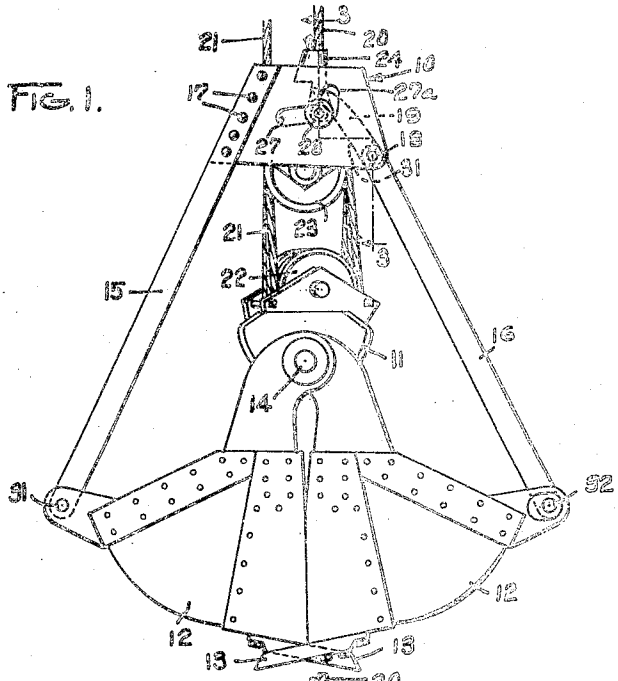
Aug. 6, 1946. J. B. BOTTEN 2,405,131

BUCKET LOCKING MEANS

Filed Nov. 9, 1944

FIG. 1.



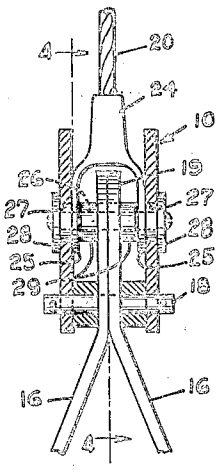
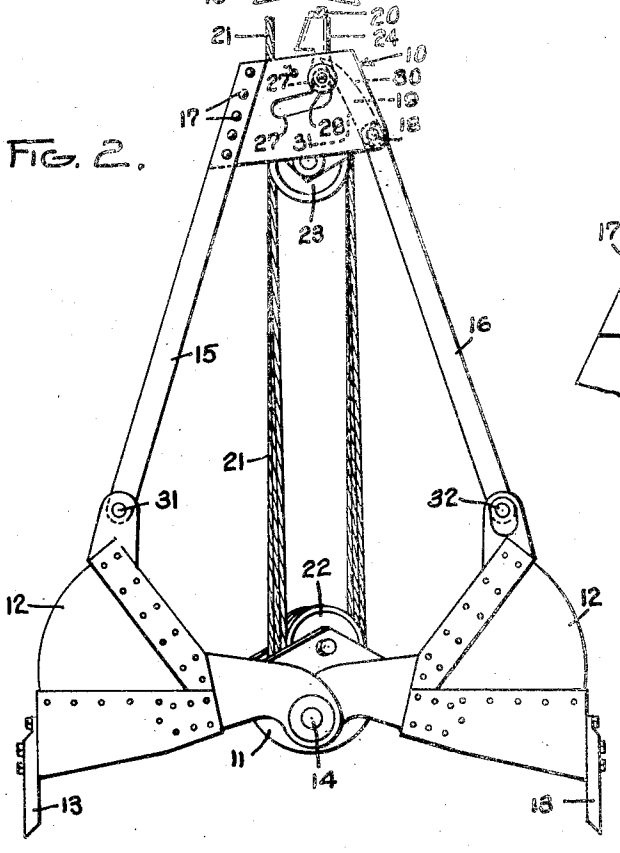


FIG. 3.

FIG. 2.



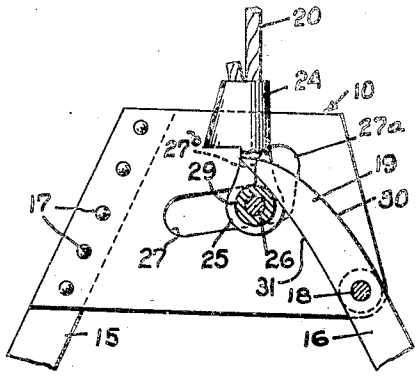


FIG. 4.

INVENTOR.
JOHN B. BOTTEN
BY Hyde and Mayer
ATTORNEYS.

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BUCKET LOCKING MEANS

John B. Botten, Russell Township, Geauga County, Ohio

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3 Claims. (Cl. 37—184)

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This invention relates to digging machines of orange peel, grapple, grab or clam shell form, the load carrying members of all of which are here characterized generally, for convenience, as buckets.

One object of the invention is to provide an improved digging device including improved means for locking the digging members in open position at the time they are dropped upon the material being handled, to insure the most efficient digging impact and avoiding damage to the teeth, lips or jaws.

A further object of the invention is to provide an improved digging device including automatic means, requiring no attention by the operator, for locking its digging members open, as described, and which interferes in no way with ordinary manipulation of said members during the filling and dumping operations.

Still another object of the invention is to provide improved locking means of the kind described, which is manipulated or controlled entirely by the holding line, or parts operated thereby.

Further objects of the invention in part are obvious and in part will appear more in detail hereinafter.

In the drawing, which represents one suitable embodiment of the invention,

Fig. 1 is an end elevation, showing the bucket closed;

Fig. 2 is a similar view, showing the bucket open;

Fig. 3 is a detailed sectional elevation on approximately the line 3—3 of Fig. 1; and

Fig. 4 is a sectional view on the line 4—4, Fig. 3.

While the invention is capable of application to various forms of digging devices, it is more particularly applicable to devices which embody two or more members hinged together or to a counterweight member and connected by links to a head member, so that the digging members open and close with more or less of a jaw motion.

For convenience, and in no sense of limitation, the invention has been shown applied to a digging device in the form of a clam shell dredging bucket embodying a head member, marked generally 10, a counterweight member, marked generally 11, and two bucket shell members 12, provided with digging teeth 13 and hinged together and to the counterweight member 11 on an axis 14. The outer edges of the shell members are pivotally connected to the usual links

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15, 16, by which they are also connected to the head member 10. For this purpose the links 15 are rigidly connected to the head member, as by rivets 17, while the links 16 are pivotally connected to the head member, as by connection to a shaft 18 mounted in its side walls. Said links 16, above the shaft 18 are provided with extensions 19, to be later referred to.

The weight of the bucket is supported by a holding line 20, which cooperates with the closing line 21 in the usual manipulation of the bucket members, the closing line being reaved over pulleys 22, mounted in the counterweight member, and 23, mounted in the head member, with the end of the closing line dead-ended on either the head or counterweight member, as is usual.

The parts so far described are those usually employed in buckets of this kind and enable it to be manipulated in the usual manner by winding or paying off one or the other or both of the said two lines, or by applying braking effects to the drums on which they are wound, as will be readily understood in the operation of these buckets.

Assuming a load has been dumped, the bucket is in a position elevated above the ground and is fully open, with the closing line slacked off. The holding line is taut. The first operation in taking another load is to lower the bucket to the place of operation, which is accomplished by paying off the holding line to lower the bucket, while simultaneously slacking off the closing line in such manner as to drop the bucket, the object being to permit the bucket finally to strike the ground with strong impact while fully open, thus to force its teeth into the ground in their vertical position, thereby not only penetrating the ground for digging purposes but preventing angular bending impact upon the teeth, which might distort them.

However, experienced operators, dropping a bucket to produce a sudden digging impact, find that it usually engages the ground in partly closed position, with liability of injury to the lips or to the digging teeth or members. This is due to the fact that the closing line is reaved in the head and counter-weight members, whereas the holding line is fast to the head. Therefore, when an attempt is made to lower the bucket in open position, upon release of the brakes on the winding drums for the two lines, the closing line takes up with respect to the holding line and thus partly closes the bucket. This makes it necessary to stop the bucket be-

fore it is all the way down to permit it to open fully, slowing up operations, and also reducing the force of impact.

According to my invention, I provide means for insuring that the bucket shell members remain in fully open position during their entire descent, so that the bucket may be permitted to drop far greater distances with the assurance that upon impact it will be wide open with its digging teeth vertical. I accomplish this by providing the bucket with means for positively locking its members in open position, a means which is automatic in operation, requiring no special attention by the operator, and which in no way interferes with the ordinary manner of manipulation of the bucket members in filling and dumping the bucket.

In the arrangement shown in the drawings, the holding line 20 is provided at its end with a shackle 24 having two arms 25 provided with aligned openings to receive a cross pin 26, the opposite ends of which extend through slots 27 in the opposite walls of head 18, in which travel the flanged or grooved rollers 28 shown in Fig. 3. The slots 27 are of special form, as shown in Fig. 2, being elongated and inclined upwardly from one end to the other, and being provided at their upper ends with lateral extensions 27*a* which extend upwardly. Within the head, and between its walls, said pin 26 is provided with a roller 29, lying in the path of movement of the extensions 19 of links 16, which extensions at their upper ends are slightly curved and somewhat pointed, by the provision thereon of curved or inclined outer edges or surfaces 30, their opposite inner surfaces or edges 31 being also curved and somewhat concave in outline as in Fig. 4.

With this arrangement, assuming that a loaded bucket has been swung around to the dumping position and has been dumped, the bucket is fully open with the parts in the positions shown in Fig. 2. The extensions 19 of links 16 have swung away from and do not cover or lie opposite any portions of the slots 27. Accordingly, by permitting downward motion of the head, the inclination of the slots 27 has permitted the pin 26 to travel upwardly along the inclined portion of said slots and to enter the vertical side extensions 27*a* thereof, in which position said rollers are in engagement with the inner concave edges 31 of the link extensions 19. If the bucket is now lowered, especially with a sudden drop, as by rapidly paying off the holding line, the bucket members are firmly locked against closing movement. This is due to the fact that said bucket members cannot close except by outward motion, or motion of separation, of the pivots 31, 32, which respectively connect the bucket members 12, 12 to the links 16, 15 respectively. Such motion of separation is strongly resisted, because the rollers 29 form an obstacle to inward motion of extensions 19 of links 16. The pressure of said extensions upon the rollers is resisted by the walls 27*b* of the recesses 27*a*. Therefore, as the bucket is dropped, its members are held or locked open and it engages the ground in the proper manner, with the digging teeth extending vertically.

That being accomplished, the holding line is slacked off and the closing line is wound in. Now, the weight of the pin 26, rollers 29, and shackle 25, especially with the pressure of the link extensions 19 applied to the pin, is sufficient to cause the pin to leave the slot extensions 27*a*

and enter the elongated portion of slots 27, as indicated in Fig. 4, traveling down to the lower end thereof. Thus, motion of the extensions 19 relative to the head is now unimpeded, and the bucket members may be moved to closed position, with full digging effect, by winding in the closing line.

In the closed position of the bucket, shown in Fig. 1, the extensions 19 of links 16 extend over and partially cover the lateral slots 27*a* and form obstacles preventing return of the roller 29 and pin 26 to their original positions. Therefore, the parts remain in the positions shown in Fig. 1 until the bucket is dumped, whereupon the link extensions 19 return to their original positions, and the weight of the bucket causes the pin and rollers to again move up along the slots and enter the lateral extensions 27*a* thereof. This again locks the bucket members in open position ready for another operation.

In this arrangement, while the locking effect is very firm and positive, and entirely effective for the purpose and in the manner described, it does not interfere with any ordinary bucket operations. For example, assuming the bucket open and suspended in mid air, the effect of the link extensions 19 upon the rollers, pinching them, as it were, against the slot edges, is not sufficient to prevent closing the bucket in the usual manner, nor does such operation injure the locking parts. Under such conditions taking up the closing line causes the concave inner edges 31 of the links to act as cams or wedges, forcing or driving the rollers down into the more horizontal parts of slots 27. Weight of the bucket parts alone is insufficient to resist the total force thus put into operation, as will be readily understood.

The actual resistance to closing movement supplied by the link, roller and slot arrangement described readily may be adjusted or proportioned to any desirable or satisfactory degree by appropriate shaping or configuration of the slot edges and the curvature or inclination of the working edges of link extensions 19 with respect to the particular size of pin or rollers employed in any given bucket.

The mechanism described provides means for firmly locking the bucket parts open, which means is automatic in operation, requires no special attention by the operator, and does not interfere with ordinary manipulation of the bucket members in loading or unloading the bucket. The parts are of simple construction, are not likely to get out of order in service, and may be included or embodied in practically any type of digging device.

Other advantages of the invention will be apparent to those skilled in the art.

What I claim is:

1. A digging device of the character described, comprising digging shell members pivoted together, head and counterweight members, two sets of links connected respectively to said shell members, one set being rigidly and the other set being pivotally connected to the head, a closing line, a holding line, said pivoted link members being provided with extensions, and means operated by the holding line when the device is open and arranged to obstruct movement of said extensions and thereby lock the digging members against closing movement.

2. A digging device of the character described, comprising digging members pivoted together, head and counterweight members, two sets of

links connected respectively to said digging members, one set being rigidly and the other set being pivotally connected to the head, a closing line, a holding line, the head member being provided with a slot, a pin traveling in said slot and to which the holding line is connected, said pivoted links being provided with extensions lying adjacent said pin, one end of said slot being so located that when the device is suspended from the holding line with the digging members in open position the pin lies in said one end of the slot and obstructs swinging movement of the pivoted links and thereby maintains the digging members in open position.

3. A digging device of the character described, comprising digging members pivoted together, head and counterweight members, two sets of links connected respectively to said digging members, one set being rigidly and the other set being pivotally connected to the head, a closing line, a holding line, the head member being provided with a slot, a pin traveling in said slot and to which the holding line is connected, said pivoted links being provided with extensions lying adjacent said pin, one end of said slot being so located that when the device is suspended from the holding line with the digging members in open position the pin lies in said one end of the slot and obstructs swinging movement of the pivoted links and thereby maintains the digging members in open position, said slot also being inclined downwardly toward its opposite end, whereby upon release of the holding line the pin moves downwardly in said slot to a position out of obstructing relation with said pivoted links, thereby releasing the digging members for movement to closed position by operation of the closing line.

JOHN B. BOTTEN.