

United States Patent

La Beck

[15] 3,697,115

[45] Oct. 10, 1972

[54] LOG GRAPPLE

[72] Inventor: Keith E. La Beck, Portland, Oreg.

[73] Assignee: Esco Corporation, Portland, Oreg.

[22] Filed: Jan. 25, 1971

[21] Appl. No.: 109,322

3,201,167 8/1965 Wampler.....294/106
2,800,355 7/1957 Vinner et al.....294/88
3,513,998 5/1970 Stone.....294/88

Primary Examiner—Evon C. Blunk

Assistant Examiner—I. Kenneth Silverman

Attorney—Dawson, Tilton, Fallon & Lungmus

[52] U.S. Cl.....294/88, 294/106

[51] Int. Cl.....B66c 1/10

[58] Field of Search.....294/88, 106

[57]

ABSTRACT

A log grapple of the fixed tong pin type wherein the tongs have a reverse curvature in their confronting surfaces.

[56] References Cited

UNITED STATES PATENTS

3,371,952 3/1968 Hunger.....294/88

1 Claim, 12 Drawing Figures

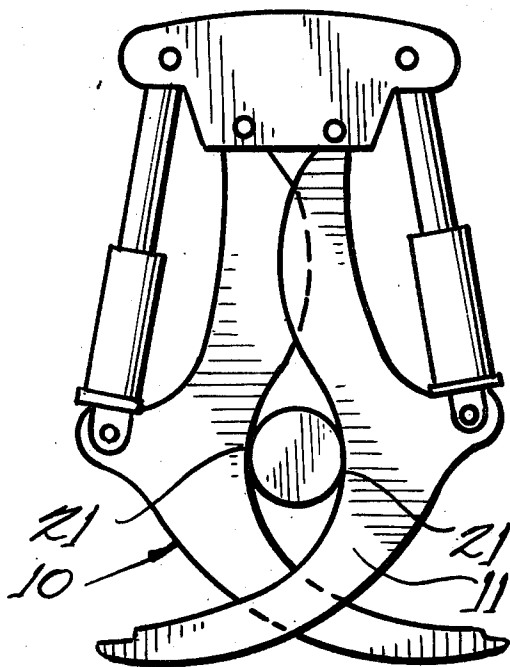


Fig. 1.

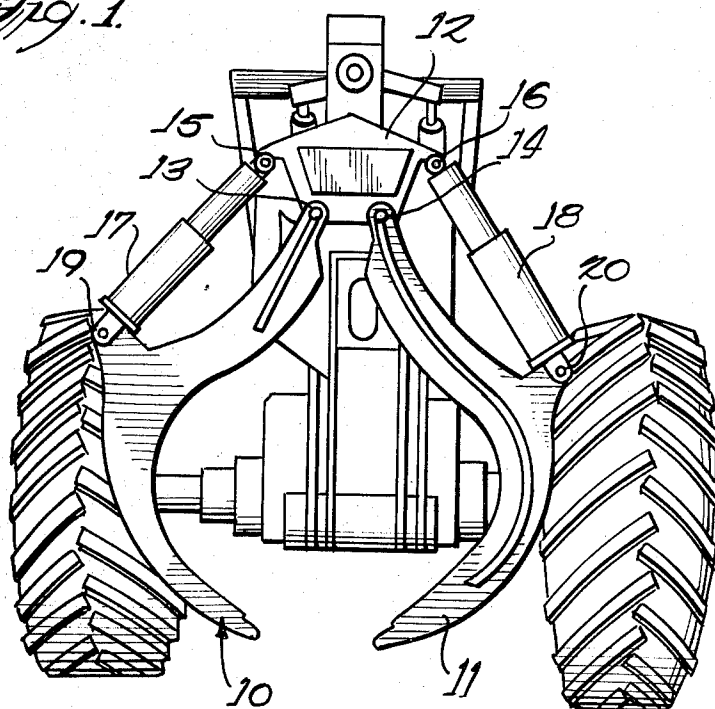


Fig. 2.

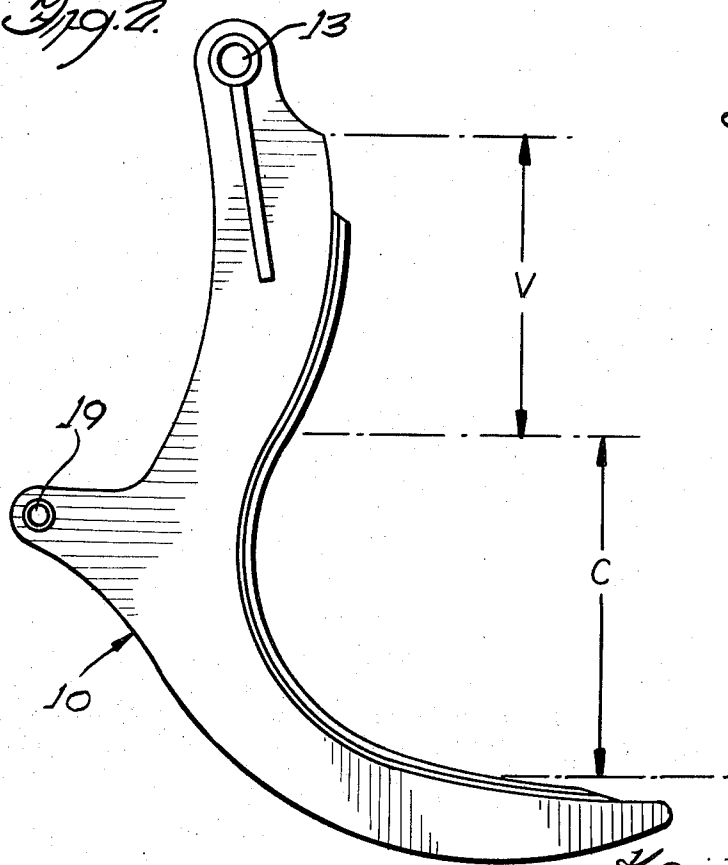
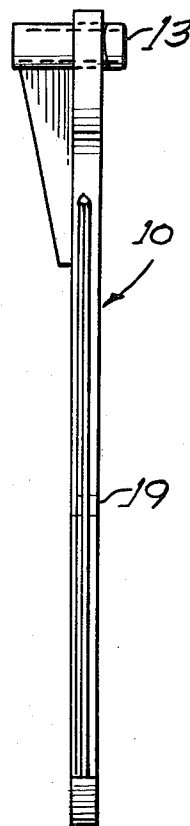


Fig. 3.



Inventor
 Keith E. LaBeck
 Dawson, Dillon, Fallon
 by: & Lungmuss
 Atty's

Fig. 4.

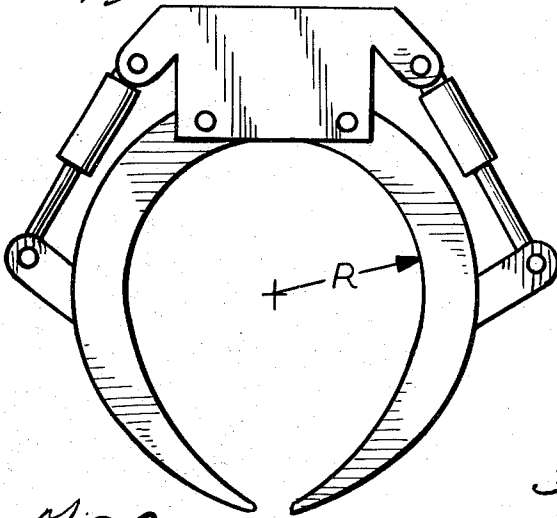


Fig. 5.

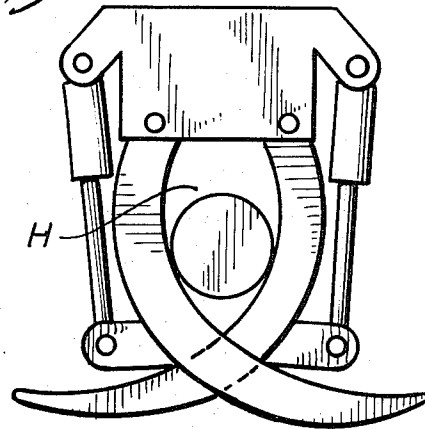


Fig. 6.

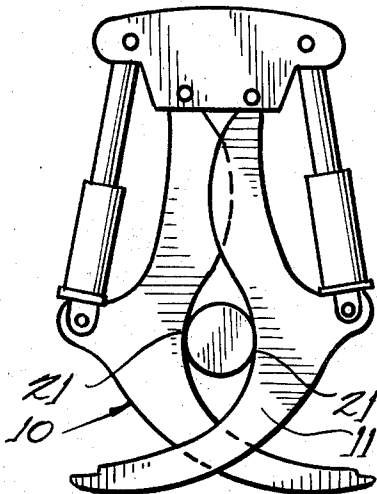


Fig. 7.

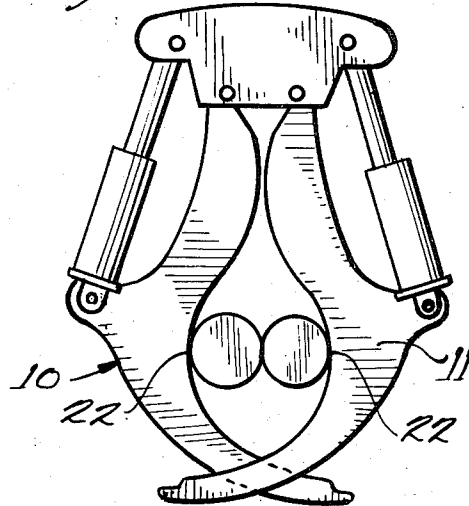
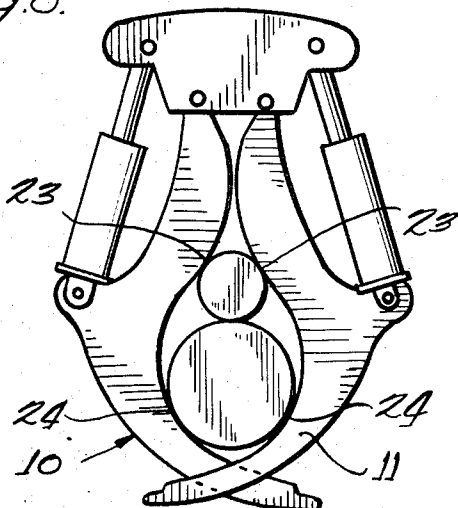


Fig. 8.



Inventor
 Keith E. LoBeck
 Dawson, Dilton, Fallon
 by F. Lingnuss
 Att'y's

Fig. 9.

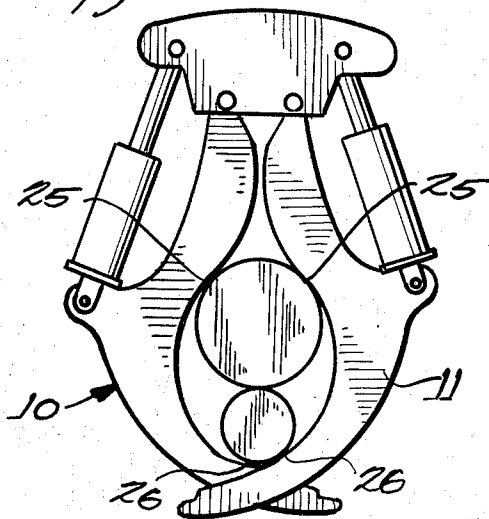


Fig. 10.

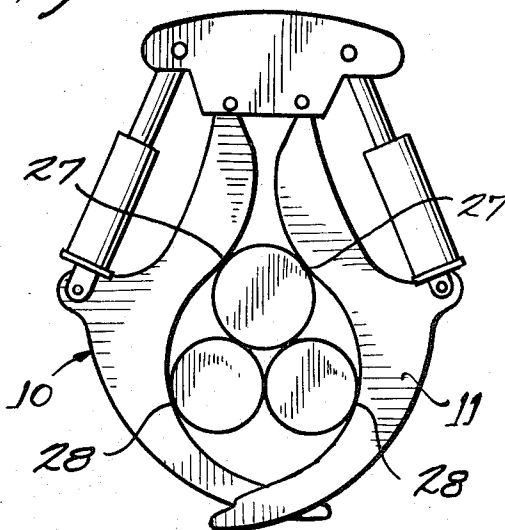


Fig. 11.

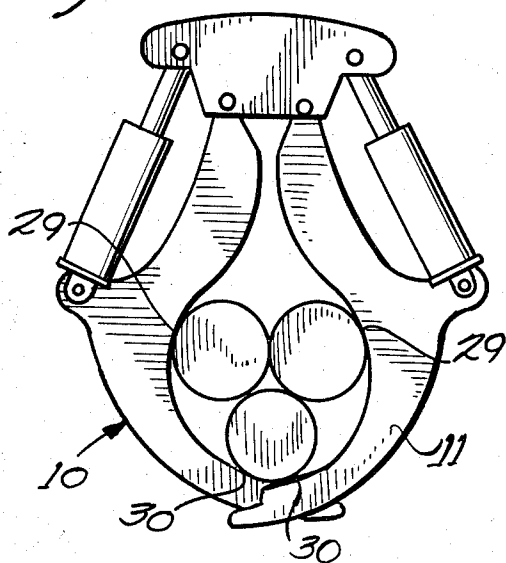
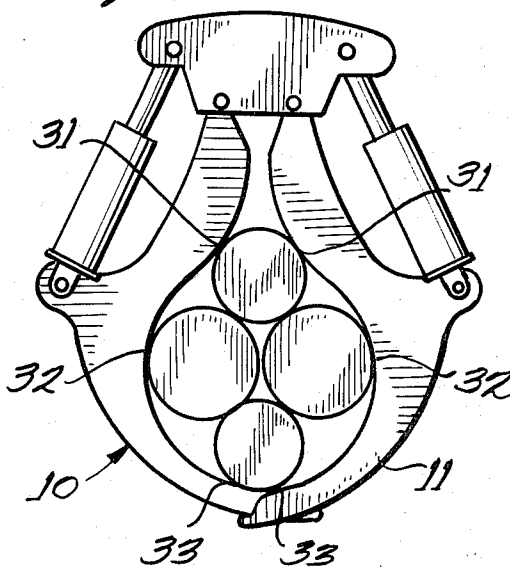


Fig. 12.



Inventor
 Keith E. LaBeck
 by Dawson, Jellon, Fallon
 & Lungmus
 Attys

LOG GRAPPLE

BACKGROUND AND SUMMARY OF INVENTION

In general, there are two distinct types of log grappling operations. These consist of grappling operations in which it is desirable to handle single or, on occasion, two logs, such as in loading or sorting operations. Another operation is that in which it is desirable, or necessary, to handle multiple logs, as in skidding operations. Although not generally recognized, these two distinct grapple operations offer definite grapple design requisites that generally affect both grapple head, and even more importantly, basic tong configuration.

In field applications today, attempts have been made to provide a single grapple head/tong configuration to serve both loading grapple and skidding grapple functions. Loading or sorting operations require a grapple that is capable of tong-pinching action of sufficient strength to hold the log through lifting operations until the log is placed. This is opposed to multiple log operations, such as skidding, that require a tong configuration capable of bunching several logs and the ability to hold all of these securely while moving in a forward direction.

There are also two distinct styles of grapple heads available today. These consist of grapple heads in which the tong pins (those pins about which the tongs rotate) are placed at a fixed distance in relation to each other, and remain transversely stationary throughout grappling operations. Along with these types are other types which, by some mechanism, the tong pin centers move transversely relative to each other (usually accompanied by some vertical motion), and, at the same time, the tongs rotate about these floating pin centers.

For loading or sorting operations, the fixed pin type grapples work well with virtually any reasonable tong shape that yields the ability to squeeze and hold the weight of a single log. However, for multiple log handling with this same fixed pin center type grapple head, basic tong configuration becomes critically important. It is this fixed pin center type grapple head, and the corresponding multiple log tong shape, with which the instant invention is concerned. In particular, each tong has a generally vertically elongated shape, and has a generally outwardly arcuate contour in the lower part of the surface confronting the other tong, and a generally inwardly arcuate contour in the upper part of the confronting surface.

DETAIL DESCRIPTION OF THE INVENTION

The invention is described in conjunction with the accompanying drawings, in which:

FIG. 1 is a rear elevational view of a vehicle equipped with the inventive grapple so as to be used in log skidding operation;

FIG. 2 is a rear elevational view of the left hand tong of FIG. 1;

FIG. 3 is a side elevational view of the tong of FIG. 2;

FIG. 4 is a schematic rear elevational view of a conventional tong fixed pin grapple;

FIG. 5 is a view similar to FIG. 4 but showing the grapple closed about a log;

FIG. 6 is a schematic rear elevational view of the inventive grapple closed about a single log;

FIG. 7 is a fragmentary rear elevational view of the grapple of FIG. 6 shown closed about two logs disposed side-by-side;

FIG. 8 is a fragmentary rear elevational view of a schematic representation of the inventive grapple shown closed about two different size logs, one disposed above the other;

FIG. 9 is a view similar to FIG. 8, but with the larger log uppermost;

FIG. 10 is a view similar to FIGS. 6—9, but showing the grapple closed on three logs;

FIG. 11 is a view similar to FIG. 10, but with the three logs disposed in a different configuration relative to each other; and

FIG. 12 is another rear elevational view of the schematic version of the inventive grapple shown closed about four logs.

It is believed that a brief discussion of the prior art type of common fixed pin grapple tong shape will be helpful in understanding the instant invention. The prior art grapple of this type is illustrated in FIG. 4, and the symbol R designates a continuously concave surface throughout the entire length of the tong surface that is in confronting relation to the other tong. This basic tong configuration yields a rounded or heart-shaped bundling area and a shield-shaped carrying area when fully closed as at H in FIG. 5. Such a grapple may be suitable for loading or sorting operations where lifting the log is the prime prerequisite, but is not suitable for skidding operations. The reason for this is that the log is not held securely enough at the sides and is not bound at all on the upper surfaces. In skidding operations with this tong configuration, at least one log will invariably be lost in transit.

In contrast to this, I provide a tong configuration exemplified by the showing in FIG. 2 where the tong is generally designated by the numeral 10. A second tong 11 is provided on a head 12 (see FIG. 1) with the pivot pins for the tongs 10 and 11 being designated respectively by the numerals 13 and 14.

The head 12 also carries pivot mountings at 15 and 16 for mounting of hydraulic cylinders 17 and 18 respectively. Each cylinder 17 and 18 at its opposite end (from the one connected to the head 12) is pivotally connected to a tong at a pivot such as is designated 19 and 20, respectively, relative to the tongs 10 and 11.

Also designated in FIG. 2 is the fact that the upper portion of the confronting surface of the tong 10 is designated by the symbol V, indicating that the surface is convex, whereas the lower portion is designated by the symbol C, indicating that this surface is concave.

Turning now to FIG. 6 which illustrates a single log operation, the curvature of the inventive tong surfaces is such that as the tongs close, the log rolls upwardly on the concave surface C and will be retained by tong surfaces at points of pressure application as at 21.

For operations in which two logs of approximately the same diameter and length are to be retained, the logs tend to reach their respective lowest potential energy states. In this case, this state dictates that the logs remain at an equal height above ground level or side-by-side as shown in FIG. 7.

The logs must then both be held by a purely pinching action, which results in the pronounced concavity of the tong surfaces in the area designated 22 in FIG. 7.

In instances in which two logs of considerably different diameter are to be carried, they will again tend to reach their respective lowest potential energy states.

This results in a stacking effect in which the larger (heavier) log tends toward the bottom as shown in FIG. 8. In this situation, the reverse curvature results in a combination of pinching and downward wedging action which aids in securing both logs. There is a combination of convex pinching and downward wedging action at 23 in FIG. 8, and a combination of concave pinching and upward wedging at 24.

In another two-log situation similar to that seen in FIG. 8, but one wherein for one reason or another the smaller log assumes the lower position, both logs will again be held by a combination of pinching and downward wedging action, aided further by the weight of the heavier log in the uppermost position, as seen in FIG. 9. The downward wedging action at points 25, and the upward pinching action at 26, hold both logs securely. Again, this unique action is the result of the reverse curvature of the tong surfaces, i.e., the combination of the concave/convex surfaces explained in conjunction with FIG. 2.

In a three-log situation in which the logs are approximately the same diameter, they will again be held by this same combination of pinching/wedging action that results from the reverse curvature of the tong surfaces as seen in FIG. 10. The downward wedging action at 27 and the upward pinching/wedging action at 28 hold all three logs securely. If the logs are reversed from that shown in FIG. 10 to that shown in FIG. 11, there is again the advantageous wedging/pinching action developed at 29 relative to the upper logs, and as at 30 relative to the lower logs.

One further illustration is seen in FIG. 12 where four logs are held in the manner described previously.

Again, the reverse curvature of the tong surfaces result in a downward wedging/pinching action as at 31, a straight pinching action as at 32, and an upward wedging/pinching action as at 33.

A specific example of the invention which has been found advantageous for use in a 60-inch head configuration makes use of a 12-inch radius for the concave portion C, and a 23½ inch radius for the convex portion V. However, it will be appreciated that substantial variation in the various radii may be employed to advantage, depending upon size, conditions of operation, etc.

I claim:

1. A grapple for logs comprising a headpiece having means for securement to a lifting mechanism, a first pair of spaced-apart pivots on said headpiece, a second pair of spaced-apart pivots on said headpiece between the pivots of said first pair, a tong mounted on each of said second pivots and having an inwardly directed end remote from said second pivot, and a cylinder and piston rod unit mounted on each of said first pivots and operatively connected to a tong, each tong being generally vertically elongated and having a generally outwardly arcuate contour in the lower part of the surface confronting the other tong and a generally inwardly arcuate contour in the upper part of said surface, the mounting of said tongs on said second pivots being offset so as to overlap said tongs in closing whereby said generally inwardly arcuate contours develop a downward wedging action supplemental to the upward pinching-wedging action developed by the generally outwardly arcuate contours.

* * * * *

35

40

45

50

55

60

65