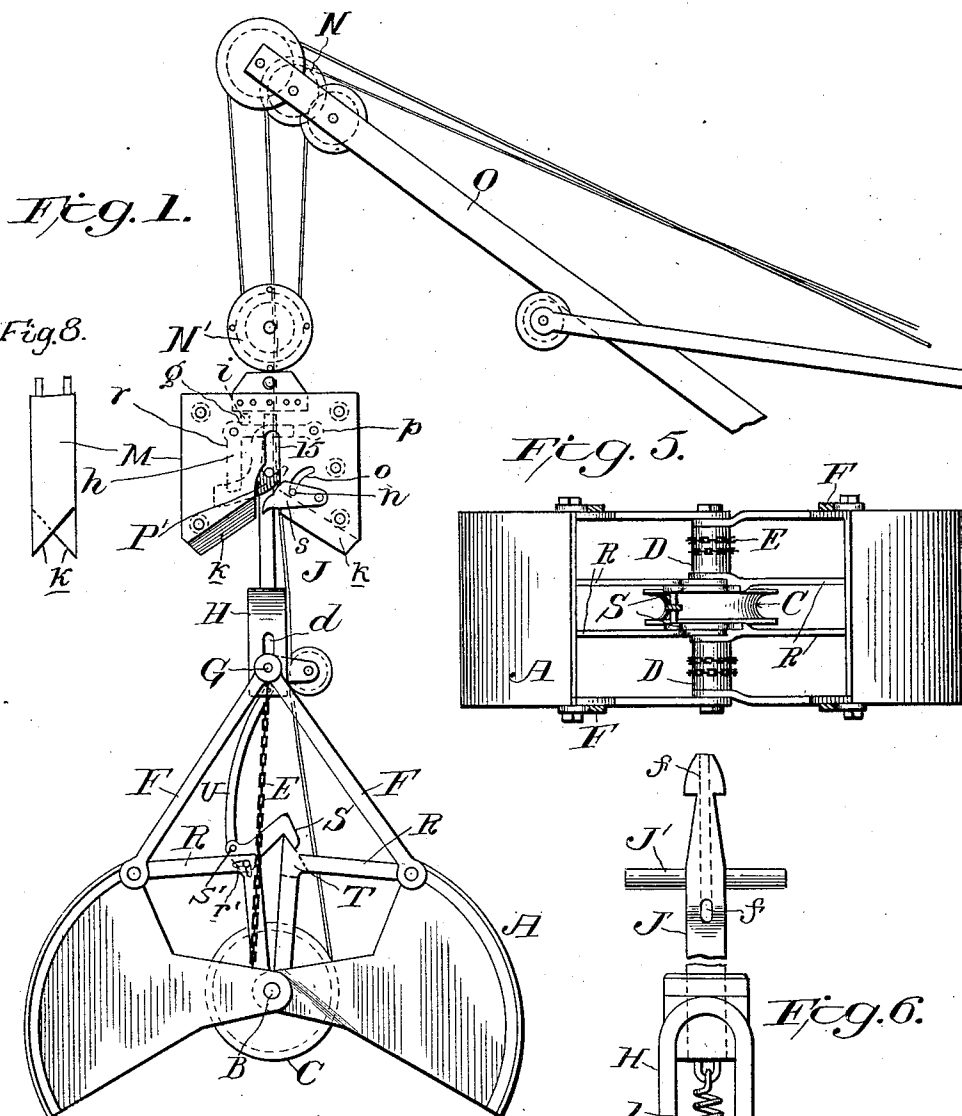


O. N. GARDNER.
LOADING AND UNLOADING APPARATUS.
APPLICATION FILED MAR. 15, 1912.

1,051,994.

Patented Feb. 4, 1913.

2 SHEETS—SHEET 1.



WITNESSES

C. N. Walker
G. Manning

INVENTOR

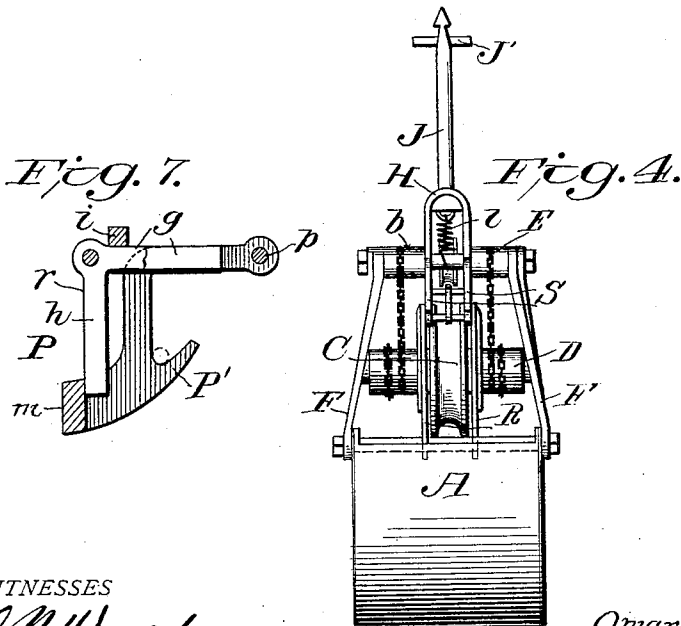
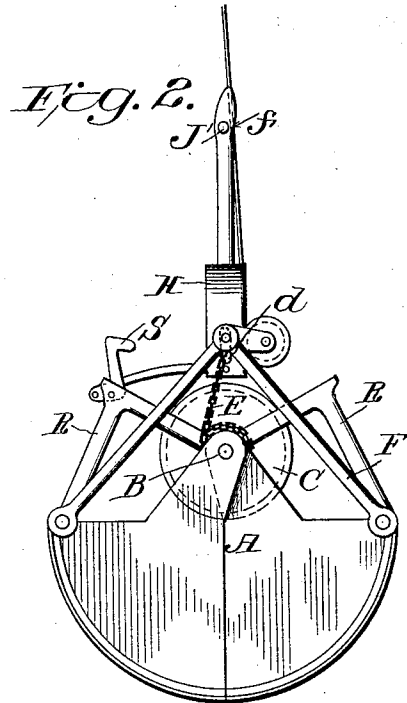
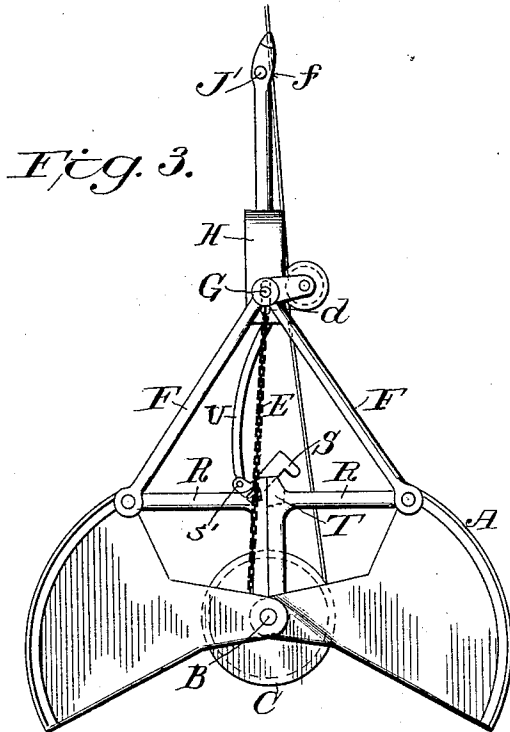
Omar N. Gardner
By T. Walter Fowler
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2 SHEETS—SHEET 2.



WITNESSES

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UNITED STATES PATENT OFFICE.

OMAR N. GARDNER, OF JAMESTOWN, NEW YORK.

LOADING AND UNLOADING APPARATUS.

1,051,994.

Specification of Letters Patent.

Patented Feb. 4, 1913.

Application filed March 15, 1912. Serial No. 683,972.

To all whom it may concern:

Be it known that I, OMAR N. GARDNER, a citizen of the United States, residing at Jamestown, in the county of Chautauqua and State of New York, have invented certain new and useful Improvements in Loading and Unloading Apparatus, of which the following is a specification.

This invention relates to certain new and useful improvements in mechanism designed for dredging or excavating purposes and for hoisting, conveying and dumping earth, ore, coal, grain and other material in dredging, excavating and other work in which a bucket of the usual "clam shell" or "orange peel" type, or of other well known form is loaded, raised and lowered, and controlled through the medium of preferably, a single line, chain, or cable and a single drum; and my invention consists of the parts and the constructions, arrangements, and combinations of parts which I will hereinafter describe and claim.

In the accompanying drawings forming part of this specification and in which similar reference characters indicate like parts in the several views; Figure 1 represents an elevation of a dredging or excavating apparatus embodying my invention and showing the bucket open in its dumping position. Fig. 2 is a similar view showing the bucket closed and in the position of hoisting. Fig. 3 is a side view showing the bucket open and in its loading position on the pile of material. Fig. 4 represents an end view of the bucket with parts broken away. Fig. 5 is a top plan view of the open bucket. Fig. 6 is an enlarged detail partially in section of the saddle and associated parts. Fig. 7 is a detail of the latch and the forked lever *r*. Fig. 8 is an edge view of the locking block, *m*, showing the oppositely inclined surfaces, *k*.

In the drawings I have illustrated my improvements in association with a well known form of grapple bucket, but it will be understood that the particular type of bucket employed, whether of the well known so-called "clam shell," "orange peel" or other design, is unimportant, as my invention is capable of being attached to any of the present types of grapple buckets used for dredging or excavating purposes, with but little trouble and at small cost. The "clam shell" bucket, A, of my drawings will therefore be considered as typical of any bucket

capable of grappling, holding and dumping any material, the sections of the buckets pivoting on a transverse shaft, B, on which is a "bull-wheel," C, said shaft also carrying the usual drums, D, around which are wound and unwound the chain or other connection, E, as is usual with buckets of the character shown and before mentioned. At suitable points on the bucket sections, pairs of rods, F, attach, said rods converging upwardly and all of the rods being pivotally hung upon a transverse shaft, G. The shaft, G, is provided with spacing sleeves, *b*.

Extending above the shaft, G, is an inverted U arched-shaped piece, or saddle, H, the side arms of which extend downwardly over the ends of the sleeves, said arms of the saddle being provided with elongated slots, *d*, through which the shaft, G, at the head of the bucket extends and by which the saddle and its associated parts may have a limited vertical movement relative to the fixed shaft. The arched shaped piece or saddle, H, and by which latter term I will hereinafter designate this piece, is fixed to the lower end of a rod, J, said rod extending through and vertically above the arch of the saddle and having its upper end arrow-shaped, beveled or otherwise appropriately formed to facilitate its entrance into a latching mechanism, such as I will hereinafter describe. Below the upper end of this rod, J, a transverse pin, J', is passed transversely through the rod, J, so as to project a suitable distance beyond each side thereof and adapted to engage certain beveled or inclined surfaces, *k*, on the frame of the latching mechanism, as I will hereinafter describe. A spring, *l*, is employed to assist the saddle in its gravitating movement relatively to the fixed shaft, as shown in Fig. 3.

The single line which I prefer to employ for closing the sections of the bucket, for raising the bucket with its load and for controlling the dumping and lowering of the bucket, passes through a hole, *f*, formed in the upper portion of the rod, and is adapted to coil around the "bull-wheel", C, of said bucket, in the manner common to such buckets, as I have shown for illustrative purposes; this single line passing upwardly and through a casing or like block, M, and over a pulley or sheave, N, on the end of a boom, O, or other support

to the drum of a hoisting engine and which drum and engine are not shown as they form no essential part of the present invention.

5 The latching block or casing, M, may be pivotally suspended upon the casing of a pulley, or sheave, N', so as to be self-adjusting; that is, the block or casing will always be maintained in substantially a perpendicular position without regard to the changing
10 inclinations of the boom or other structure which carries it. The locking block, or casing, M, is open from below to admit the upper end of the rod, J, and slots or openings, 15, are formed in the sides of the block to receive the projecting ends of the transverse pin, J', when the bucket is elevated to carry its rod, J, into the locking block, M, so as to latch with suitable devices therein.

20 The latching means comprise a swinging latch, P, within the locking block, M, having one end pivotally mounted and having opposite portions provided with a hook portion, P', which is adapted to extend substantially across the throat or entrance of
25 the block and point upwardly to form an inclined throat, and to lie in such position that when it is engaged by the extensions of the cross-pin, J', on the rod, J, the latch will be lifted to admit the pin, and then
30 will drop to allow the pin to be sustained in the hook portion of the latch.

Within the locking block is a bell-crank, or L-shaped lever *r*, which is pivotally
35 mounted at its angle and has horizontal and vertical bars, *g*—*h*, spaced apart and between which horizontal bars the arrow-shaped head of the rod, J, is designed to pass at a certain part of the operation.
40 The horizontal bars, *g*, of the lever are sufficiently elastic to be spread apart as the arrow head of the rod is drawn up between them, the lever being held from upward oscillating movement during this action by
45 means of a fixed pin, or stop, *i*; the lower end of the vertical bars, *h*, of the lever are designed to engage the cross-bar, *m*, in the free end of the swinging latch, P, and when the arrow head of the rod, J, passes clear
50 of the free end of horizontal bars *g*, of the lever, and the shoulder of the head seats upon the top edges of the bars, *g*, and the pulley upon the hoisting line is relaxed, the weight of the suspended empty bucket is
55 placed upon the lever *r*, and the said lever is caused to swing upon its pivot to make the lower free end bear upon the cross-bar, *m*, of the swinging latch, P, and thereby raise the hook portion of said latch out of
60 the path of the cross-pin, J', of the now descending rod, J, and uncover the entrance slit or opening and allow the rod to freely pass out of the locking block, M, when the latch and lever return to normal position.

65 Pivotally secured on the outside of the

locking block, one on each side thereof, is a stop or plate, *s*, whose free end projects into the entrance slit or space and whose upward movement is determined by a pin or
70 lug, *n*, carried on its inner face between its ends, contacting with the end wall of a slot, *o*, formed in the locking block.

The construction and operation of the latch, the aforesaid lever and the stop or
75 plate so far as described, may follow the lines of the similar parts shown and described in my former Patent No. 589,964, dated Sept. 14, 1897, but other and suitable
80 latching and releasing means may be substituted therefor, if desired, without departing from the spirit of my invention.

It will be observed at this point that on the under side of the locking block are
85 formed two oppositely inclined surfaces, *k*, both of which are beveled transversely in opposite directions and whose primary function is to direct the cross-bar, J', of the rod, J, accurately into the slot or entrance to
90 the latch no matter at what angle the pin may stand, due, say to the swinging or turning of the hoisting rope, while the bucket is being lifted; in other words, when
95 the rod is lifted high enough for the cross-pin to strike the inclined surfaces, *k*, (see Fig. 1), said block will be caused to turn axially until the ends of the cross-pin register
100 with the slots—there being one of these slots in each side of the locking block, when the head of the rod is presented to engage and actuate the latch, as before described,
105 said latch having its free end extending to or beyond the opposite side of the center of the casing and the two sides of the latch being there suitably connected by means of the cross-bar; in other words, the latch, P, is duplex in character as it comprises two
110 similar spaced parts pivoted upon a common pivot at one end and rigidly connected by the cross-bar at the other end.

The bucket is also provided with two substantially right-angled arms, R, whose horizontal
115 members are pivoted at their outer ends to the upper outer sides of the bucket sections, and whose vertical arms are pivoted at their lower ends upon the shaft, B. The vertical members of said arms by substantially
120 abutting, as shown in Fig. 1, limit the opening movement of the bucket sections and assist in removing excessive strains on the cross-shaft upon which the bucket sections turn. The arms, R, are in pairs; that
125 is, each arm comprises similar parts spaced from each other and one pair of arms carries at its upper angle the pivotally mounted forked latch, S, and the other pair of said arms is provided with lugs, T, adapted to be engaged by the forks of the latch of the first-named pair of arms, when the bucket
130 sections are opened to dump the load, as shown in Fig. 3. The forked latch, S, is

also provided with a short arm, S', and this is connected by a rod, or bar, U, with the saddle, H, before mentioned; and the pivot of the latch is designed to operate freely in angular slots, r', formed in the arms which carry the latch.

The operation of the foregoing parts may be summarized substantially as follows, having reference, first, particularly to Fig. 3, where the bucket is shown as resting on the material to be loaded or unloaded, as the case may be: The hoisting drum being started, the line or cable, L, is wound thereon and the sections of the bucket are drawn together or closed, in a manner well known in this art. The continued winding of the line on the drum causes the bucket and suspending parts to ascend and the arrow head end of the rod, J, to approach the latching mechanism in the locking block suspended on the boom, derrick, bridge or other structure, and to finally latch therewith, in the manner described at length in my aforesaid prior patent. The engineer now throws off the brake and friction (clutch) with which the usual winding drum is supplied, and thereby allows the line or cable to pay out which permits the bull-wheel, C, to lower and the sections of the bucket to swing outwardly or away from each other and dump the load. During this operation the pairs of angular arms, R, approach each other and the hook-shaped ends of the forked latch, S, of one pair of arms hook over the lugs, T, on the other pair of arms (the latch being held in engagement by friction and the tendency of the scoop members to close) and thus hold the bucket sections latched together in open or dumping position, as shown in Fig. 3, in which position the parts remain until the bucket strikes the ground and the gravitating action of the saddle and its adjuncts, the hauling line being now slack, causes the bar or rod, U, to so act on the short arm of the latch, S, that said latch is turned about its pivots and the hook-shaped end disengages or unlatches from the lugs, T, on the opposing pair of arms. As the bucket sections close after grappling the load, the outer ends of the angular arms move downwardly with the bucket sections and assume the position shown in Fig. 2, in which position they are held by the pull upon the cable, L. It will be understood that as soon as the bucket comes to rest on the pile or surface to be operated on, the saddle, H, lowers because of its slot and the shaft working therein, and the power of the spring. The independent movement of the saddle due to its slots and the spring or equivalent means is important in the operations just described for it is this movement which causes the release of the forked latch and which latch holds the bucket sections in locked open position when the empty

bucket is being lowered to working position. The unlatching of the rod from the latching block, M, and the lowering of the bucket is effected in the manner described in detail in my said former patent, for instance, the engineer at the hoisting engine, operates the winding drum so that there will be a resulting pull upon the hoisting cable or line. The effect of this will be that the rod, J, will be lifted vertically in the frame or casing to remove the trunnions or extensions of the cross-pin, J', out of the throat of the latch, P, and the arrow-shaped head of the rod will be forced between the separated ends of the members of the bell-crank lever, r, spreading them apart until the head passes clear of the upper sides of these members. The shoulders of the arrow-shaped head now rest upon the horizontal members of the lever, and the pull upon the hoisting line being relaxed, the weight of the suspended load is now brought upon said members, the bell-crank lever, r, swinging about its fulcrum p, and the free end of the lever bearing upon the free end of the latch and thereby raising said latch so as to move the hook-portion to one side of the plane of the trunnions and uncovering the entrance slot or opening in the frame or casing to allow the rod to pass out of the casing.

Among the advantages attributed to the foregoing constructions and arrangements or their equivalents might be mentioned the following: That the aforesaid parts which are interposed between the latching mechanism and the bucket can be attached to and will operate successfully in connection with many types of dredger buckets because of such buckets depending on two things, namely, the drawing in of the cable or line to cause the sections of the bucket to close and the paying out of the line or cable to enable the bucket sections to open or release the load. The improvements will therefore operate equally with buckets of both the "clam shell" and "orange peel" type. My invention also does away with the usual additional dumping rope or line which latter allows the bucket to open up with full force and in the case of buckets of large capacity, often results in damage to the bucket. My controlling devices being located on the head of the bucket, they never come in contact with the material to be handled. The beveled surfaces on the bottom of the locking block enable me to dispense with additional guides, cables and chains, and permit the apparatus to be always guided accurately to the latching devices on the boom or derrick, bridge or other part, and when the bucket is released from the latching devices, said bucket will turn on its single line and again be dropped in any angle or direction the operator may desire, or that will be to the best advantage of loading. In my invention. I

operate the bucket on a single "whip" or part of a cable which insures the most rapid operation, and accordingly effects a saving of time in operation. Single rope operated buckets may be classified as (1) those having guide cables or chains and hand-operated dumping lines; and (2), those which are operated by two or more "whips" of rope and which in either case will only allow the bucket to dig in the same position every time, which is a great disadvantage when loading from boats and cars, where it is desired to have the bucket turn in any direction.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:—

1. In an apparatus of the character described, the combination, with a bucket and a latching mechanism, of a hoisting line connected to said bucket, a member carried by the head of the bucket and having a limited vertical movement relative thereto, said member having a rod with means for engaging the latching mechanism whereby the loaded bucket is suspended from the latter, said bucket moving vertically relatively to said member when the hoisting line is paid out, whereby the bucket opens to discharge its load, and the empty bucket is lowered in open position while suspended from the hoisting line, and means controlled by the vertically movable member and independent of the hoisting line, for holding the sections of the bucket locked in open position during the descent of the empty bucket.

2. In an apparatus of the character described, the combination, with a bucket and a latching mechanism, of a hoisting line connected to said bucket, a member carried by the head of the bucket and having a limited vertical movement relative thereto, said member having a rod with means for engaging the latching mechanism whereby the loaded bucket is suspended from the latter, said bucket moving vertically relatively to said member when the hoisting line is paid out, whereby the bucket opens to discharge its load, and the empty bucket is lowered in open position while suspended from the hoisting line, and means controlled by the vertically movable member and independent of the hoisting line, for holding the sections of the bucket locked in open position during the descent of the empty bucket, said last-named means including arms on the bucket adapted to approach and recede from each other as the bucket sections open and close, said arms having co-acting elements adapted to engage and hold the sections of the bucket locked in open position during the descent of the empty bucket.

3. In an apparatus of the character described, the combination, with a bucket and a latching mechanism, of a hoisting line con-

nected to said bucket, a member carried by the head of the bucket and having a limited vertical movement relative thereto, said member having a rod with means for engaging the latching mechanism whereby the loaded bucket is suspended from the latter, said bucket moving vertically relatively to said member when the hoisting line is paid out, whereby the bucket opens to discharge its load, and the empty bucket is lowered in open position while suspended from the hoisting line, means controlled by the vertically movable member and independent of the hoisting line, for holding the sections of the bucket locked in open position during the descent of the empty bucket, and means for tripping the bucket locking means at the conclusion of the descent of said empty bucket.

4. In an apparatus of the character described, the combination, with a bucket and a latching mechanism of a hoisting line connected to said bucket, a member carried by the head of the bucket and having a limited vertical movement relative thereto, said member having a rod with means for engaging the latching mechanism whereby the loaded bucket is suspended from the latter, said bucket moving vertically relatively to said member when the hoisting line is paid out, whereby the bucket opens to discharge its load, and the empty bucket is lowered in open position, while suspended from the hoisting line, means controlled by the vertically movable member and independent of the hoisting line, for holding the sections of the bucket locked in open position during the descent of the empty bucket, and means for tripping the bucket locking means at the conclusion of the descent of said empty bucket, said last-named means being actuated to unlock the bucket sections by the gravitating movement of said vertically moving member.

5. In apparatus of the character described, the combination with a bucket having a head portion, of a saddle mounted for independent movement on the head portion of the bucket, said saddle having a vertically extending rod, a latching mechanism into engagement with which the rod is adapted to be lifted, a line or cable connected to the bucket and controlling the raising, lowering and dumping movements thereof, and means controlled by said saddle and independent of the hoisting line for holding the sections of the bucket locked in open position during the descent of the empty bucket.

6. In apparatus of the character described, the combination with a bucket having a head portion, of a saddle mounted for independent movement on the head portion of the bucket, said saddle having a vertically extending rod, a latching mechanism

into engagement with which the rod is adapted to be lifted, a line or cable connected to the bucket and controlling the raising, lowering and dumping movements thereof, and means controlled by said saddle and independent of the hoisting line for holding the sections of the bucket locked in open position during the descent of the empty bucket, said means comprising arms on the sections of the bucket foldable toward and from each other and having co-acting agencies to interlock as the bucket sections open.

7. In apparatus of the character described, the combination with a bucket having a head portion, of a saddle mounted for independent movement on the head portion of the bucket, said saddle having a vertically extending rod, a latching mechanism into engagement with which the rod is adapted to be lifted, a line or cable connected to the bucket and controlling the raising, lowering and dumping movements thereof, and means controlled by said saddle and independent of the hoisting line for holding the sections of the bucket locked in open position during the descent of the empty bucket, said means comprising arms on the sections of the bucket foldable toward and from each other, one of said arms having a pivoted latch and the other having lugs to be engaged thereby when the bucket sections open and the arms come together.

8. In apparatus of the character described, the combination with a sectional bucket having a transverse shaft at its upper end, of an inverted U-shaped saddle having slots in its sides through which said shaft passes, a vertical rod or stem fixed to said saddle, downwardly converging bars connecting the shaft with the upper sides of the sections of the bucket, a line or cable connected to said shaft and adapted to raise and lower the bucket, and a latching mechanism, said rod or stem having a part adapted to be engaged by the latching mechanism to thereby hold a loaded bucket suspended from the latching mechanism, and said bucket moving relatively to the rod and

away from the latching mechanism when the cable is paid out whereby the sections of the bucket open to dump the load, and means for holding the bucket sections locked in open position during the descent of the empty bucket.

9. In mechanism of the character described, the combination, with a sectional bucket and a transverse shaft in the upper part thereof, of an inverted U-shaped saddle having vertical slots through which the shaft passes, a vertical rod fixed to the saddle and extending a substantial distance above the same, and having an engageable upper end, a latching mechanism with which the rod engages and from which the bucket is suspended when in position to be dumped, a hauling line or cable connected to the bucket, said suspended bucket adapted to open when the hauling line is paid out, and a spring between the head of the bucket and said saddle for positively moving the latter vertically with relation to the head of the bucket.

10. In mechanism of the character described, the combination with bucket mechanism which includes a vertical stem having a transverse projection, and a line or cable, of a suspended locking block having latching devices to engage said stem, said locking block having an opening or throat leading to the latching devices, and said block having oppositely inclined guides, one of the guides at one side of the throat or opening being transversely beveled in one direction, and the guide at the other side of the throat or opening being transversely beveled in an opposite direction, said guides being engaged by said transverse projection whereby the locking block is axially turned and the projection is guided into register with the opening or throat of the block when said projection is lifted into engagement with said inclined guides.

In testimony whereof I affix my signature in presence of two witnesses.

OMAR N. GARDNER.

Witnesses:

T. WALTER FOWLER,
C. W. FOWLER.