March 21, 1950 R. O. BILLINGS 2,501,594

EXCAVATING BUCKET

Filed Oct. 19, 1944 2 Sheets-Sheet 1

Fig. 1.

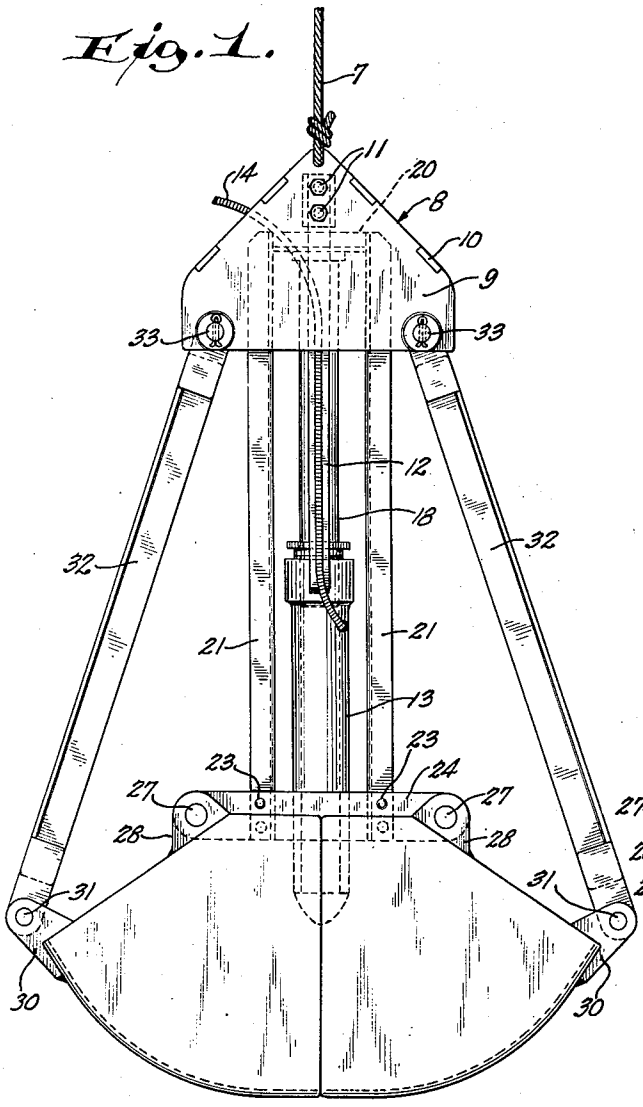
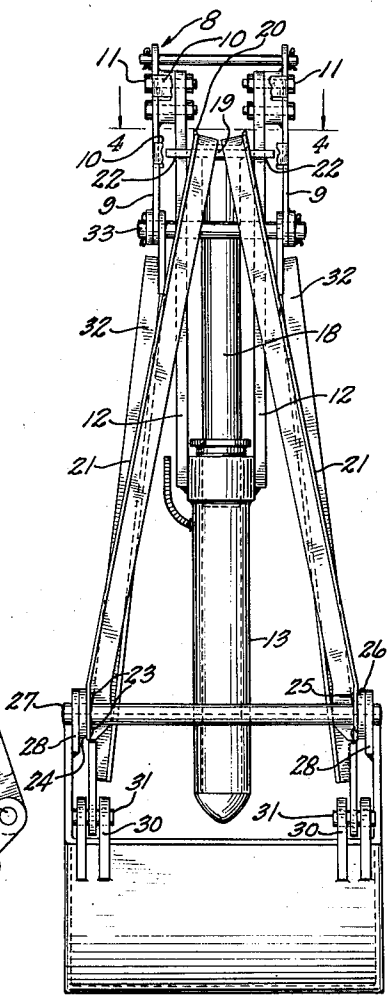


Fig. 2.



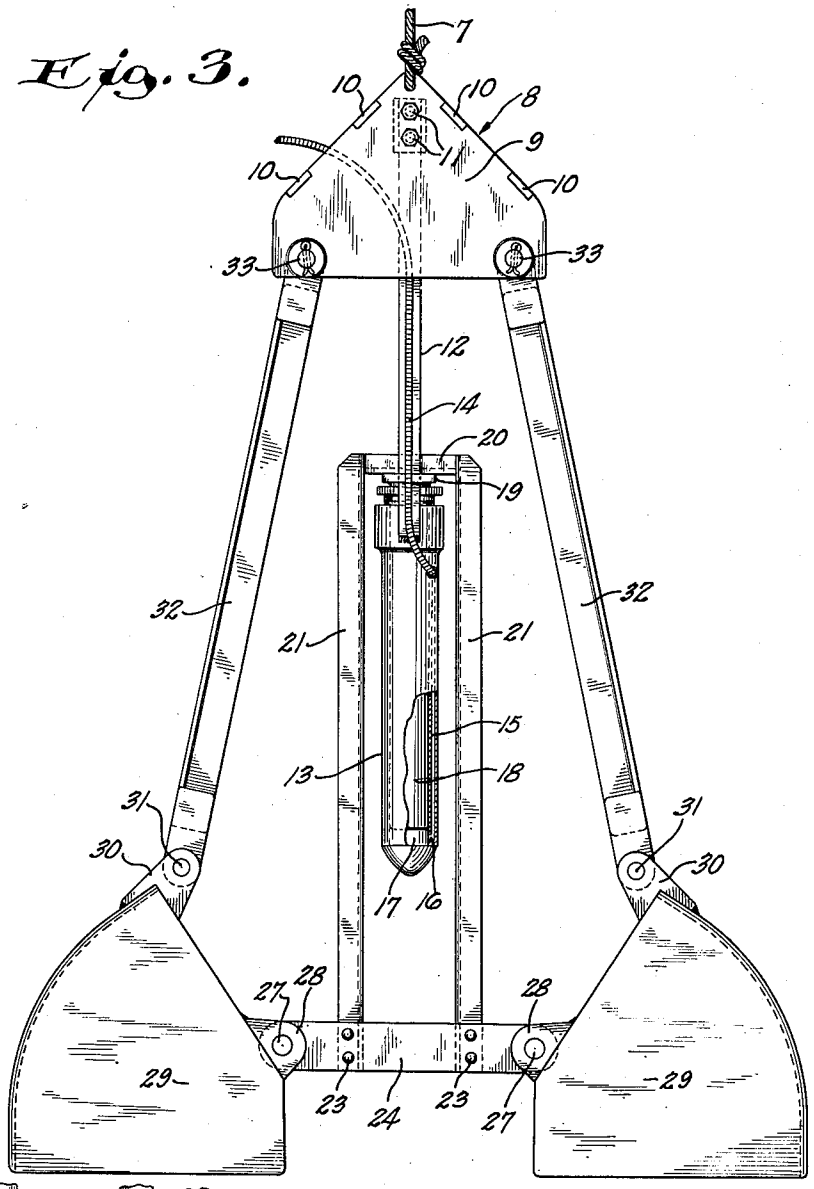
INVENTOR.
Roy O. Billings
BY
Morsell & Morsell
ATTORNEYS.

March 21, 1950 R. O. BILLINGS 2,501,594

EXCAVATING BUCKET

Filed Oct. 19, 1944 2 Sheets-Sheet 2

Fig. 3.



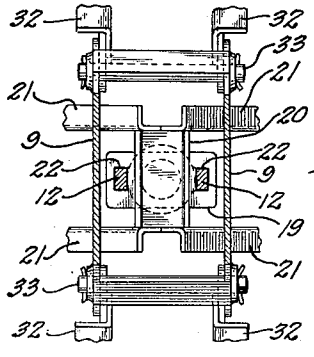


Fig. 4.

INVENTOR.
Roy O. Billings
BY
Morsell & Morsell
ATTORNEYS.

Patented Mar. 21, 1950 2,501,594

UNITED STATES PATENT OFFICE

2,501,594

EXCAVATING BUCKET

Roy O. Billings, Milwaukee, Wis.

Application October 19, 1944, Serial No. 559,373

4 Claims. (Cl. 37—187)

1

This invention relates to improvements in excavating buckets and is particularly adapted for use in connection with buckets of the clamshell type.

Clamshell buckets are commonly supported by a cable which extends over a sheave on the outer end of a boom. This cable controls the raising and lowering of the bucket. The usual type of clamshell bucket is also equipped with a second cable which controls the opening and closing of the bucket bottom. During the latter operation there is necessarily an upward pull exerted on the entire bucket which tends to raise the bucket out of proper engagement with the ground or other material to be lifted. This is obviously undesirable.

It is a general object of the present invention to obviate the abovementioned objectionable feature by providing improved means for operating the bucket bottom.

A more specific object of the invention is to provide a bucket wherein the opening and closing of the bottom is controlled by an hydraulic ram built on the bucket.

A further object of the invention is to provide a construction in which the opening and closing of the bucket bottom is more positive than with the cable controlled methods now utilized.

A more specific object of the invention is to provide an improved clamshell bucket construction wherein there is a horizontally disposed crossbar pivotally connected at its ends to the grapple members and positioned between said members when the latter are open, there being improved means including an hydraulic ram for exerting an upward force on said crossbar to cause closing of the grapple members. With this arrangement, the weight of the grapple members do not tend to undesirably cause closing movement of the ram when the bucket is in a raised position, and when it is desired that the grapple members remain open. In addition, the arrangement is such that the full benefit of the full power of the ram is obtained. The leverage is so worked out, in a novel manner, that the grapple members can be moved from open to closed position with a relatively short stroke of the ram. Thus, there is no need to increase the length of the main supporting arms to provide for a longer stroke.

With the above and other objects in view, the invention consists of the improvements in excavating buckets, and all its parts and combinations, as set forth in the claims, and all equivalents thereof.

In the accompanying drawings illustrating one complete embodiment of the preferred form of the invention, in which the same reference numerals designate the same parts in all of the views:

2

Fig. 1 is a side elevational view of the bucket with the grapple members in closed position;

Fig. 2 is an end elevational view of the construction of Fig. 1;

Fig. 3 is similar to Fig. 1, showing the grapple members in open position; and

Fig. 4 is a sectional view taken on line 4—4 of Fig. 2.

Referring more particularly to the drawings, the bucket construction includes a supporting head 8, which is suspended from the lower end of a cable 7. The head includes spaced, vertically disposed plates 9 connected by cross members 10. Rigidly connected at their upper ends to the plates 9 by means of bolts 11 are vertical bars 12. These bars have their lower ends rigidly connected to the upper end of an hydraulic cylinder 13.

The cylinder 13 may be supplied with hydraulic fluid under pressure by a conduit 14 which leads to a duct 15 in the cylinder wall. The duct 15 in turn communicates with the lower end of the interior of the cylinder 13 through a port 16. Hydraulic fluid entering the space 17 at the lower end of the cylinder is adapted to act on the lower end of a ram member 18 to urge the same in an upward direction.

The upper end of the ram has a head portion 19 which is rigidly secured to the lower side of a cross channel member 20. Rigidly connected at their upper ends to the ends of the cross channel 20 are grapple-operating members 21. It is preferred to utilize two of such members on each side, as is illustrated in Figs. 1 and 2. The head portion 19 of the ram 18 is slotted on each end, as at 22 (see Figs. 2 and 4), and extending through the slots are the vertical bars 12. It is thus apparent that upon movement of the ram, the head portion 19 slides up and down on the bars 12 and is guided thereby.

The lower ends of one pair of the grapple-operating members 21 are rigidly connected, as at 23, to a bottom crossbar 24 on one side. The lower ends of the other pair of members 21 are rigidly connected in a similar manner, as at 25, to a bottom crossbar 26 on the other side (see Figs. 2 and 3). The ends of the bottom crossbars 24 and 26 are pivotally connected, as at 27, to ears 28 which project from the grapple members 29.

Other ears 30, projecting from the grapple members, are pivotally connected, as at 31, to the lower ends of supporting arms 32. The upper ends of the supporting arms 32 are pivotally connected, as at 33, to the plates 9 of the supporting head 8.

In use of the device, as the load line 7 is lowered

by a crane or other device toward the ground or other material, the parts of the bucket construction will be in the position shown in Fig. 3. During such downward movement, it is to be noted that the weight of the grapple members 29 tends to maintain the ram 18 in its downward position of Fig. 3. When the bucket engages the ground or other material to be lifted, hydraulic fluid, under pressure, is caused to flow through the conduit 14, duct 15, port 16, and into the lower end of the cylinder 13. This causes extension of the ram member 18 from the position of Fig. 3 to the position of Fig. 1. During such movement, the head 19 of the ram slides upwardly on the bars 12 and exerts an upward pull on the cross channel 20 and in turn on the grapple-operating members 21. The members 21 in turn cause an upward pull to be exerted on the bottom crossbars 24 and 26 to swing the grapple members from the open position of Fig. 3 to the closed position of Fig. 1. To again open the grapple members, it is merely necessary to shut off the flow of hydraulic fluid, and to permit the fluid in the cylinder 13 and line 14 to be returned to the fluid reservoir. The fluid will be forced in a return direction by the weight of the grapple members, acting in a downward direction on the ram 18, as the grapple members swing by gravity to open position.

With this novel arrangement, the full benefit of the full power of the ram is obtained during the closing movement. In addition, by having the grapple members pivotally connected to the ends of the bottom crossbars 24 and 26 and by having the ram exerting an upward pull at an intermediate point on each of said crossbars, the closing movement can be accomplished by a relatively short stroke of the ram. In arrangements requiring a long stroke of the ram, it is necessary to have the supporting arms 32 considerably longer, and this is of course undesirable.

The ram may be operated pneumatically instead of by the preferred hydraulic means. Various other changes and modifications may be made without departing from the spirit of the invention, and all of such changes are contemplated as may come within the scope of the claims.

What I claim is:

1. In a clamshell bucket, a supporting head, a pair of grapple members, supporting means depending from said head and pivotally connected to one of said grapple members, supporting means depending from said head and pivotally connected to the other of said grapple members, a crossbar pivotally connected at one end to one grapple member and at its other end to the other grapple member, grapple operating members connected to said crossbar and extending upwardly therefrom, a cylinder suspended in vertical position from said supporting head, a fluid operated ram extensible in an upward direction from the upper end of said cylinder and connected to said grapple operating members to actuate the latter and swing the grapple members from open to closed position, and means depending from the supporting head and positioned for cooperation with an outer end of the ram throughout its range of movement for guiding said ram in its movement.

2. In a clamshell bucket, a supporting head, a pair of grapple members, supporting means depending from said head and pivotally connected to one of said grapple members, supporting means depending from said head and pivotally connected to the other of said grapple members, a crossbar pivotally connected at one end to one grapple member and at its other end to the other grapple member, grapple operating members connected to said crossbar and extending upwardly therefrom, a cylinder suspended in vertical position from said supporting head, a fluid operated ram extensible in an upward direction from the upper end of said cylinder and connected to said grapple operating members to actuate the latter and swing the grapple members from open to closed position, a head on the upper end of said ram having guiding slots therein, and guiding means depending rigidly from the supporting head and extending through the slots in the ram head for guiding the ram in its movement.

3. In a clamshell bucket, a supporting head, a pair of grapple members, supporting means depending from said head and pivotally connected to one of said grapple members, supporting means depending from said head and pivotally connected to the other of said grapple members, a crossbar pivotally connected at one end to one grapple member and at its other end to the other grapple member, grapple operating members connected to said crossbar and extending upwardly therefrom, a vertically disposed cylinder, a fluid operated ram extensible in an upward direction from the upper end of said cylinder and connected to said grapple operating member to actuate the latter and swing the grapple members from open to closed position, a head on the upper end of said ram having guiding slots therein, and means depending rigidly from the supporting head and connected to the cylinder for supporting the latter from the supporting head, said means extending through the slots in the ram head to guide the ram in its movement.

4. In a clamshell bucket, a load line, a supporting head directly connected to said load line and supported thereby, a pair of grapple members, supporting means directly connected to and depending from said head and pivotally connected to one of said grapple members, supporting means directly connected to and depending from said head and pivotally connected to the other of said grapple members, a crossbar pivotally connected at one end to one grapple member and at its other end to the other grapple member, grapple operating members connected to said crossbar and extending upwardly therefrom, elongated members rigidly connected to the supporting head and depending therefrom, a vertically disposed cylinder rigidly connected to said elongated members with the upper end of the cylinder positioned a substantial distance below the supporting head, and a fluid operated ram extensible in an upward direction from the upper end of said cylinder and connected to said grapple operating members to actuate the latter and swing the grapple members from open to closed position.

ROY O. BILLINGS.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
514,788	Symonds	Feb. 13, 1894
1,481,336	Armstrong	Jan. 22, 1924
1,535,878	Townsend	Apr. 28, 1925