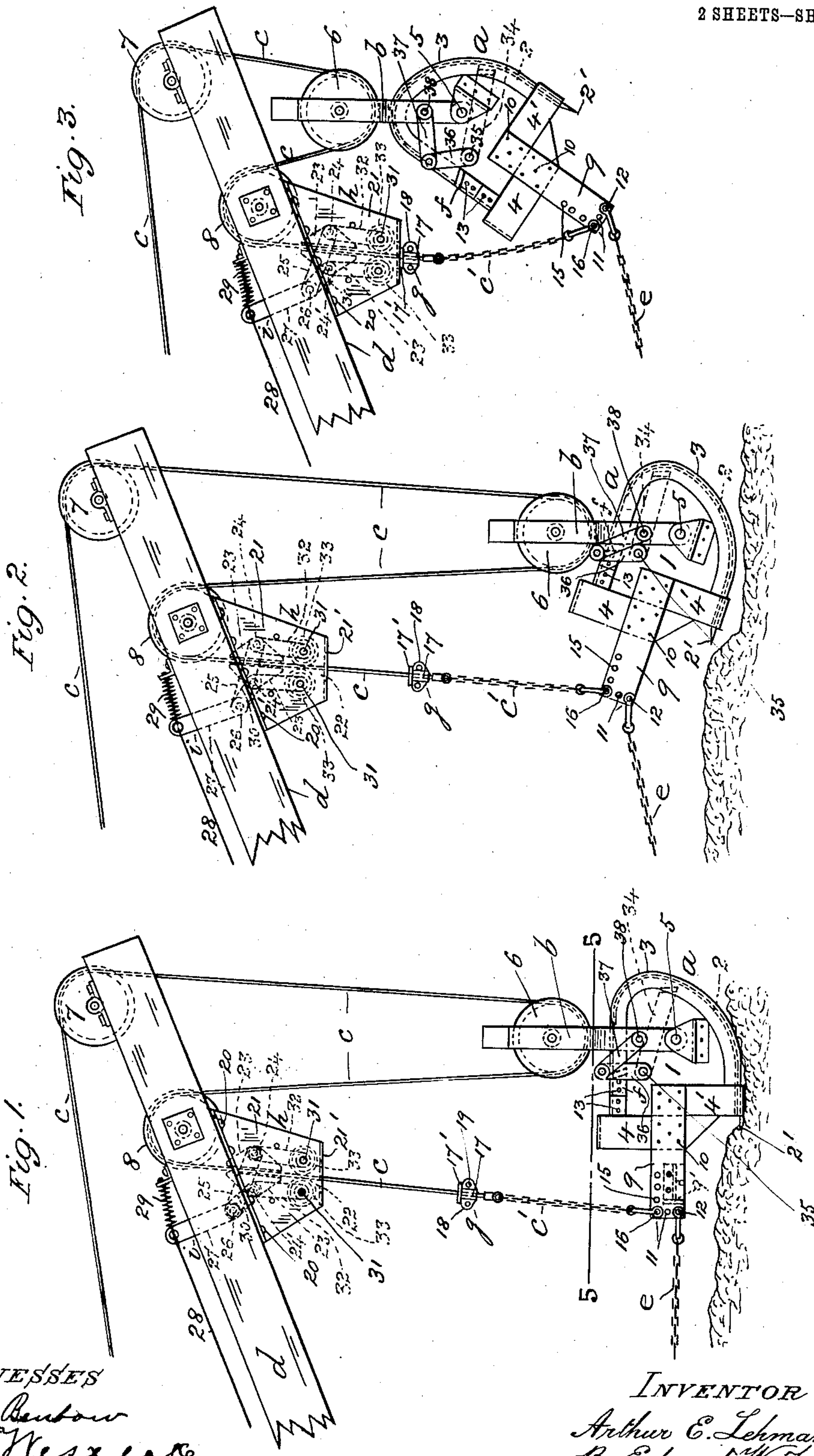


A. E. LEHMANN.
EXCAVATING APPARATUS.
APPLICATION FILED MAY 26, 1909.

940,035.

Patented Nov. 16, 1909.

2 SHEETS—SHEET 1.



WITNESSES

J. M. Bantow
C. J. Meszner

INVENTOR

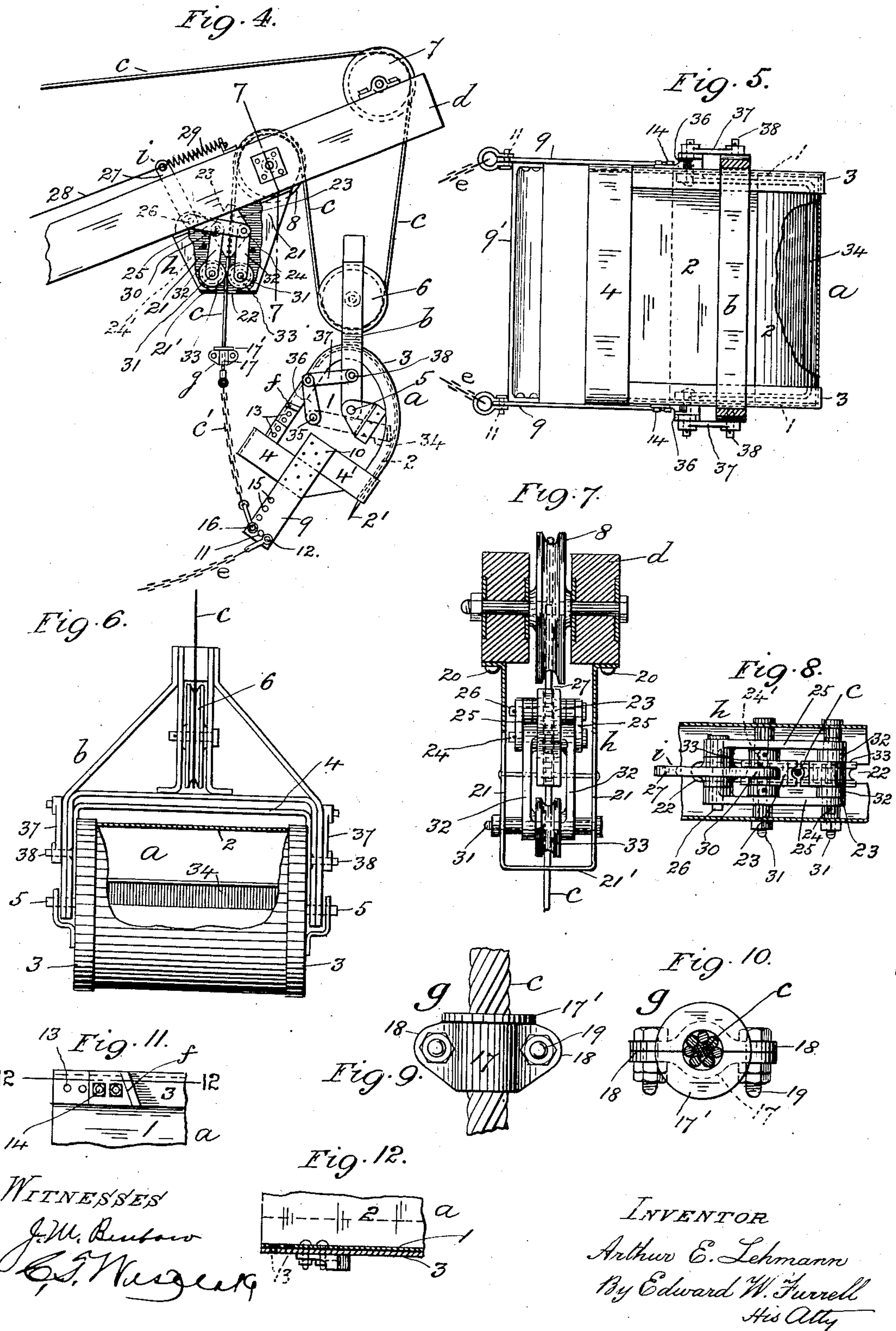
Arthur E. Lehmann
By Edward W. Furrell
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WITNESSES
J. M. Bunker
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UNITED STATES PATENT OFFICE.

ARTHUR E. LEHMANN, OF ST. CHARLES, MISSOURI.

EXCAVATING APPARATUS.

940,035.

Specification of Letters Patent.

Patented Nov. 16, 1909.

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To all whom it may concern:

Be it known that I, ARTHUR E. LEHMANN, a citizen of the United States, residing at St. Charles, in the county of St. Charles and State of Missouri, have invented a new and useful Improvement in Excavating Apparatus, of which the following is a specification.

My invention relates particularly to the bucket or shovel of an excavating machine, and to improved means combined therewith, firstly, for regulating the depth of cut by the bucket according to the nature of the material to be excavated, secondly, for automatically adjusting the inclination of the loaded bucket about its pivotal point of suspension from the derrick of the machine at the initial raising of the bucket from the ground, thirdly, for automatically dumping the bucket at a predetermined height while being raised, fourthly, for dumping the bucket at any desired point below the said height, and fifthly, for automatically scraping or cleaning the bucket while dumping, and my invention has for its object to simplify construction, to insure ready and positive action of the bucket, and to reduce the strain on the hauling and lifting gears of the machine.

The invention consists in features of novelty as hereinafter described and claimed, reference being had to the accompanying drawing forming part of this specification, whereon,

Figure 1, is a side elevation of an excavating bucket or shovel in the digging position with the combined parts of the apparatus constructed and arranged according to my invention for respectively, adjusting, and dumping the bucket; Figs. 2, 3, and 4, similar views to Fig. 1, showing the relative arrangements of the said parts in the initial raising, and dumping positions respectively, of the bucket; Fig. 5, a horizontal section to enlarged scale through the bail of the bucket on line 5, 5, in Fig. 1, showing the latter (partly broken away) and its appendages in top plan view; Fig. 6, a rear end view of the bucket (partly broken away) and its appendages; Fig. 7, a cross section to enlarged scale through the derrick boom of the machine on line 7, 7, in Fig. 4, showing the auxiliary sheave carried thereby, and combined gripping device, forming parts of my invention in the operation of the lifting rope of the bucket; Fig. 8, a top plan view

of the gripping device detached from the boom; Fig. 9, a side elevation to enlarged scale of the adjustable stop on the lifting rope, seen in Figs. 1, 2, 3, and 4, and forming part of my invention for regulating the dumping altitude of the bucket; Fig. 10, a top plan view thereof; Fig. 11, a side view to enlarged scale of the adjustable stop at each side of the bucket for regulating its inclination when loaded and initially raised from the ground, and Fig. 12, a horizontal section through the side wall of the bucket on line 12, 12, in Fig. 11, showing the stop in top plan view.

Like letters and numerals of reference denote like parts in all the figures.

a represents an excavating bucket or shovel the body of which may be of any suitable size, shape, and material, preferably of sheet metal, open at its front end and at the top, and comprising in the present case two opposite upright side plates 1, and a bottom plate 2 having a front cutting edge 2' and bent upward to form the closed rear end of the bucket *a* as shown, the plates 1 and 2 being united together at their edges by angles 3, combined with suitably shaped yokes or braces 4, 4', which straddle the top and bottom respectively, of the bucket *a* at its open front end and are secured to the side plates 1 thereof.

The bucket *a* is pivoted externally at the sides and rearward of its center of gravity, by pins 5 projecting therefrom, to the bail *b* which straddles and extends a suitable distance above the bucket *a* for allowing clearance to the latter between the arms of the bail *b* when "dumping" about its pivots 5. In the upper part of the bail *b* is pivoted an upright sheave 6 which with the bucket *a* and bail *b* is supported by the lifting rope *c*, the latter passing thereunder and upward therefrom at its front edge to a sheave 7 pivoted to the derrick-boom *d* and over the sheave 7 to the lifting gear of the machine, which being of the usual well-known construction needs no description or illustration; while from the sheave 6 at its rear edge the lifting rope *c* passes upward and over an auxiliary sheave 8 pivoted to the boom *d* and thence downward to its connection with an auxiliary chain *c'* which is coupled at its lower free end to the outer ends of two opposite arms (or yoke) 9 which project forward from the front open end portion of the bucket *a* and are rigidly

fixed to the side plates 1 and braces 4, 4', thereof by rivets 10 or otherwise, the arms 9, which are preferably connected to each other by a transverse bar or brace 9', being adapted for the coupling thereto of the hauling cable *e*, and hereinafter termed the "traction members."

For regulating the depth of cut by the front cutting edge 2' of the bucket *a* in its digging position as seen in Fig. 1, each traction member 9 is perforated preferably at its outer free end with an upright series of spaced apart holes 11 adapted respectively, to receive the coupling-pin 12 of the hauling chain or cable *e* which is operated by the usual hauling mechanism of the machine, so that in pulling on the cable *e* when coupled to the bottom hole 11 of the series as shown, the bucket *a* is drawn and caused to dig practically horizontally, or with the minimum cut into the ground, but when a deeper cut of the bucket *a* is desired, the coupling-pin 12 of the hauling cable *e* is removed to a higher hole 11 of the series and thereby constrains the traction members 9 downward thereat and causes the cutting edge 2' of the bucket *a* to sink deeper into the ground.

For automatically adjusting or limiting the inclination of the bucket *a* when loaded about its pivotal point 5 with the bail *b*, at the initial raising of the bucket *a* from the ground, each side wall of the bucket *a* is preferably perforated near the top with a longitudinal series of spaced apart holes 13 adapted respectively, for the passage therethrough of a bolt 14 by which an outwardly projecting stop *f* is adjustably fixed thereat to the side of the bucket *a*, as seen particularly in Figs. 11 and 12, the inner or rear end of the stop *f* opposite to the front edge of the corresponding arm of the bail *b* diverging upward from the latter, so that, when raising the loaded bucket *a* by the lifting rope *c* about the sheaves 6, 7, and 8, and by the auxiliary chain *c'*, the front end of the bucket *a*, owing to the extended leverage of its traction members 9 to which the chain *c'* is coupled, from the fulcrum 5, is initially raised until the stops *f* are brought into engagement with the front edges of the bail *b* as seen in Fig. 2. For this purpose also, a longitudinal series of spaced apart holes 15 are formed through each traction member 9, preferably at the top, for the removal of the coupling-pin 16 of the chain *c'* from one hole 15 to another of the series according to the desired initial tilting of the loaded bucket *a* thereat.

For automatically dumping the loaded bucket *a* at a predetermined height from the ground while being raised, the lifting rope *c* is provided with a stop *g* which may be of any suitable construction adapted to be clamped to the rope *c*, consisting in the present case of a tubular collar 17 having a top

flange 17' of suitable diameter, and made therewith in halves, each half having two opposite outwardly projecting ears 18 for the passage therethrough in their assembled position of bolts 19 by which the halves of the stop *g* are fixed together around and tightly clamped to the lifting rope *c* (as seen in Figs. 1, 2, 3, and particularly Figs. 9 and 10) at or adjacent to its connection with the auxiliary chain *c'*. Dependent from and fixed at the top by rivets 20 to the underside of the derrick-boom *d* (or equivalent member of the machine) is a casing *h* which may be of any suitable construction and depth, comprising preferably, two opposite spaced apart upright side plates 21 which are united at the bottom by a floor-plate 21' having a suitable elongated opening 22 (seen particularly in Fig. 8) for the passage therethrough of the lifting rope *c*, the length of the opening 22 allowing free rearward and forward movement of the rope *c*, and its width somewhat less than the diameter of the top flange 17' of the stop *g* which is so arranged that, on raising the loaded bucket *a* by the lifting rope *c* about the sheaves 6, 7, and 8, to a predetermined height, the stop *g* will engage the underside of the floor-plate 21' of the casing *h* and thereby prevent the further raising of the front end of the bucket *a*, whereby the lifting rope *c* continuing to raise the rear part of the bucket *a* through the bail *b*, the bucket *a* will be moved by the latter until the load acting through its center of gravity causes the bucket *a* to fall at its front portion about its pivots 5 into the position shown by Fig. 3, or "dumped."

For dumping the bucket *a* at any desired height below that last described, I provide a suitable device adapted to grip the lifting rope *c* previously to the engagement of the stop *g* with the floor-plate 21' of the casing *h*, this device comprising in the present case two opposite upright brake-shoes 23 which are arranged within the casing *h* before described, adjacent to the sheave 8, one on each side of the lifting rope *c* in proximity thereto but normally out of contact therewith, one of the brake-shoes 23 being pivoted laterally by a pin 24 to one end of two opposite and parallel links 25 which are coupled at their other ends to the fulcrum-pin 26 of a lever *i* of the first order having one arm 27 projecting upward and coupled at its free end to a rope or chain 28 extending in one direction and controlled by the operator of the machine, and to the boom *d* in the opposite direction by a spiral spring 29 which in the normal position of the brake-shoes 23, or when free of the rope *c*, is in minimum tension, the other arm 30 of the lever *i* being coupled at its free end by a pin 24' to the other brake-shoe 23. Hinged at a suitable distance beneath the

brake-shoes 23 to the side plates 21 of the casing *h* on each side of the lifting rope *c* by a pin 31, are two opposite and parallel arms 32 between which is axially mounted on the pin 31, a guide-sheave 33, the sheaves 33 which are in the same vertical plane and in circumferential proximity to each other, operating as guides to the lifting rope *c* at all times, the upper free ends of the arms 32 being coupled to the pivot-pins 24, 24', of the brake-shoes 23. By this arrangement, on pulling over the lever *i* by the rope 28 against the tension of the spring 29, the brake-shoes 23 are drawn toward each other by the movement of the arm 30 of the lever *i* and the links 25 in connection respectively with the shoes 23, and of the arms 32 about their hinge-pins 31 as fulcrums so as to grip the lifting rope *c* at a point between the sheave 8 and stop *g* before the latter has reached the floor-plate 21' of the casing *h* and thereby prevent its further upward movement and cause the dumping of the bucket *a* at any desired height from the ground below that determined by the stop *g*.

For automatically scraping or cleaning the bucket *a* while dumping, I preferably use a yoke-shaped scraper-bar 34 which is arranged in a suitable plane within the bucket *a* with its members parallel and in proximity to the walls 1 and 2 of the bucket *a*, the arms of the scraper-bar 34 being fulcrumed at their free ends by pins 35 in bearings therefor through the side walls 1 of the bucket *a* forward of the bail *b*. On the outer projecting end of preferably each, fulcrum-pin 35 is fixed an arm 36 which is coupled at its upper free end by a link 37 to a pin 38 which projects from the side of the bail *b* at a suitable distance from its pivotal connection 5 to the bucket *a*, the arm 36, link 37, and pin 38 being so arranged relatively to the movements of the bucket *a* about its pivots 5 as to hold the scraper-bar 34 in a constant plane, or so that in dumping the walls 1 and 2 of the bucket *a* will move across the scraper-bar 34 and the material within the bucket *a* be thereby dislodged and the said walls scraped or cleaned. Or if preferred the scraper-bar 34 and its appendages may be dispensed with entirely.

What I claim as my invention and desire to secure by Letters Patent is:—

1. In apparatus of the class described, the combination of an excavating bucket having its front end open and a suitable cutting edge thereat, means for supporting the bucket in the digging position, a traction member fixed to the bucket and projecting

forward from its said end, and a cable adapted to be directly coupled to the said member at varying heights respectively, from the said edge for hauling the bucket and regulating the depth of cut by the said edge into the material to be excavated, substantially as described.

2. In apparatus of the class described, the combination of an excavating bucket having its front end open, a bail pivoted to the bucket at a point rearward of the center of gravity thereof, a traction member fixed to the bucket and projecting forward from its said end, means adapted to be connected to the bail in its vertical position for supporting the bucket thereat, means for raising the bucket at varying points respectively, of the said member about the said pivotal point, and means adapted to engage the said bail for limiting the inclination thereto of the bucket when so raised, substantially as described.

3. In apparatus of the class described, the combination of an excavating bucket having its front end open, a bail pivoted to the bucket at a point rearward of the center of gravity thereof, a traction member fixed to the bucket and projecting forward from its said end, means adapted to be connected to the bail in its vertical position, and to the said member, for raising the bucket at both the said points of connection thereto, simultaneously, and means for limiting the said raising of the bucket through the said member while continuing to raise it through the bail, for dumping the bucket at a predetermined, and varying heights respectively, from the ground, substantially as described.

4. In apparatus of the class described, the combination of an excavating bucket open at its front end, a bail pivoted to the bucket at a point rearward of the center of gravity thereof, a traction member fixed to the bucket and projecting forward from its said end, means adapted to be connected to the bail in its vertical position, and to the said member, for raising the bucket at both the said points of connection thereto, simultaneously, means for limiting the said raising of the bucket through the said member while continuing to raise it through the bail, for dumping the bucket, and means for dislodging the excavated material from the walls of the bucket while being dumped, substantially as described.

ARTHUR E. LEHMANN.

Witnesses:

EDWARD W. FURRELL,
HAL C. BELLVILLE.