June 6, 1944. W. M. HUSTON 2,350,762

EXCAVATING EQUIPMENT

Filed Aug. 20, 1942

Fig. 1.

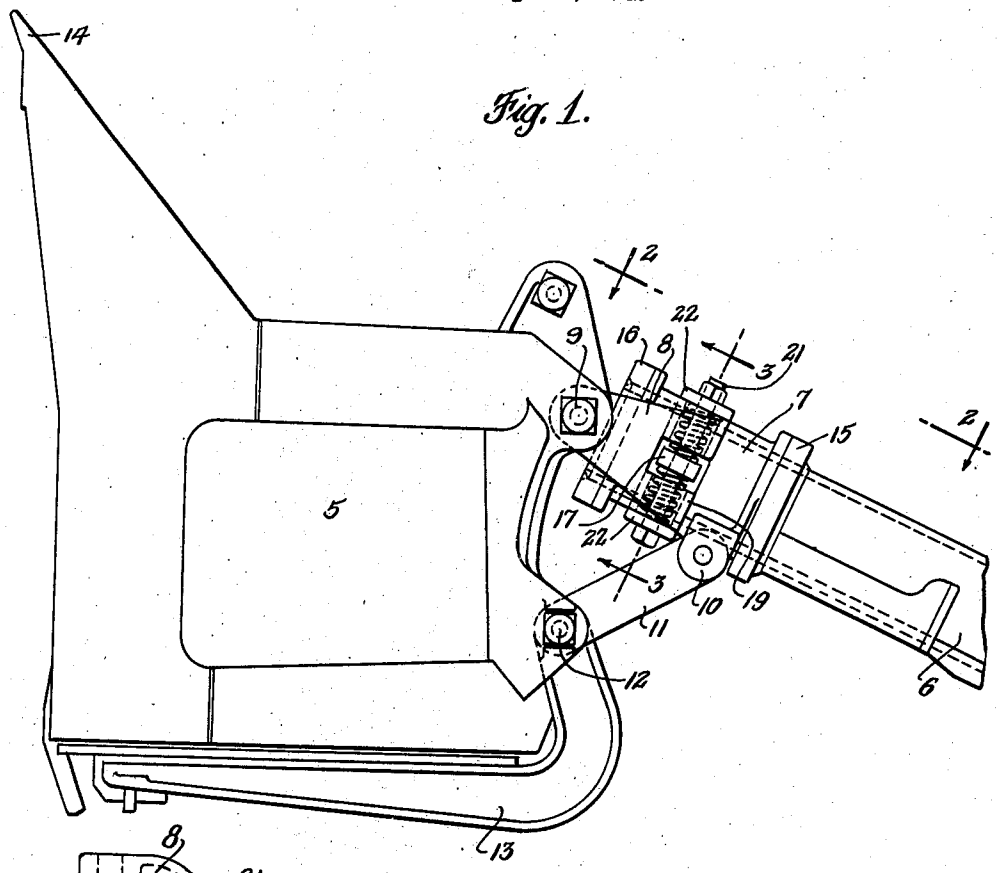


Fig. 2.

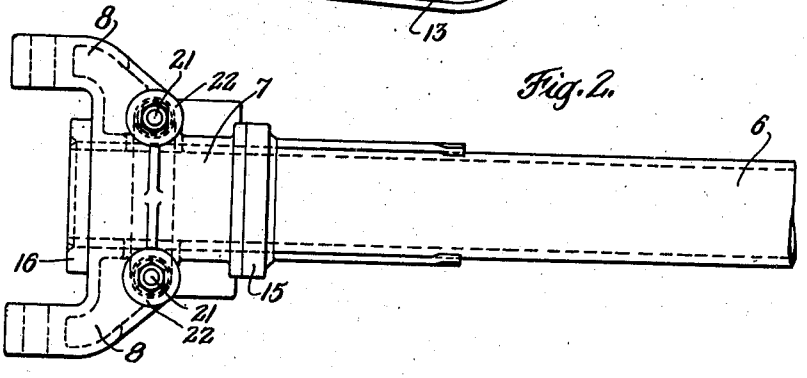


Fig. 3.

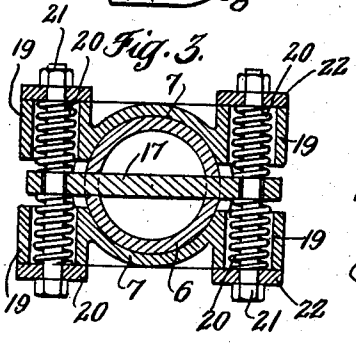
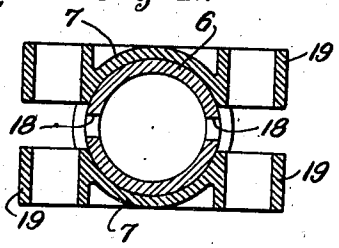


Fig. 4.



INVENTOR
William M. Huston
BY Symmes, Hadt & Lechner
ATTORNEYS

Patented June 6, 1944 2,350,762

UNITED STATES PATENT OFFICE

2,350,762

EXCAVATING EQUIPMENT

William M. Huston, Lima, Ohio

Application August 20, 1942, Serial No. 455,398

9 Claims. (Cl. 214—145)

This invention relates to excavating equipment, and particularly to equipment of the power shovel type, having a dipper mounted on a dipper handle.

The invention is especially concerned with a novel type of connection between the dipper and handle, providing freedom for twisting movement of the dipper with respect to the handle and/or for shock absorption or cushioning of loads or shocks tending to twist the dipper handle.

In accordance with the usual prior practice, the dipper was mounted on the dipper handle by means of a "solid" connection. As a result, in certain types of excavation, especially where considerable rock is encountered, heavy shocks or loads are frequently transmitted to the dipper handle, tending to twist the handle. For instance, a heavy load of this type often results from the wedging of an outside dipper tooth under a rock. The transmission of such loads to the dipper handle has caused damage to and even failure of the dipper handle. The magnitude of such twisting loads has also resulted in damage to or failure of the shipper shaft assembly by which the handle is mounted on the usual boom and even of the boom itself.

To meet severe digging conditions, such as those described above, the invention provides a novel form of dipper mounting affording freedom for twisting or swivelling movement of the dipper with its pin mounting and rake brace means, as a unit, relative to the dipper handle, thereby avoiding transmission of twisting loads to the handle. With such freedom for twisting movement, the dipper automatically accommodates itself, i. e., adjusts its position, in accordance with the particular distribution of digging load encountered by the several dipper teeth, especially in accordance with substantial differences in load as between teeth toward opposite sides of the dipper.

In excavations under less severe conditions, extensive freedom for twisting of the dipper may not be required or desirable. Therefore, for the more ordinary excavating conditions, the invention contemplates the employment of means limiting the freedom for twisting movement of the dipper to a relatively small angular range.

Still further, the invention provides a cushioning or shock absorption mechanism associated with the dipper mounting, so as to cushion shocks and loads and thereby avoid transmission thereof to the dipper handle and therefrom to the shipper shaft assembly and the boom.

In accordance with another aspect of the invention, the stop means and the yielding shock absorption means are arranged for ready displacement, so as to provide for operation alternatively either with or without the stop means and the shock absorber. By this adjustment the equipment may readily be modified to meet different excavating circumstances.

How the foregoing and other objects and advantages are attained will appear more fully from the following description, referring to the accompanying drawing, in which—

Figure 1 is a side elevational view of a dipper and of the extremity of the dipper handle on which the dipper is mounted, the mounting mechanism being arranged in accordance with this invention;

Figure 2 is a view of the extremity of the dipper handle taken as indicated by the line 2—2 on Figure 1;

Figure 3 is a transverse sectional view taken as indicated by the line 3—3 on Figure 1; and

Figure 4 is a view similar to Figure 3 but with certain parts displaced and removed, as described fully hereinafter.

In the drawing, the dipper is designated by the numeral 5 and the dipper handle by the numeral 6. The dipper handle is adapted to be mounted on a boom by means of a shipper shaft assembly, in accordance with usual practice, provision being made for the several normal functions, such as boom hoist, dipper hoist, crowding, and retract.

A sleeve or swivel casting 7 is mounted for rotative movement adjacent the extremity of the dipper handle, this sleeve carrying apertured lugs or brackets 8—8 adapted to be pinned to the dipper as at 9. Additional apertured brackets or lugs such as indicated at 10, may be employed as an anchorage for rake brace 11 which extends therefrom to the dipper, being pinned to the dipper at 12 coaxially with the axis of the hinge mounting for the dipper door 13. Thus the angle of vertical adjustment of the dipper on its handle (about pivot axis 9) is determined and fixed by the rake brace means, in the known manner; but the several parts, including said brace means, can rock as a unit about the longitudinal axis of the dipper handle, by virtue of their being mounted on the swivel sleeve 7.

When dipper teeth, especially an outside tooth such as indicated at 14, become wedged under a rock or the like, thereby setting up a force tending to twist the dipper, the mounting of the dipper on the sleeve 7 permits freedom for corre-

sponding twisting movement, thereby relieving the dipper handle of twisting loads.

Crowding loads are transmitted from the sleeve 7 to the handle 6 through a thrust abutment 15 which may conveniently be welded to the handle. Similarly, retract loads are transmitted to the handle 6 by means of thrust ring 16.

A removable key 17, constituting abutment means for limiting the range of swivelling or twisting movement of the dipper, is adapted to be inserted through apertures such as indicated at 18 in Figure 4 formed in the dipper handle 6. The swivel casting 7 is provided with opposed pairs of sockets 19—19 which are spaced from each other to receive the projecting ends of key 17. Parts 19 and the projecting ends of the key, therefore, serve as stops limiting swivelling or twisting movement of the casting 7 with respect to the dipper handle. As best seen in Figure 3, pairs of opposed compression springs 20 are arranged in sockets 19, being retained by through bolts 21, with thrust washers 22 toward opposite ends serving as reaction abutments for the springs 20. The bolts 21 extend through somewhat enlarged apertures in the projecting ends of key 17 and the compression springs bear against the key, thereby normally urging the swivel casting 7 to a mid position.

As hereinbefore indicated, the limiting stops and shock absorption means are readily removable, this being accomplished merely by withdrawing bolts 21, after which springs 20 and key 17 may be taken out.

In accordance with the foregoing, when it is desired to provide extensive freedom for twisting movement of the dipper, for instance in order to meet the severe conditions of digging in rock, the shock absorption springs and the key 17 are removed, leaving the mounting for the dipper in the form indicated in Figure 4. Under these conditions, substantially complete freedom for twisting movement of the dipper is provided.

For less severe digging conditions it is contemplated that the abutment key and shock absorption springs shall be assembled as indicated in Figure 3, in which condition limited freedom for twisting of the dipper is provided, and at the same time the shock absorption springs serve to cushion any shocks or loads which would otherwise tend to impose severe twisting strains on the dipper handle.

The invention, therefore, is capable of meeting a variety of conditions, it being of especial advantage that under all conditions at least some freedom for twisting or swivelling of the dipper is permitted, thereby relieving the handle of twisting loads, and also relieving the boom and shipper shaft assembly of corresponding undesired forces.

I claim:

1. In excavating equipment of the type having a boom, a dipper, and a dipper handle or stick, which latter is worked from the boom, a dipper supporting member rotatably mounted on the dipper handle upon an axis generally paralleling the longitudinal axis of the handle, pivot means connecting the dipper to said supporting member for movement about an axis which permits vertical adjustment of the dipper, and rake brace means extending between the dipper and said member and adapted to fix the dipper in adjusted position with respect to said member, said member with the dipper, the dipper pivot and the dipper rake brace being adapted to swivel on said handle so as to yield as a unit relative to the handle under twisting loads set up in digging.

2. The structure of claim 1, wherein yielding resistance means is associated with said swiveling supporting member by means of which resistance means the dipper handle is cushioned as against shocks from the dipper.

3. The structure of claim 1 wherein the dipper supporting member is a sleeve surrounding the end of the dipper handle and wherein stop means are provided for limiting the range of movement of the sleeve.

4. The structure of claim 1 wherein the dipper supporting member is a sleeve surrounding the end of the dipper handle and wherein stop means are provided for limiting the range of movement of the sleeve, together with yielding means for cushioning said movement.

5. In excavating equipment having a dipper and a dipper handle, supporting mechanism for the dipper mounted to swivel on the handle about an axis generally paralleling the longitudinal axis of the handle, said supporting mechanism including a rake brace for the dipper.

6. In excavating equipment having a dipper and a dipper handle, mechanism mounting the dipper on the handle including a swivel joint providing freedom for movement of the dipper with respect to the handle under the influence of twisting loads set up in digging, and stop means for establishing a limited range of freedom for twisting movement of the dipper, said stop means being displaceable whereby to provide for operation alternatively either with said freedom limited by the stop means or with said stop means displaced.

7. In excavating equipment having a dipper and a dipper handle, mechanism mounting the dipper on the handle including a swivel joint providing freedom for movement of the dipper with respect to the handle under the influence of twisting loads set up in digging, and means for cushioning twisting movement of the dipper, the cushioning means being displaceable, whereby to provide for operation alternatively with or without cushioning of said twisting movement.

8. In excavating equipment having a dipper and a dipper handle, a dipper supporting sleeve mounted to swivel on the dipper handle about an axis generally paralleling the longitudinal axis of the handle, alined apertures through the sleeve and the dipper handle, and a stop pin extending through said apertures, the apertures in the sleeve being formed to permit limited swiveling movement thereof.

9. The structure of claim 8 having spring means which react between the pin and the sleeve to cushion movements of the latter.

WILLIAM M. HUSTON.