

Nov. 21, 1939.

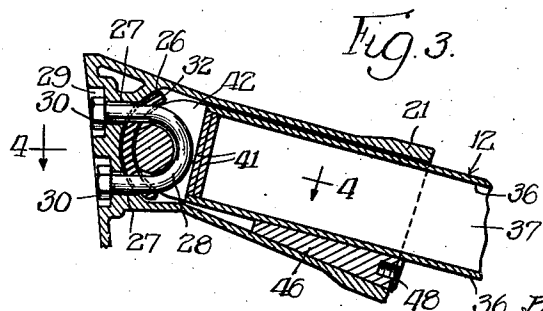
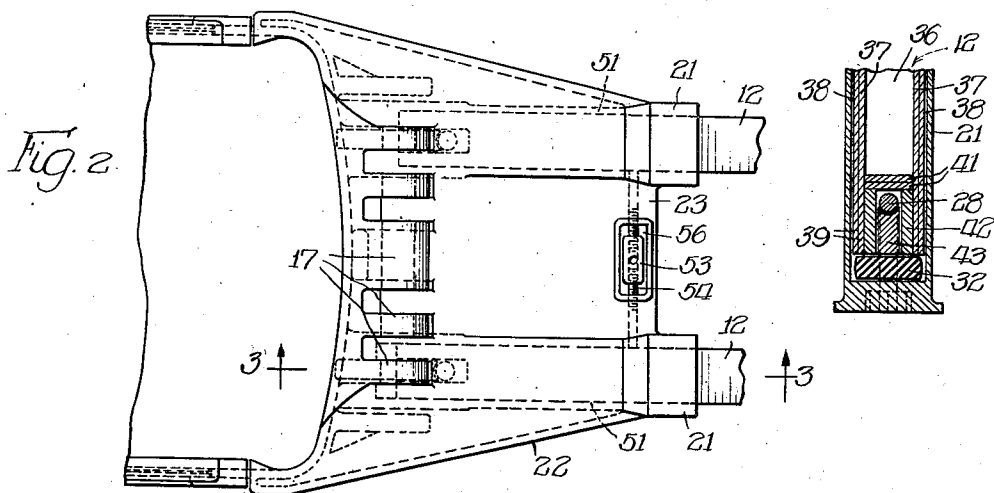
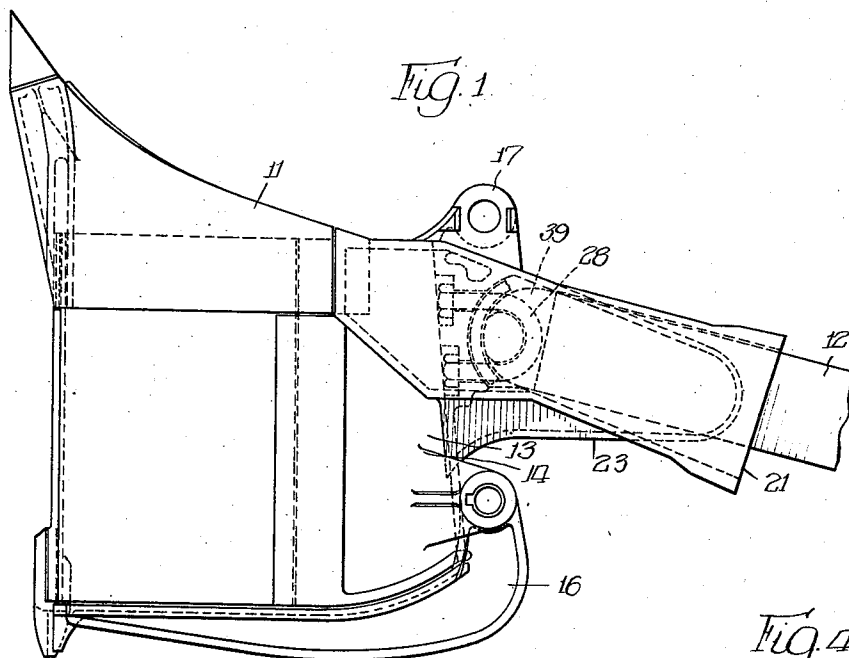
A. W. DANIELS

2,180,348

DIPPER

Filed July 6, 1936

2 Sheets-Sheet 1



Inventor:
Arthur W. Daniels,
By Louis Robertson atty.

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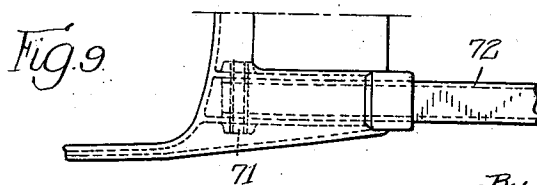
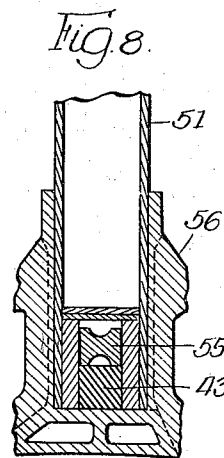
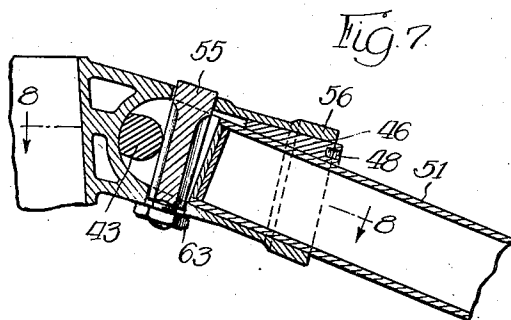
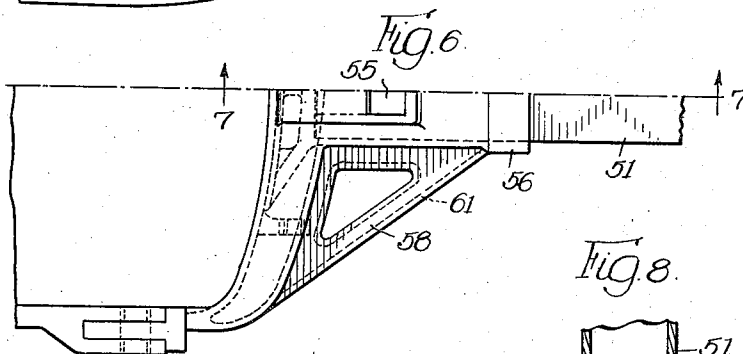
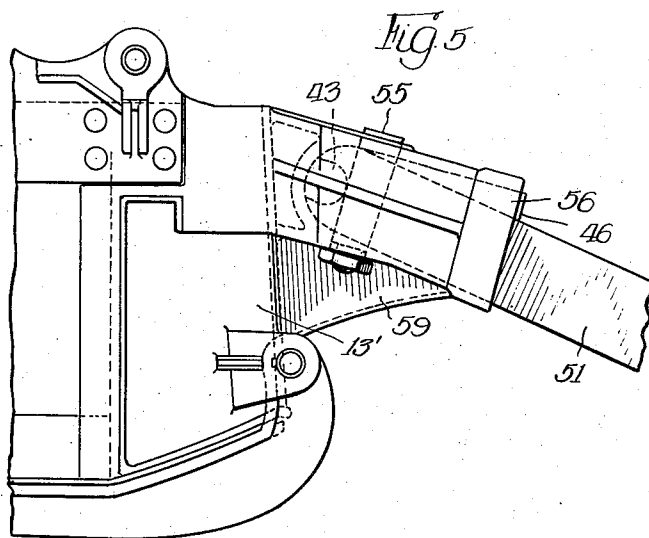
A. W. DANIELS

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DIPPER

Filed July 6, 1936

2 Sheets-Sheet 2



Inventor:
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UNITED STATES PATENT OFFICE

2,180,348

DIPPER

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Application July 6, 1936, Serial No. 89,142

13 Claims. (Cl. 214—145)

This invention relates to dippers for steam
shovels and the like and more particularly to
the connection between the dipper and the dipper
stick with which the dipper is operated by the
5 steam shovel or like machine.

According to the present invention, the heavy
casting which has heretofore been applied to the
dipper stick to facilitate its connection with the
dipper is dispensed with and instead the back
10 of the dipper has formed thereon suitable sockets
or other connecting structure for the reception
of the dipper stick. Although such additions to
the dipper back add some weight to it, the weight
added is small in comparison to the amount saved
15 by the omission of the usual separate casting,
and furthermore the added structure on the
dipper back reinforces this member.

An object of the invention, therefore, is to pro-
vide a dipper and dipper stick construction in
which satisfactory mounting of the dipper on
the stick is obtained at a substantial saving in
weight. Such a saving in weight not only re-
duces the initial cost of the dipper but also per-
mits a dipper of a given capacity to be operated
25 by a smaller machine and consequently at less
cost.

Another object of the invention is to provide
a dipper and dipper stick construction in which
the dipper is more satisfactorily mounted on the
stick than heretofore.

A related and more specific object of the in-
vention is to provide such a construction in which
the connection between the dipper and dipper
stick can be drawn tight and does not become
30 loose.

Still another object of the invention is to pro-
vide such a construction in which the angle of
the dipper with respect to the dipper stick may
be adjusted with comparative ease and reliability.

Another and important object of the invention
is to provide a connection between the dipper
and dipper stick which does not weaken the stick
and render it more liable to breakage.

Additional objects will be apparent from the
45 following description and from the drawings, in
which:

Fig. 1 is a side elevation of one preferred form
of the construction.

Fig. 2 is a fragmentary plan view of the con-
struction shown in Fig. 1.

Fig. 3 is a fragmentary sectional view taken
substantially along the line 3—3 of Fig. 2.

Fig. 4 is a fragmentary sectional view taken
approximately along the line 4—4 of Fig. 3.

Fig. 5 is a fragmentary view corresponding to
Fig. 1, but of a modification of the invention.

Fig. 6 is a fragmentary view corresponding to
Fig. 2, but showing the structure of Fig. 1.

Fig. 7 is a fragmentary sectional view taken
5 substantially along the line 7—7 of Fig. 6.

Fig. 8 is a fragmentary view taken substantially
along the line 8—8 of Fig. 7; and

Fig. 9 is a fragmentary view similar to a por-
tion of Fig. 2, but showing another modification 10
of the invention.

Although this invention may take many forms,
only a few have been chosen for illustration.
In all of these forms the dipper is secured to the
dipper stick with the aid of a special construction 15
of the dipper back. The dipper back is that por-
tion of the dipper to which it is the conventional
practice to secure the stick and the hinged bot-
tom or door.

In Fig. 1 the dipper 11 is secured to a dipper
stick having the two portions 12. According to 20
conventional practice, the dipper is made up of
a plurality of castings, and for the purpose of
considering the connection of the dipper to the
dipper stick all of these castings may be consid-
ered as conventional except for the dipper back 25
13. The dipper back 13 includes the conven-
tional lugs 14 for connection of the bottom or
dipper door 16 to the back, and the lugs 17 for
connection of the hoist line to the dipper. In 30
addition, it includes two sockets 21 which are
braced by wings 22 and a connecting center con-
struction 23. The wings 22 may be flanged webs
but both these wings and the center construction
have been illustrated as being of hollow con- 35
struction. For the purpose of casting the struc-
ture, core holes will of course be provided wher-
ever necessary. At the bottom of the socket 21
there is preferably provided an arcuate wall 26,
through which passages 27 extend (in the form 40
of Figs. 1 to 4) to the inside of the dipper so as
to receive a U-bolt 28. The inside of the dipper
back is recessed as at 29 to receive nuts 30 screw-
ed onto the U-bolt. A wear plate 32 is provided
against the wall 26, this wear plate preferably 45
being made of a tough rubber material, such as
rubber reinforced by suitable cords or fabric. Of
course, a steel plate may be used if preferred.
The dipper stick 12 is provided with an end
structure which will rest on the wear plate 32 50
and be secured by the U-bolt 28.

One form of dipper stick is seen clearly in Figs.
3 and 4. Each portion 12 of the dipper stick is
made up of a box like construction including front
and back walls 36 and side walls 37 welded to- 55

gether in accordance with prior practice. Bracing plates 38 are desirably welded to the outside of side plates 37 throughout the portion thereof projecting into the sockets 21 and as much further as may be necessary for adequate strength. The side plates 37 and reinforcing plates 38 terminate in arcuately shaped projections 39, which fit against the wear plate 32.

Within the stick 12 are welded one or more transversely extending plates 41 and longitudinally extending plates 42, to which in turn is welded the lug 43, around which the U-bolt 28 extends. It will be observed that when the dipper stick is out of the socket 21, the U-bolt may be slipped into place with ease.

The U-bolt 28 extends through the passages 27 as previously mentioned and the nuts 30 are applied to the U-bolt and turned to draw it tight, thus clamping the stick 12 tightly against the wear plate or cushion 32. The socket 21 is designed to permit angular adjustment between the stick 12 and the bucket, one position being shown in Fig. 3, and another position being shown (with a modified construction) in Fig. 7. To maintain the desired relation a wedge 46 is provided of rubber or of any suitable metal to be driven between the dipper stick 12 and either the top or bottom of the socket 21. In Fig. 3, it is shown between the stick 12 and the bottom of the socket 21, but, if it were desired to shift the bucket to the other angle, this could be done merely by removing the wedge 46 from the position shown and driving it in above the stick between the stick and the top of the socket 21. The nuts 30 could be loosened to permit the shifting, if necessary, to facilitate removal of the wedge 46, it may be provided at its outer end with suitable securing means such as a threaded hole 48, which may be formed directly in the wedge if it is of a hard metal or in an insert embedded in the wedge if the wedge is rubber.

With a casting such as the dipper back 13, it is, of course, desirable to avoid the necessity for extreme accuracy. At the same time it is sometimes desirable to avoid any lateral play between the dipper sticks 12 and the sockets 21. To reconcile these two opposed requirements, the sockets may be made sufficiently over size to insure the dipper sticks fitting into them easily, and the efforts of accuracy are concentrated on the spacing of the outside walls 51 of the sockets. The dipper sticks 12 will, therefore, fit into the sockets easily and will fit fairly close to the walls 51. If it is desired to press them firmly against said walls, a turn buckle 53 may be provided which spreads apart a pair of bolts 54 to press against the insides of the dipper sticks 12 and flex them the slight amount necessary to force them against the outer walls 51 of the sockets 21. The bolts 54 are preferably provided with square ends fitting through square holes in the sockets 21 or with some other means for preventing the bolts from turning when the turn buckle 53 is turned. It will be understood, of course, that a suitable opening 56 is provided in the center structure 23 to permit access to the turn buckle 53. Many people consider a little play advantageous or harmless and so the turn buckle may be omitted. Also rubber side pads may be provided if desired.

The structure shown in Figs. 5 to 8 is quite similar to that shown in Figs. 1 to 4 except that there is a single dipper stick 51 instead of a double dipper stick, and a wedge 55 is used instead of a U-bolt. Except as modified in accord-

ance with these differences, the socket 56 of the dipper back 13' is quite similar to the sockets 21 of Figs. 1 to 4. The bracing is somewhat different, side braces 58 and downwardly extending braces 59 all being of web like construction. For the sake of rigidity and the best use of the metal these braces are provided with flanges 61 along their edges.

As will be seen most clearly from Fig. 7, the wedge 55 is thrust through the socket 56 from the top thereof and bears against the lug 43, which is similar to that shown in Fig. 3 although it may be shaped slightly differently for engagement by the wedge 55 instead of the U-bolt 28. The wedge 55 may be drawn tight in any suitable manner, as by a nut 63.

Although no cushion or wear plate has been shown between the dipper stick 51 and the seat of the socket 56, either may be provided, if desired. Also the reinforcing side plates 38 of Fig. 4 may be provided, though they have not been shown in Fig. 8.

Because of the use of the U-bolt 28 or wedge 55, which may be drawn perfectly tight by tightening the nuts 30 or nut 63, it is believed that the connection between the dipper and the dipper stick will be free from trouble, since such troubles have usually been due to a slight looseness which resulted in repeated pounding of the parts against one another. Because of the possible tightness of the U-bolt 28 or wedge 55 it probably will not be necessary to use the rubber cushion 32 nor even any other wear plate but some such intervening member may be desired, out of an abundance of caution in protecting the relatively expensive back casting of the dipper. Of course, a rubber cushion will be especially desirable, since it not only will protect the parts in contact therewith but will take up a little bit of the shock which otherwise would be transmitted between the dipper and the dipper stick during normal operations.

It should be noted that there is nothing in this connection that weakens the dipper stick. In the past these sticks have often broken, and usually at a point where pin holes weakened the stick, the pin holes being positioned at a point about corresponding to the top of the socket in the present invention.

In Fig. 9 is illustrated another modification of the invention, one side of a double dipper stick is shown. The structure is similar to that shown in Figs. 1 to 4 except that instead of a U-bolt or wedge co-acting with a block such as the block 43, a pin 71 is passed through the walls 55 of the socket and through the end portion of the dipper stick 72. This pin is positioned at about the end of the stick so that its weakening effect is relatively harmless.

It should be obvious that with any form of connection illustrated either a single or a double stick may be used. All forms provide a better connection between the dipper and dipper stick while nevertheless saving a considerable weight of metal.

The disclosures of this application are illustrative and the invention is not to be limited by them. In fact, if modifications or improvements are not at once obvious, they may be devised in the course of time to make additional use of the broad ideas taught and covered by this application. The claims are intended to point out novel features and not to limit the invention except as may be required by prior art.

I claim:

1. The combination of a dipper having a unitary dipper back with a socket formed integrally therewith and extending away therefrom, a dipper stick for operating said dipper extending removably into said socket, and means for eliminating vertically transverse digging slap between the stick and the socket.

2. The combination of a dipper having a closed unitary dipper back with a socket formed integrally therewith and extending away therefrom and a dipper stick for operating said dipper extending into said socket, means for securing the inner end of said stick to said dipper including screw means for drawing the two tightly together and removably holding it therein.

3. The combination of a dipper having a closed unitary dipper back with a socket formed integrally therewith and extending away therefrom and a dipper stick for operating said dipper extending into said socket, said stick including side walls extending forwardly from the end of the stick and a lug secured between said side walls, and means for engaging said lug to draw said stick tightly into said socket and removably holding it therein.

4. The combination of a dipper having a dipper back with a socket extending away therefrom and a dipper stick for operating said dipper extending into said socket, said stick including side walls extending forwardly from the end of the stick and a lug secured between said side walls, and a U-bolt extending around said lug and into said socket and having nuts thereon for drawing said stick tightly into said socket.

5. The combination of a dipper having a dipper back with a socket extending away therefrom and a dipper stick for operating said dipper extending into said socket, said stick including side walls extending forwardly from the end of the stick and a lug secured between said side walls, and a wedge extending through said socket and engaging said lug for drawing said stick tightly into said socket.

6. The combination of a dipper having a dipper back with a socket extending away therefrom and a dipper stick for operating said dipper extending into said socket, said socket being of such size with respect to said stick as to permit angular adjustment of the dipper with respect thereto and means for securing said socket and stick in an adjusted position.

7. The combination of a dipper having a dipper back with a socket extending away therefrom and a dipper stick for operating said dipper extending into said socket, said socket being of such size with respect to said stick as to permit angular adjustment of the dipper with respect thereto, and a wedge adapted to be driven between said stick and said socket to lock the stick and socket in a given position.

8. The combination of a dipper having a dipper back having a pair of spaced sockets integrally

formed thereon and a pair of spaced sticks fitting into said sockets and secured therein at approximately the inner ends thereof, and means acting simultaneously on both sticks for flexing said sticks laterally to press them firmly against the sides of said sockets.

9. The combination of a dipper having a dipper back with a socket extending integrally therefrom and a dipper stick for operating said dipper extending into said socket, said socket being of such size with respect to said stick as to permit angular adjustment of the dipper with respect thereto and means for securing said socket and stick in an adjusted position.

10. The combination of a dipper, stick-engaging means carried by the dipper including top and bottom walls rigidly associated with a portion of the dipper, a dipper stick for operating said dipper extending between said top and bottom walls, said walls being so spaced as to permit movement of the dipper stick therebetween, and a wedge adapted to be driven between said stick and one of the walls to lock the stick and dipper in a given position; the combination of dipper, wedge and stick including a resilient pad placed under pressure by the action of the wedge for absorbing the digging shock between the dipper and the stick.

11. The combination of a dipper, stick-engaging means carried by the dipper including top and bottom walls rigidly associated with a portion of the dipper, a dipper stick for operating said dipper extending between said top and bottom walls, said walls being so spaced as to permit movement of the dipper stick therebetween, and means for absorbing the digging shock between the dipper and the stick and for minimizing slap between the dipper and the stick including a resilient pad positioned and compressed between the stick and one of the walls.

12. The combination of a dipper having a dipper back, a dipper stick for operating said dipper including side walls and a lug secured between said side walls, a U-bolt extending around said lug and into said dipper back and having nuts thereon for drawing said stick tightly into said socket, and means for substantially preventing angular movement between the dipper and the dipper stick.

13. The combination of a dipper having a dipper back, a dipper stick for operating the dipper, means for securing the end of the stick to the dipper including screw means for drawing the dipper stick and dipper back tightly together and removably holding them together, and a resilient pad compressed between the dipper and the dipper stick characterized by a rigid but smooth increase during compression of its resistance to further compression, and means for substantially preventing angular movement between the dipper stick and the dipper back.

ARTHUR W. DANIELS.