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3,422,975

VEHICLE GRAPPLE ATTACHMENT

Filed Dec. 12, 1966

Sheet 1 of 2

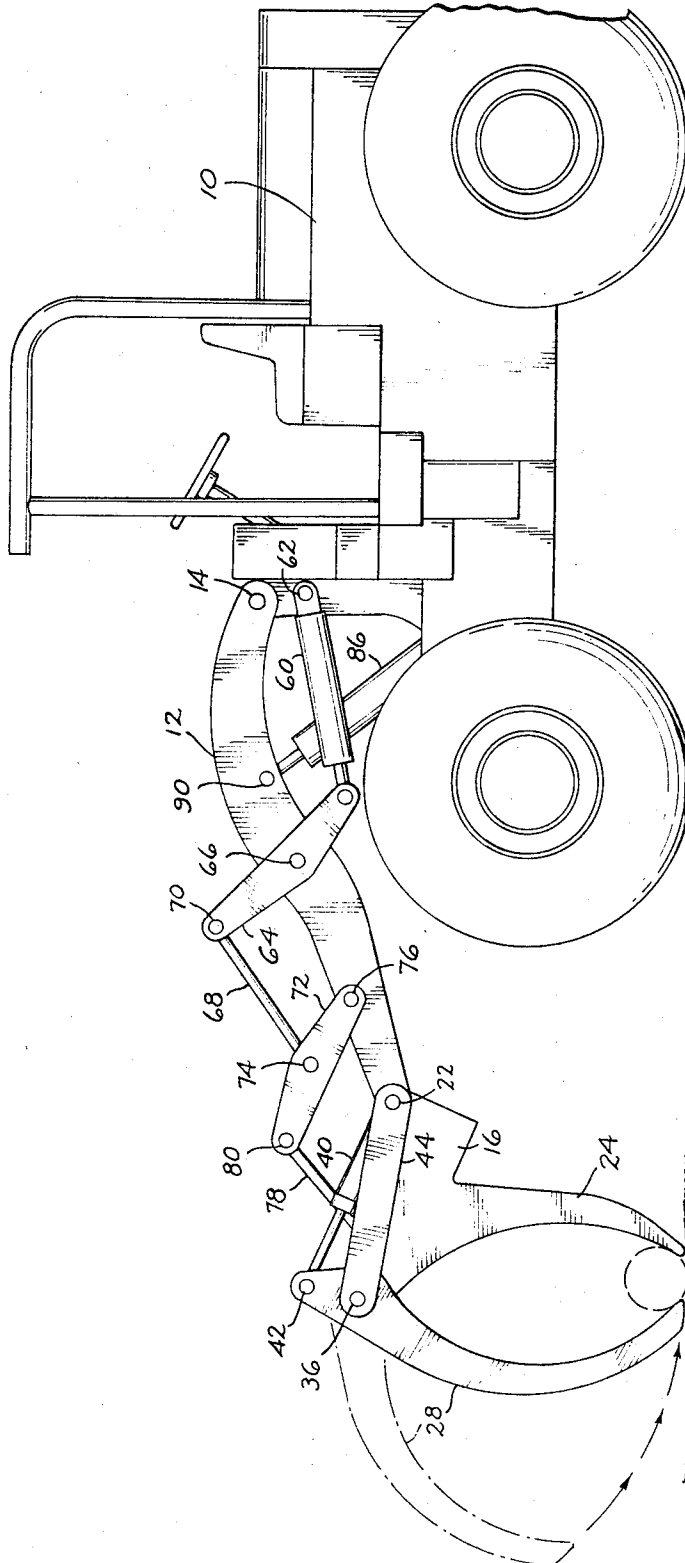


Fig. 1.

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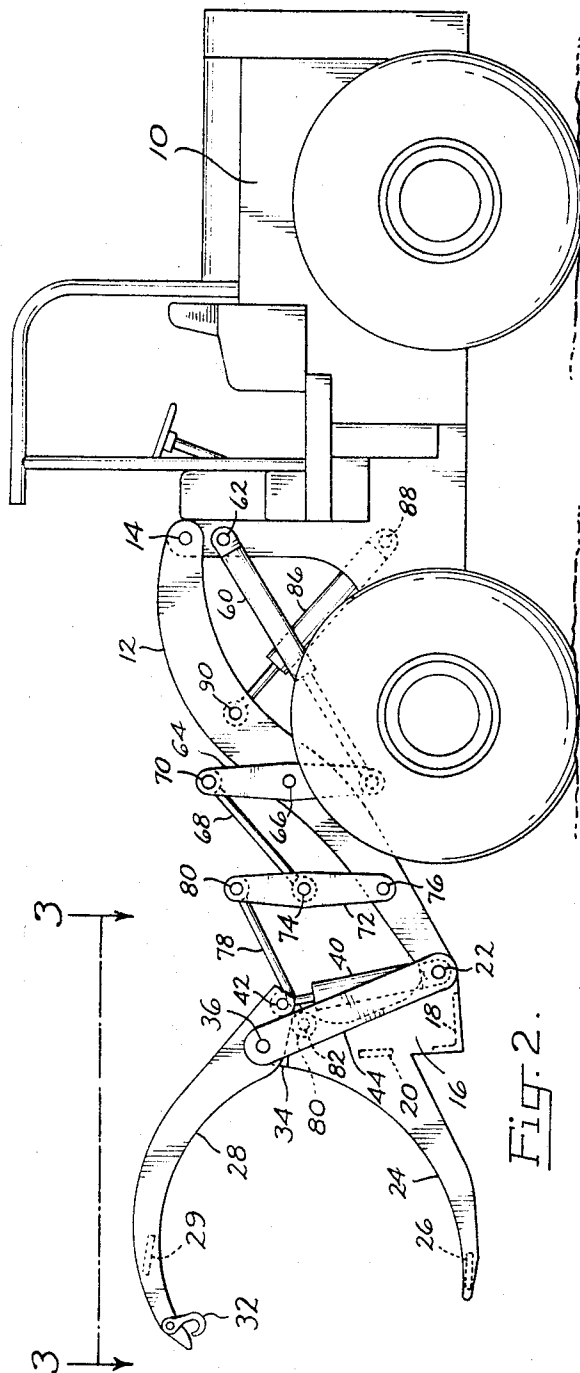


Fig. 2.

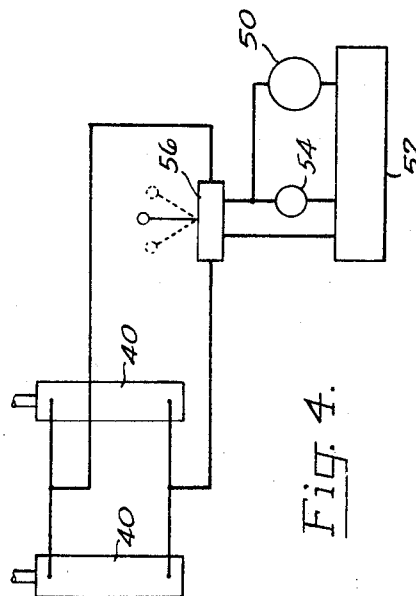


Fig. 4.

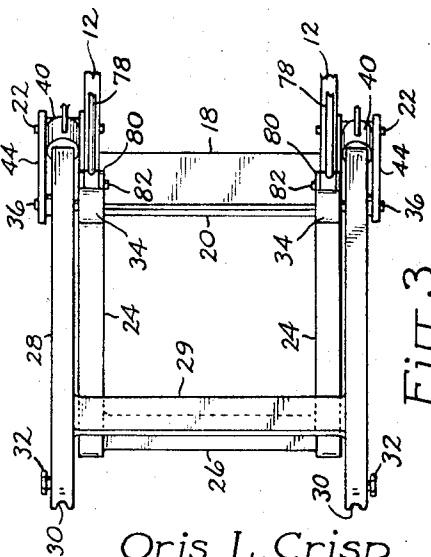


Fig. 3.

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## VEHICLE GRAPPLE ATTACHMENT

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3 Claims 5

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This invention pertains to a grapple attachment for self propelled vehicles. It pertains particularly to a grapple attachment for self propelled, track or rubber-tired, tractor-type front end loaders of the class used in log handling operations, i.e., for stacking and unstacking logs, loading and unloading them from various conveyances, and for like operations.

It is the general object of the present invention to provide a grapple attachment for front end loaders and the like, which attachment is characterized by the following advantages:

First, it is versatile in its operation in that it can lift logs higher and lower than can conventional log handling apparatus; can take a single log separately, or a group of logs together; can reach over a deck of logs to load or unload a single log; and when conveying a cluster of logs can release one without spilling the others.

Second, it is versatile in its application to various types of self-propelled tractors and other vehicles.

Third, it holds the logs securely, so that they will not slide, nor become otherwise disarranged.

Fourth, it affords the operator clear vision of his work.

Fifth, it is remarkably safe in operation and

Sixth, it is of simple, rugged construction which permits both original low cost and trouble-free operation.

Considering the foregoing in greater detail and with particular reference to the drawings, wherein:

FIGS. 1 and 2 are views in side elevation of a tractor-type front end loader provided with the herein described grapple attachment illustrated in FIG. 1 in its lowered, closed position, and in FIG. 2 in its elevated, open position;

FIG. 3 is a plan view of the grapple attachment looking in the direction of the arrows of line 3-3 of FIG. 2; and

FIG. 4 is a schematic diagram illustrating an hydraulic circuit which may be used to operate the presently described grapple attachment.

Generally stated, the grapple attachment of my invention is designed for application to a vehicle provided with an elongated arm extension. The grapple comprises a pair of vertical jaw-support members arranged in spaced, parallel relation to each other. First pivot means pivotally attach the lower ends of the jaw support members to the outer end of the arm.

A pair of concavely arcuately lower jaws are affixed in parallel relation, one to each of the jaw support members. A pair of concavely arcuate, elongated upper jaws are arranged in parallel, operative relation to the lower jaws. Second pivot means pivotally attach the inner ends of the upper jaws one to each of the jaw support members.

First reciprocating drive means are mounted on the outer end of the arm and are connected to the inner ends of the upper jaws for oscillating the same between open and closed positions. Second reciprocating drive means are mounted on the arm and connected to the upper ends of the jaw support members for oscillating the same, and hence the jaws, between raised and lowered positions.

If desired, the elongated arm extension may be attached to the vehicle pivotally in a vertical plane, and third reciprocating drive means may interconnect the arm and the vehicle for raising and lowering the arm extension, thus still further increasing the versatility of movement of the apparatus.

Referring now to FIGS. 1 and 2 of the drawings:

The herein described grapple is illustrated in its application to a rubber-tired front end loader, indicated generally at 10. The loader is provided in the usual manner with a forward arm extension 12 which is of considerable length and extends forwardly of the driver's station in the line of travel of the vehicle. Preferably the arm extension is of massive construction and comprises a pair of parallel arms spaced and braced by a suitable arrangement of structural members, not illustrated.

The inner end of arm extension 12 preferably is pivoted for vertical angular movement between raised and lowered positions, by attaching it to the frame of the vehicle with pivot pin 14. The outer end of arm extension 12 supports the herein described grapple attachment.

To this end there are provided a pair of vertical jaw support members 16 arranged forwardly of the arm in spaced, parallel relation. The jaw support members preferably have a rectangular base and are interconnected by suitable braces such as angle iron 18 and bar 20.

First pivot means pivotally attach the lower ends of the jaw support members to the outer end of arm 12. In the illustrated form of the invention, the pivot means comprise pivot pins 22 penetrating the end of the arm and journalling the jaw support members.

A pair of concavely arcuate, elongated lower jaws 24, interconnected and braced by bar 26, are mounted in fixed parallel relation one on each of the jaw support members. Preferably the lower jaws are integral with the jaw support members. Preferably also the jaw support members extend below the inner ends of the lower jaws for connection of the angle iron 18 which thus may serve additionally as a pusher member, as illustrated in FIGURE 2 of the drawings. The lower jaws are of substantial length, as required to engage and retain a single log, or a cluster of logs.

A pair of concavely arcuate, elongated upper jaws 28, interconnected and braced by bar 29, are arranged in parallel operative relation to the lower jaws. Each of the upper jaws is provided in a terminal notch, forming a guideway 30, and with a pivotally mounted hook 32, to assist in the log handling operation.

It is to be understood that for handling logs, jaws 24, 28 should be spaced laterally a substantial distance from each other in order to provide the required stability. However, where the grapple is to be used for manipulating shorter objects, a single jaw may be employed.

Second pivot means pivotally attach the inner ends of the upper jaws one to the upper end of each of the jaw support members.

To this end there are provided standards 34 extending upwardly one from each of the jaw support members. The standards mount pivot pins 36 on which the inner ends of upper jaws 28 are journaled. The location of pins 36 along the lengths of upper jaws 28 is such as to leave a rearward extension to which the drive for oscillating the upper jaws is attached.

The preferred drive for accomplishing this purpose comprises a pair of fluid-operated cylinders, preferably double-acting hydraulic cylinders 40. The lower end of each cylinder is pivoted to the outer end of arm 12 by means of pivot pin 22 which pivotally mounts jaw support member 16. The piston rod of each cylinder is pivotally connected to the inner end of its associated upper jaw 28 by means of a pivot pin 42.

Further to brace and support the jaws in their heavy duty operation, there are provided a pair of side plates 44. The upper end of each of plates 44 is secured by means of pivot pin 36, which mounts the associated upper jaw. The lower end of each of plates 44 is secured by means of pivot pin 22, which mounts the associated jaw support member 16 on the outer end of arm 12.

The hydraulic circuit employed for operation of upper jaws 28 is illustrated schematically in FIG. 4.

A motor driven pump 50 draws hydraulic fluid from a reservoir 52 and recycles it to the reservoir through pressure relief valve 54. When the operator wishes to energize cylinders 40, he manipulates the lever of solenoid-operated valve 56 in a direction appropriate to actuate the cylinders in the desired direction.

Cylinders 40 are employed for opening and closing the jaws. Second reciprocating drive means are provided for moving the entire jaw assembly angularly between raised and lowered positions, i.e., between the positions of FIGS. 1 and 2. The fluid-operated drive with which a conventional front end loader is provided may be used for this purpose.

Thus there may be provided a pair of double-acting cylinders 60, one mounted on each side of arm extension 12. The case of each cylinder is pivoted to the vehicle frame by means of a pin 62. The piston rod of each cylinder is pivoted to the lower end of a lever 64. The lever in turn is fulcrumed to one side of arm 12 by means of a pivot pin 66.

A first connecting rod 68 has one of its ends pivoted to the upper end of lever 64 by means of a pin 70. The other end of connecting rod 68 is pivoted to an intermediate position on a second lever 72 by means of a pin 74.

The lower end of lever 72 is pivoted to the side of arm extension 12 by means of a pivot pin 76. The rearward end of a second connecting rod 78 is pivoted to the upper end of lever 72 by means of a pin 80. The forward end of connecting rod 78 is pivoted to a tab extension 80 on the upper end of jaw support member 16 by means of a pin 82. Thus, by reciprocating cylinder 60, the entire jaw assembly may be raised and lowered angularly about pivot pins 22.

Further to increase the range of application of the unit, there may be provided third reciprocating drive means for elevating arm 12 and the jaw assembly which it carries.

For this purpose there may be provided one or more double-acting fluid-operated cylinders 86. The inner end of each cylinder is pivoted to the frame of the vehicle by means of a pivot pin 88. The piston rod of each cylinder is pivoted to arm 12 at a point intermediate its ends, but toward the rear, by means of a pivot pin 90. Accordingly by reciprocating cylinders 86, arm 12 and the jaw assembly which it carries, may be raised and lowered over a substantial range of elevation.

It thus will be seen that the independent relative movement of jaws 24, 28, of the jaw assembly and arm 12, and of arm 12 and the vehicle, enables application of the apparatus to a wide range of operations including picking up individual logs, picking up several logs at a time, and supporting and transporting one or more logs as shown in FIGS. 1 and 2. Also, the apparatus can reach over a stack of logs and pick up a single log separately. Further, it can release a single log of a bundle of logs without spilling the residue. Still further, it holds the logs securely at all times, thus accomplishing the various purposes of the invention. Additionally, logs arranged parallel to vehicle 10 may be grasped at one end between the transverse braces 26 and 29 for endwise manipulation of the logs. The portions of the upper jaws forwardly of brace 29 confine the logs between them.

It is to be understood that the form of my invention herein shown and described is to be taken as a preferred example of the same and that various changes in the

shape, size and arrangement of parts may be resorted to without departing from the spirit of my invention or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. A grapple attachment for a vehicle provided with an elongated arm extension, the attachment comprising:
  - (a) a pair of vertical jaw support members arranged in spaced parallel relation,
  - (b) first pivot means pivotally attaching the lower ends of the jaw support members to the outer end of the arm extension,
  - (c) a pair of concavely arcuate, elongated lower jaws mounted in fixed parallel relation, one on each of the jaw support members,
  - (d) a transverse brace member interconnecting the forward ends of the pair of lower jaws,
  - (e) a pair of concavely arcuate, elongated upper jaws arranged in parallel operative relation to the lower jaws,
  - (f) a transverse brace member interconnecting the pair of upper jaws rearwardly of the forward ends of the latter,
  - (g) second pivot means adjacent the inner ends of the upper jaws pivotally attaching the upper jaws to their respective jaw support members,
  - (h) first reciprocating drive means mounted on the outer end of the arm and connected to the inner ends of the upper jaws for oscillating the same between open and closed positions, and
  - (i) second reciprocating drive means mounted on the arm and connected to the upper ends of the jaw support members for oscillating the same, and hence the jaws, between raised and lowered positions.
2. The grapple of claim 1 wherein:
  - (a) the jaw support members extend downward from inner ends of the associated lower jaws, and
  - (b) a transverse brace member interconnects said downwardly projecting portions of the jaw support members,
  - (c) said brace member having a front surface arranged for use as a pusher member.
3. The grapple attachment of claim 1 wherein the second reciprocating drive means comprises:
  - (a) first lever means mounted pivotally intermediate its ends on the arm extension,
  - (b) second lever means mounted pivotally at end on the arm extension forwardly of the first lever means,
  - (c) link means pivotally interconnecting the upper ends of the jaw support members and the opposite end of the second lever means,
  - (d) link means pivotally interconnecting the second lever means intermediate its ends to one end of the first lever means, and
  - (e) fluid-operated cylinder means pivotally interconnecting the opposite end of the first lever means and the vehicle.

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