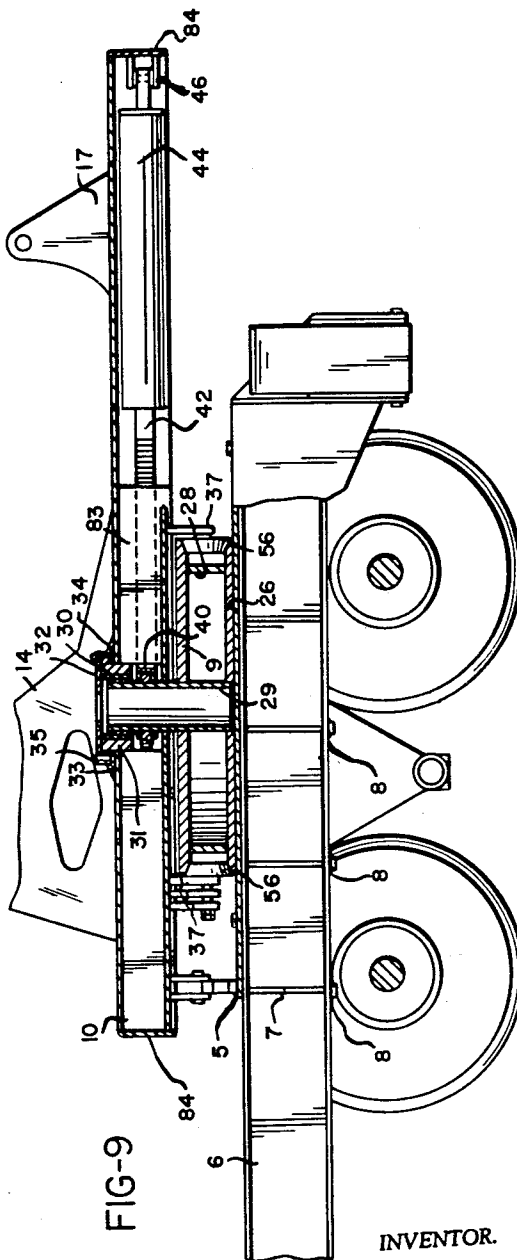
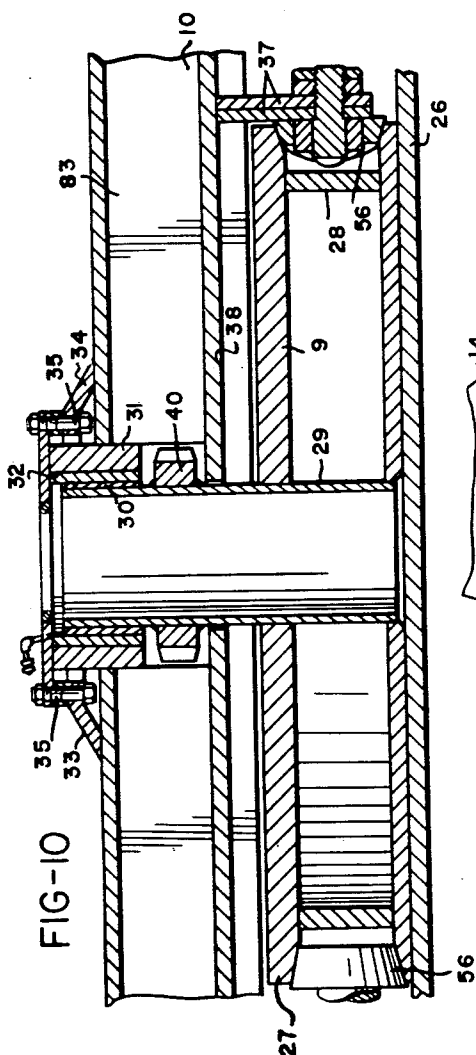
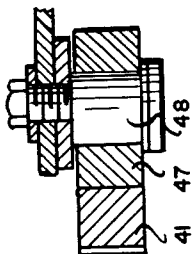


FIG-9

INVENTOR.

DANIEL F. PRZYBYLSKI

BY

Daniel F. Przybylski

ATTORNEY

1

3,003,649

TURNTABLE STRUCTURE FOR HYDRAULIC DIGGING MACHINES

Daniel F. Przybylski, Winona, Minn., assignor to The Warner & Swasey Company, Cleveland, Ohio, a corporation of Ohio

Filed Oct. 23, 1957, Ser. No. 691,910

5 Claims. (Cl. 212—69)

This invention pertains to excavating equipment and is particularly concerned with portable excavating equipment, and is most especially concerned with a novel arrangement for rotatably supporting an excavating unit on a mobile frame such as a truck or tractor chassis.

Excavating equipment of a mobile type is important in construction and road building operations since it enables such pieces of equipment to be readily moved from job to job or to and from working position on a job without delaying work operations. Heretofore most excavating devices of any size have been considerably less than freely movable because of being mounted on caterpillar tracks or the like.

The present invention has as a particular object the provision of an arrangement for supporting an excavating unit on a truck or tractor chassis so as to permit movement of the unit readily from one place to another while at the same time the supporting of the excavating unit is of such a nature as to permit free swinging thereof on its supporting frame.

A particular object of the present invention is the provision of a structure for rotatably supporting an excavating unit on a support frame so that the loads imposed on the unit are transmitted to the frame without the unit tilting.

A still further object of this invention is the provision of a unique structure for rotating an excavating unit on a supporting platform therefor to position the unit in various angular positions for work operations.

A still further object of this invention is the provision of a combination turntable and hydraulic motor arrangement for rotatably connecting a platform mounted excavating unit to a chassis mounted support plate for the ready rotation of the excavating unit for work operations while supporting the excavating unit against tilting movements due to work loads imposed thereon.

It is also an object of this invention to provide a construction for angularly positioning an excavating unit at any point about the 360° of a circle and for holding the excavating unit in its rotated position.

The several objectives of this invention set forth above as well as still other objectives and advantages will become more apparent upon reference to the following specification taken in connection with the accompanying drawings wherein like parts are referred to by like reference numbers.

In the drawings:

FIGURE 1 is a perspective view of a typical truck mounted excavating unit constructed according to the present invention.

FIGURE 2 is a side elevational view thereof with the boom and dipper stick positioned in transport position beside the driver's cab of the truck.

FIGURE 3 is a plan view looking down on top of FIG. 2.

FIGURE 4 is a plan view at the rear end of the truck looking down on top of the platform of the excavating unit, but with the operator's cab, the power unit, and the boom and dipper stick assembly removed therefrom.

FIGURE 5 is a plan view like FIG. 4 except with the entire excavating unit platform removed in order to disclose the arrangement for rotating the excavating platform on its supporting plate.

2

FIGURE 6 is a sectional view indicated by line 6—6 in FIG. 5 showing the manner in which the support plate is detachably connected with the truck chassis.

FIGURE 7 is a view looking in the direction of the arrow 7 in FIG. 5 showing a latch or stop mechanism associated with the platform for limiting the rotative movement thereof.

FIGURE 8 is a section indicated by line 8—8 in FIG. 5 showing the adjustable support for the rollers that back up the racks forming a part of the mechanism for rotating the excavating unit platform.

FIGURE 9 is a vertical sectional view indicated by line 9—9 in FIG. 4 showing the turntable unit that interconnects the excavating unit platform with the support plate.

FIGURE 10 is an enlarged sectional view showing in more detail the turntable structure.

FIGURE 11 is a fragmentary view showing the construction of a floating roller frame attached to the excavating unit platform and which rollers engage in the track about the turntable.

Referring to the drawings: a truck indicated at T has a chassis 1 on which an excavating unit E is mounted. The excavating unit comprises a boom and dipper stick assembly indicated at B operable for excavating or other earth working operations.

The truck T has a driver's cab 2 positioned to one side of the center of the truck and to the other side of the truck is the engine compartment 3. The truck may comprise the steerable front wheels 4. Resting on the chassis 1 of the truck is a support plate 5 of the excavating unit which is attached to the beam-like side frame members 6 of chassis 1 as by the bolts 7 extending along opposite sides of the frame members and interconnected at their lower ends by plate 8.

Uprstanding from plate 5 is a turntable or circular track arrangement 9 and rotatably supported thereon is the platform 10 of the excavating unit.

Mounted on the upper plate of platform 10 is an internal combustion engine located within a compartment 11 which drives a hydraulic pump that supplies hydraulic power for operating the boom and dipper stick and the bucket on the end of the dipper stick and for swinging the platform 10 on frame 5.

The excavating unit has a boom 12 pivoted adjacent its lower end at 13 to upstanding bracket members 14 that are integral with the top plate of platform 10. The boom 12 is arranged for being tilted about its pivotal connection with bracket means 14 by a hydraulic motor means 15 which includes cylinders pivotally connected at 16 with brackets 17 fixed to platform 10 and having double acting rams 18 therein attached at 19 to the boom.

Pivoted to the outer end of boom 12 is a dipper stick 20 as by means of the pivotal connection 21, and the dipper stick is tiltable on the boom by a hydraulic motor consisting of a cylinder 23 pivoted to the boom and a double acting ram 22 extending therefrom and connected with the dipper stick.

Pivotally connected at 24 to the lower end of the dipper stick is a shovel or bucket 25 which is adapted for being tilted about its pivotal connection 24 by a double acting hydraulic ram 25' that extends into a cylinder mounted inside the dipper stick in a protected location.

As will be seen particularly in FIGS. 2, 4, 9 and 10 the platform 10 is rotatably supported and guided on support plate 5 by the aforementioned circular track or turntable structure 9. This structure comprises a circular bottom plate 26 and a circular top plate 27 spaced from plate 26 and attached thereto as by the cylindrical rib element 28 which may be welded to plates 26 and 27. Extending vertically from the bottom plate on its axis and upwardly through the upper plate is a cylindrical

member or center post 29 which serves as a pivot post about which platform 10 is rotatable.

At its upper end post 29 receives a bearing sleeve 30 and rotatable on the bearing sleeve is a sleeve element 31 attached to flat plate 32 that extends outwardly beyond sleeve element 31 and which is attached to the platform 10 as by the members 33 and 34 that receive the bolts 35.

The aforementioned plates 26 and 27 have their outer edges beveled to form an outwardly divergent and generally V-shaped circular track that receives a plurality of rollers 56 which are fixed as by brackets 37 to the bottom of the lower plate 38 forming a part of platform 10. The two of the rollers on the side of the platform opposite the side from which the boom extends are fixed to the platform as can be seen in FIG. 4 whereas the two rollers on the opposite end of the track are carried in a bracket or yoke 38' which is pivoted at 39 to its pertaining support bracket 37. In this manner the platform has four angularly spaced points of engagement with the track while, at the same time, the self aligning advantages of a three point suspension of the platform is had.

The combination of the strong track rigid with plate 5 and the strong cylindrical center post 29 supports the platform 10 on the plate 5, and, therefore, on the chassis on the truck so as to prevent tilting of the platform thereon.

The cylindrical post 29 is also availed of for supporting a gear 40 located between the upper plate of platform 10 and the plate 38, and meshing with gear 40 are racks 41 and 42. Each of racks 41 and 42 is attached to a double acting ram and the rams extend into the cylinders 43 and 44 respectively which are pivotally supported in brackets at 45 and 46 to platform 10 adjacent the outer edge thereof as will be best seen in FIGS. 4 and 9.

The racks 41 and 42 are held in engagement with gear 40 by the backup rollers 47 which are adjustably supported on platform 10 as by the support bolts 48 which will be seen in FIG. 8. It will be evident that the reversible energization of the hydraulic motors formed by the cylinders 43 and 44 and their pertaining double acting rams will cause rotation of platform 10 about the axis of the turntable. The amount of rotation of platform 10 on plate 5 is limited in each direction of rotation by a stop 60 fixed to plate 5 and which is adapted for engagement by the stop pawls 61 and 62 carried by the bracket 63 that depends from the under side of platform 10 and which pawls are urged downwardly by spring 64 so that each pawl will be effective for stopping platform 10 in one direction of rotation. A full 360° of rotation of the platform can thus be had but overtravel in either direction is positively prevented.

Inasmuch as the excavating unit will be subject to severe loading at times it is preferred that there be a stabilizer frame S attached to plate 5 at its rear edge and which stabilizer frame comprises a transversely extending channel unit 70 preferably welded to plate 5 and braced thereon by plates 71 and having stabilizer pontoons 72 pivoted to the outer ends thereof movable between upper idle positions and lower ground engaging working positions by hydraulic motor means 73.

All of the previously mentioned motor means are adapted for energization by hydraulic fluid supplied by the previously referred to hydraulic pump via suitable conduits and control valves, the said control valves being generally designated at 80 in FIG. 4 and there being provided control means generally designated at C located within an operator's cab 81 positioned at the edge of platform 10 to the side of the boom supporting brackets so that an operator therein can observe the position of the boom and the earth working implement carried thereby and easily control the movements thereof.

As will be observed in FIGS. 2 and 3 a feature of the arrangement of the present invention resides in the fact that platform 10 can be rotated so as to position the boom assembly so that it extends longitudinally forwardly of the truck and parallel with the axis of the truck. In

this position the dipper stick is folded underneath the boom as shown in FIG. 2 and the lower end thereof, or the implement carried thereby, can thus rest on top of the engine compartment. It is preferred that there be provided at about the rear end of the engine compartment an upstanding frame 82 that receives and supports the boom and also prevents lateral movement thereof. When the device is collapsed into its FIG. 2 and 3 position it will be evident that the entire unit is quite readily portable along regular traffic channels wherever normal head room is available and the unit can be transported at normal traffic speeds. It will also be apparent that the unit can quickly be placed into operation merely by bringing the carrying truck to the place desired, starting up the engine that powers the excavating unit, and then manipulating the boom and dipper stick and the earth working implement carried thereby to carry out the desired work operations; the rotation of the platform 10 being accomplished as previously described, and the pontoons 72 being lowered into engagement with the ground to prevent tilting of the truck chassis.

The turntable structure described provides a rigid support of platform 10 on support plate 5 and with support plate 5 fixed rigidly to the chassis, and with the pontoons preventing tilting of the plate and chassis, relatively heavy work operations can be carried out and there will be no severe loads imposed on the running gear and spring structure of the truck.

The location of the power plant on platform 10 on the opposite side of the axis of rotation of the platform from the boom tends to counter balance the boom so that only the actual loads picked up are imposed on the turntable.

The stiffness of platform 10 and, therefore, its ability to withstand heavy loads, is augmented by a longitudinally extending stiffening rib 83 which is located in the plane of the axis of rotation of the platform and which is welded to the top and bottom plates of platform 10. The platform also preferably comprises a peripheral flange part 84 so that the entire platform is of a box-like nature and is thus extremely strong and rigid while at the same time it remains relatively light.

It will be understood that the present invention may be modified to adapt it to various circumstances and conditions and it is accordingly desired to comprehend within the purview of this invention such modifications as may be considered to fall within the scope of the appended claims.

I claim:

1. An excavating unit comprising, a bottom support plate to be fixed to a vehicle chassis, a turntable having a bottom part fixed to said support plate and having a rotatable upper part, a platform fixed to said upper part so as to be rotatable therewith, excavating means mounted on said platform, a stationary pinion on the axis of said turntable, racks meshing with opposite sides of said pinion, double acting reciprocating hydraulic motors connected between said racks and one edge of said platform for turning said platform, a stop abutment upstanding from said support plate, and a pair of stop pawls carried in adjacent relation by said platform and each adapted for engaging said abutment only in one direction of rotation of said platform, whereby substantially a full 360° of rotation of said platform can be had from its stop position.
2. In an excavating unit, a support plate, a post fixed to said plate, a platform having an upper supporting surface, means supporting said platform for rotation relative to said post, a pinion fixed to said post, a pair of racks meshing with said pinion, a ram fixed to each rack, a pair of cylinders extending generally perpendicular to said post and telescopically receiving said rams, and means securing said cylinders to said platform for pivotal movement about axes generally parallel to said post.
3. In an excavating unit, a support plate, a post fixed to said plate, a platform having an upper supporting surface, means supporting said platform for rotation rela-

5

tive to said post, a pinion fixed to said post, a pair of racks meshing with said pinion, a ram fixed to each rack, a pair of cylinders extending generally perpendicular to said post and telescopically receiving said rams, means securing said cylinders to said platform for pivotal movement about axes generally parallel to said post, and back up rollers carried by said platform engaging said racks to maintain the racks in engagement with said pinion.

4. In an excavating unit, a support plate, a post fixed to said plate, a platform having an upper supporting surface, means supporting said platform for rotation relative to said post, a pinion fixed to said post, a pair of racks meshing with said pinion, a ram fixed to each rack, a pair of cylinders extending generally perpendicular to said post and telescopically receiving said rams, and means securing said cylinders to said platform for pivotal movement about axes generally parallel to said post, said pinion, racks, rams and cylinders all being located beneath the upper supporting surface of said platform.

5. In an excavating unit, a support plate, a post fixed to said plate, a platform having an upper supporting surface, means supporting said platform for rotation relative to said post, a pinion fixed to said post, a pair of

6

racks meshing with said pinion, a ram fixed to each rack, a pair of cylinders extending generally perpendicular to said post and telescopically receiving said rams, means securing said cylinders to said platform for pivotal movement about axes generally parallel to said post, and back up rollers carried by said platform engaging said racks to maintain the racks in engagement with said pinion, said pinion, racks, rams and cylinders all being located beneath the upper supporting surface of said platform.

References Cited in the file of this patent

UNITED STATES PATENTS

412,525	McBride	Oct. 8, 1889
994,324	Maul	June 6, 1911
2,079,663	Rasmussen	May 11, 1937
2,285,862	Jeffrey	June 9, 1942
2,363,860	Gentry	Nov. 28, 1944
2,365,168	Billings	Dec. 19, 1944
2,513,726	Huston	July 4, 1950
2,678,136	Metailler	May 11, 1954
2,718,312	Pilch	Sept. 20, 1955
2,754,977	Przybylski	July 17, 1956
2,796,998	Sundin	June 25, 1957