R. M. DOWNIE.

EXCAVATOR BUCKET OR SCOOP.

APPLICATION FILED FEB. 25, 1916.

1,237,878.

Patented Aug. 21, 1917.

3 SHEETS—SHEET 1.

Fig. 1.

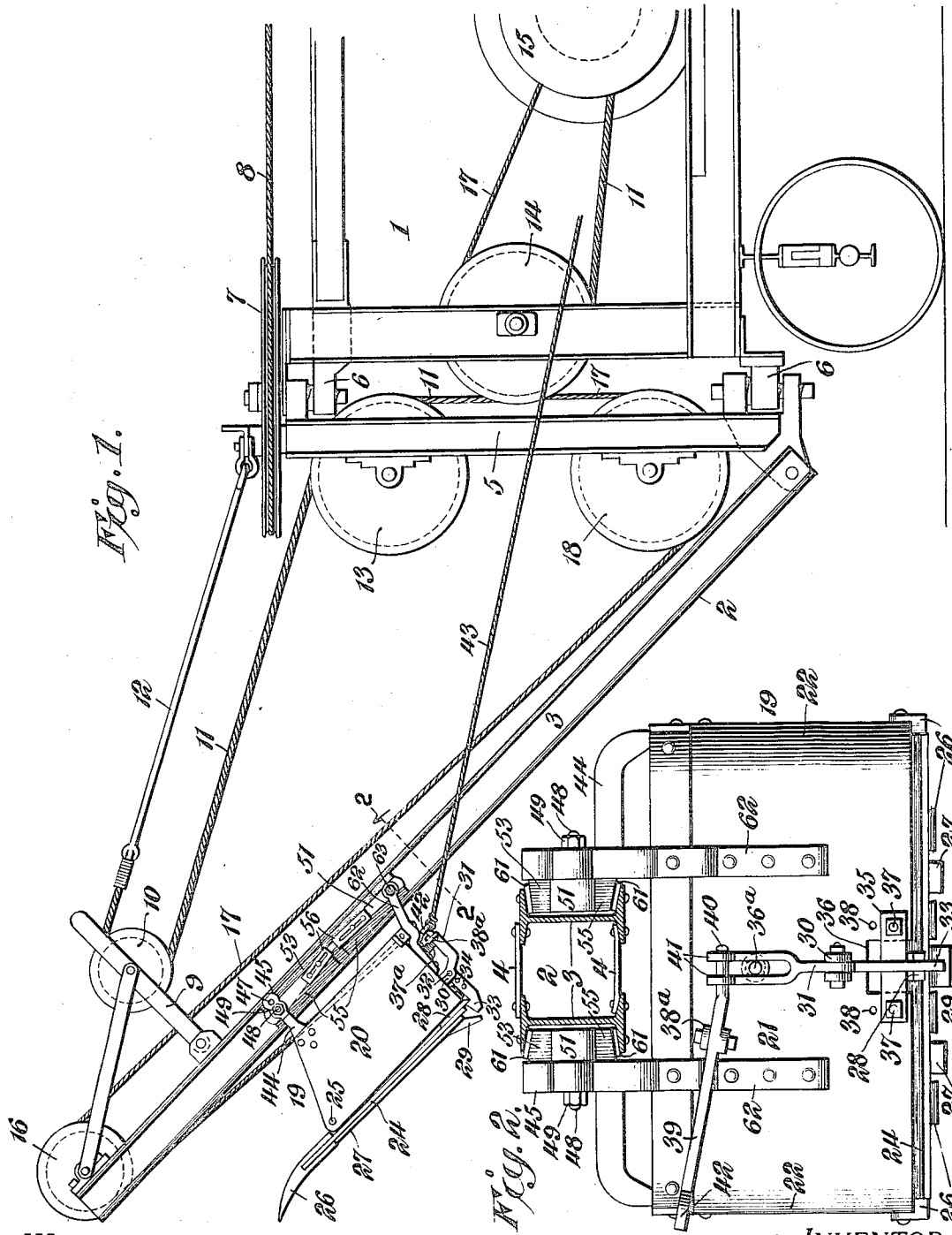


Fig. 2.

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3 SHEETS—SHEET 2.

Fig. 3.

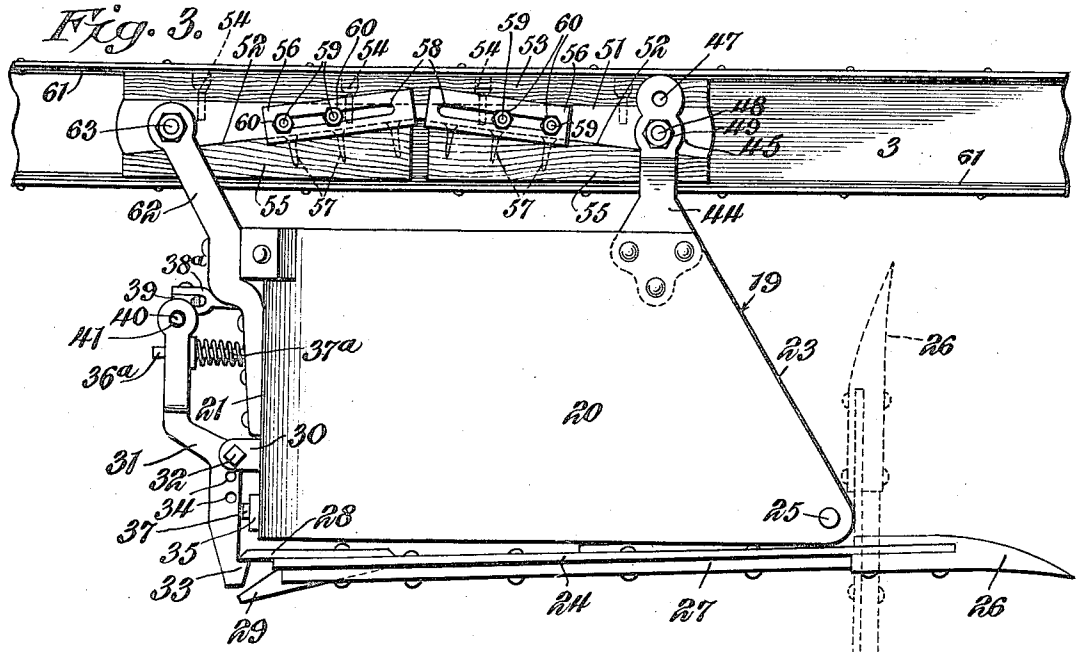
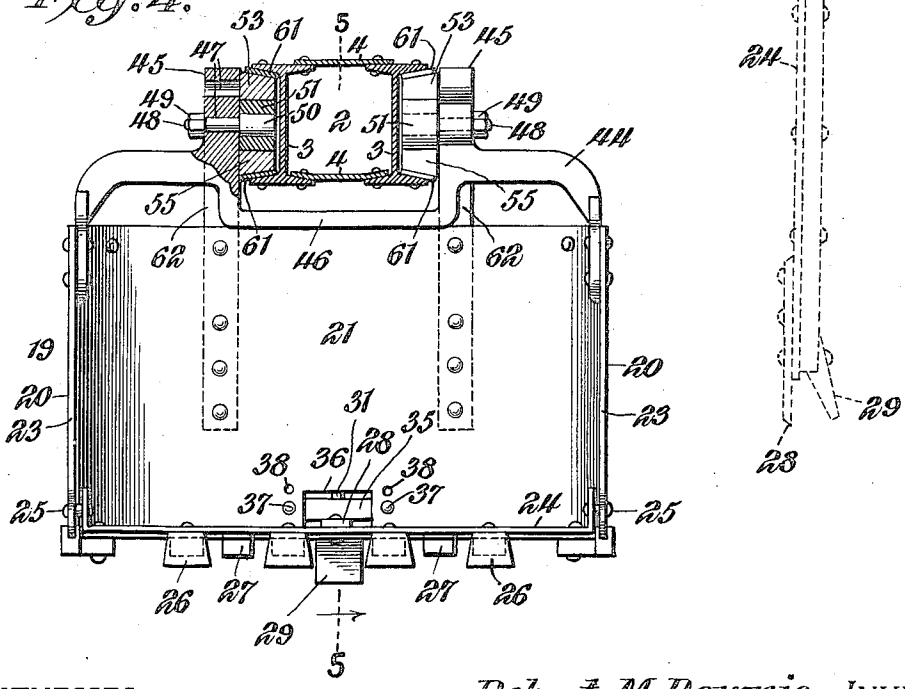


Fig. 4.



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3 SHEETS—SHEET 3.

Fig. 5.

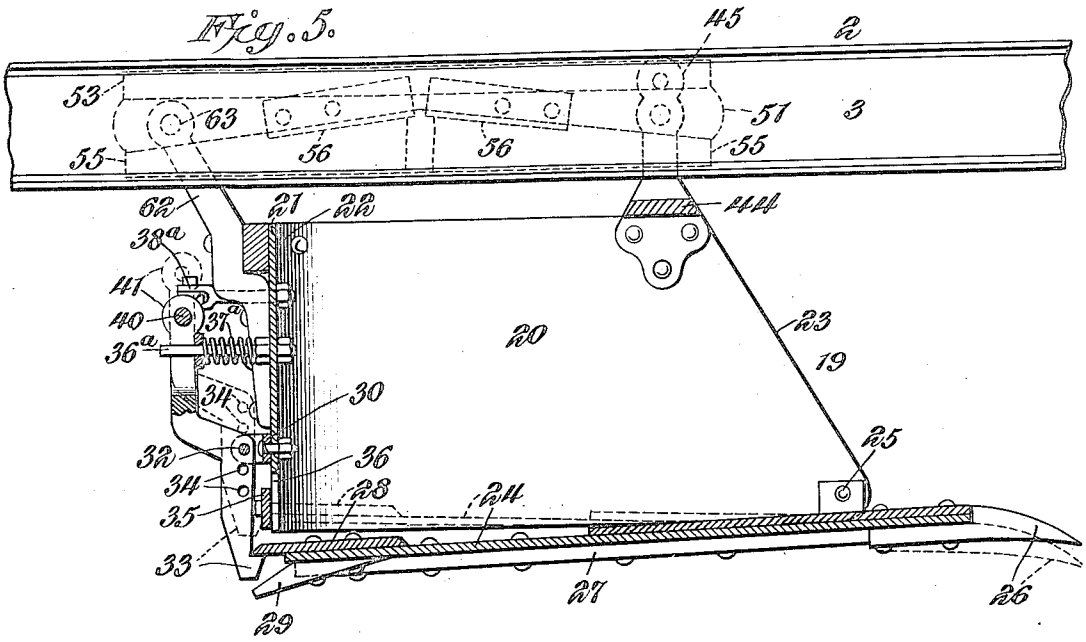
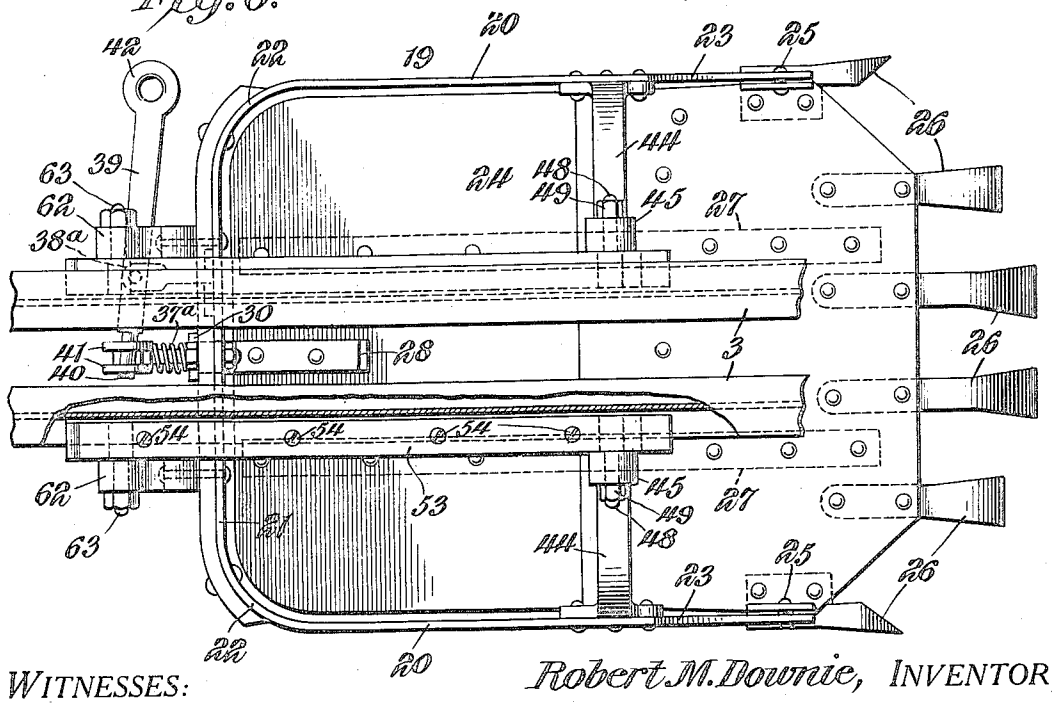


Fig. 6.



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UNITED STATES PATENT OFFICE.

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EXCAVATOR BUCKET OR SCOOP.

1,237,878. Specification of Letters Patent. Patented Aug. 21, 1917.

Application filed February 25, 1916. Serial No. 80,479.

To all whom it may concern:

Be it known that I, ROBERT M. DOWNIE, a citizen of the United States, residing at Beaver Falls, in the county of Beaver and State of Pennsylvania, have invented a new and useful Excavator Bucket or Scoop, of which the following is a specification.

This invention has reference to excavator buckets or scoops, and its object is to provide a bucket or scoop supported by and movable along a boom so that the wearing action of the material being excavated upon moving parts is reduced to a minimum, and all wear may be readily taken up, while the bucket may be adjusted to meet various conditions.

In accordance with the present invention the bucket is mounted to move lengthwise of a boom preferably of double channel or I form, with the carrier for the bucket movable in the channels on opposite sides of the boom as upon tracks. The bucket is of the skimmer type, that is, it is intended to take up surface material by being moved lengthwise of the boom lying close to the surface to be acted upon by the bucket, while the latter is so constructed that the angle of the active end of the bucket to the surface to be removed may be varied as desired, either by tilting the bucket with relation to the boom, or tilting the bottom of the bucket with relation to the body of the bucket, or both expedients may be utilized. With such an arrangement the bucket is moved along the surface to be excavated with the front edge of the bucket engaging such surface, whereby the loosened material engaged by the bucket is directed thereinto, and then by elevating the boom the bucket is so positioned as to retain the excavated material while the boom is swung to one side or the other to the desired position, whereupon the bottom of the bucket, which is hinged to the body of the bucket, is released from retaining means and gravitates to a pendent position for dumping purposes. With the present invention the bottom of the bucket, after the discharge of the contents of the bucket, may be made to close and lock without the necessity of special closing mechanism.

Since the bucket is made to travel lengthwise of the boom along the tracks provided by the flanges of the I or other beams constituting the boom, and since material being excavated is liable to find lodgment on such tracks, the carriers are made to fit the tracks snugly so that in a manner they become self-cleaning, and wear is correspondingly lessened. Provision is made by the invention for taking up such wear as does occur, so that there may be maintained a sufficiently snug fit between the carriers and the parts along which they move.

The invention will be best understood from a consideration of the following detailed description, taken in connection with the accompanying drawings forming part of this specification, with the further understanding that while the drawings show a practical form of the invention, the latter is not confined to any strict conformity with the showing of the drawings, but may be changed and modified so long as such changes and modifications come within the scope of the appended claims.

In the drawings:—

Figure 1 is a side elevation of the fore part of an excavating machine with the bucket or scoop of the present invention applied, only such parts of the excavating machine being shown as are necessary for an understanding of the operation of the parts.

Fig. 2 is an elevation of the rear end of the bucket with the boom shown in cross-section on the line 2—2 of Fig. 1.

Fig. 3 is a side elevation of the bucket with the boom in the horizontal position.

Fig. 4 is a front elevation of the bucket as seen from the right hand side of Fig. 3, with the boom in cross-section and the forward hanger or supporting bracket on one side of the bucket also in cross-section.

Fig. 5 is a section on the line 5—5 of Fig. 4.

Fig. 6 is a plan view of the bucket showing the boom partly in plan view and partly in section.

Referring to the drawings there is shown in Fig. 1 an excavating machine 1 provided with a boom 2, the latter in the particular structure shown being made up of two I beams 3 connected together in spaced relation by plates 4, or in any other manner. The boom is pivoted at one end to the lower end of a post 5, in turn pivoted to brackets 6. The boom is movable in an upright plane about its connection with the post 5, and the latter is capable of swinging about an upright axis on the brackets 6 and is under the control of a sheave 7 movable by means of a cable 8 controlled by suitable mecha-

nism, not shown. Near the outer or free end of the boom is a bracket 9 carrying a sheave 10 about which travels a cable 11 connected at one end to one end of a link 12, the other end of which is connected to the sheave 7. The cable 11 is carried about a direction-changing sheave 13 on the post 5, and about another direction-changing sheave 14 on a fixed part of the excavator structure, and ultimately leads to a winding-drum mechanism, indicated generally at 15, and controlled by suitable mechanism not shown.

The boom 2 also carries another direction-changing sheave 16 at the outer or free end, about which sheave there extends a cable 17 carried around a sheave 18 of the post 5, and from thence about a direction-changing sheave corresponding to the sheave 14, and ultimately to the winding-drum mechanism 15. The arrangement is such that either cable 11 or 17 may be operated independently of the other, the cable 11 controlling the movements of the boom in a vertical plane, while the cable 17 controls the movements of the excavating bucket to be described. The cable 8 controls the movements of the boom and parts carrying it about a vertical axis, so that the boom may be swung to one side or the other of the excavating machine.

The parts so far described have to do with the operation of the bucket, but have nothing to do with the construction of the bucket itself, which construction will now be described with more particular reference to Figs. 2 to 6.

The bucket has a body portion 19 which may be made of sheet metal of suitable gage bent to form two side members 20 and a rear member 21. In the particular construction shown the body of the bucket is made of a single sheet of metal bent so that the junctions between the side members and the rear member are rounded, as shown at 22, but these are features of construction which, while advantageous, are not obligatory, since the body of the bucket may be made of a plurality of pieces suitably connected together. The body of the bucket is open at the front, top and bottom, with the front edges 23 of the sides of the bucket sloping forwardly from top to bottom. In referring to the parts of the bucket as top, bottom, front and rear, reference is made to the general position of the bucket as illustrated in Figs. 2 to 6, which represents approximately the position of the bucket when in the operation of skimming the surface to be excavated, or of acting upon accumulations of material to be removed.

The bucket or scoop is provided with a bottom 24 having pivot connections 25 with the lower front ends of the sides 20 of the body of the scoop, and the bottom is of sufficient length to project beyond the front or nose end of the scoop for a short distance, where it carries a number of teeth 26, such as are customarily provided with dredging scoops. The under face of the scoop has runner bars 27 extending lengthwise or in the direction of travel of the scoop, such runner bars serving to stiffen the bottom of the scoop. Extending outwardly from the rear end of the dumping bottom 24 is a latch plate 28 riveted or otherwise made fast to the bottom. Also made fast to the under face of the bottom of the scoop is a rearwardly and downwardly extending block 29.

Fast to the rear wall 21 of the body of the scoop at a point about midway of the scoop is a bracket 30 to which is pivoted a latch lever 31 by means of a bolt 32 or otherwise. The latch lever has a latch end or nose 33 in position to engage the latch plate 28 and lock the bottom 24 in the closed position. The latch plate 28 and latch end 33 of the latch lever 31 are so related that the latch plate will readily snap into locking relation to the latch end 33 to be there held until on the movement of the lever 31 the latch end 33 is moved out of the path of the plate 28, whereupon the bottom 24 will gravitate away from the body of the bucket to a distance depending upon the inclination of the bucket at the time. The block 29 is so situated in its rearward and downward projection from the rear end of the bottom 24 that its free or rear end is contiguous to and in a plane below the nose 33 of the latch lever with that portion of the block fast to the bottom 24 in advance of the nose end of the latch lever, wherefore the block 29 serves as a latch guard protecting the nose end of the lever from engagement with the surface being excavated. The latch lever 31 is provided with a series of perforations 34, through any one of which the bolt 32 may be passed, so that the latch or nose end 33 of the latch lever will be located at different distances from the pivot bolt 32, thus correspondingly varying the angle of the bottom 24 to the body of the bucket. This bottom 24 is of a size to permit it to enter the body of the bucket through the lower end of the latter, but its extent of entrance is limited by a bumper plate 35 traversing an opening 36 in the rear wall of the body of the bucket and into which opening the latch plate 28 may enter. The bumper plate 35 is held by bolts 37 extending through suitable perforations 38 in the rear wall 21, and these perforations are so arranged that the elevation of the bumper plate may be varied accordingly, thus permitting a corresponding change in the latch lever. By this means the dip of the cutting teeth 26 with respect to the bucket may be regulated to suit hardness or softness of material being excavated.

The latch lever on the side of the pivot bolt 32 remote from the nose 33 is traversed

by a pin 36ª carrying a spring 37ª between the rear wall of the back of the bucket and the latch lever, so that the nose 33 is always yieldably urged into the path of the latch plate. At a convenient point on the rear of the bucket there is secured a bracket 38ª carrying a lever 39 provided with a pin end 40 entering eyes 41 on the corresponding end of the latch lever, so that upon a rocking movement of the lever 39 the latch lever is also rocked in opposition to the spring 37 in a direction to carry the latch nose 33 out of the path of the latch plate, thus releasing the bottom 24. The lever 39 is formed at the end remote from the end 40 with an eye 42 for the attachment of a jerk line 43 carried to some convenient point on the machine or vehicle 1, so that an operator on the vehicle may cause the unlatching of the bottom 24 and the dumping of the bucket at any time desired.

The front portion of the bucket is secured rigidly to the ends of a laterally extended rigid hanger 44 having suitably spaced upstanding arms 45 connected by a yoke 46 so that the hanger, which extends laterally across the bucket, is an effectively one-piece structure with the arms 45 on opposite sides of the boom and exterior to the outside channels of the boom. Since it is only the outside channels of the boom that are utilized, it will be apparent that the boom may be made up of channel beams instead of I beams, but these are matters of constructional detail which need not be particularly referred to. Each arm 45 is provided with a series of perforations 47 for stud bolts 48 made fast to the arms by nuts 49 with the stud ends 50 entering the corresponding channels at the outer sides of the boom. The stud bolts each enter one end of a corresponding slide spacing bar 51 elongated in the direction of the length of the boom and oppositely inclined on the bottom edge, as shown at 52, the inclined surfaces meeting at about the middle of the spacing bar and there being at the greatest distance from the corresponding flange of the respective channel of the boom, such flange being the bottom flange when the boom is in a substantially horizontal position. Fast to what constitutes the upper edge of the spacing bar is a shoe 53 which may be about as long as the spacing bar and is secured thereto by screws 54 or otherwise. The shoe 53 is made of wood or some other anti-friction material, which may or may not be of a fibrous nature like wood.

Between the slanting or angle edges 52 of the spacing or spacer bar 51 and the lower flange member of the respective channel of the boom are slide members or shoes 55 also of wood or other anti-friction material, and these slide members 55 are wedge-shaped with their slanting edges engaging the slanting edges 52 of the spacer bar. Each wedge 55 has an angle plate 56 made fast thereto by screws 57 or otherwise, and one web of each angle plate lies against the outer face of the corresponding portion of the spacer bar 51. Those flanges of the angle plates which bear against the spacer bar have each a longitudinal slot 58 traversed by bolts 59 carried by the spacer bar and provided with nuts 60 by which the angle plates are clamped fast to the spacer bar and by which they may be loosened therefrom. The flanges of the channels of the boom in which the slides move are provided with replaceable tracks 61 which may be conveniently made of flat bars of metal, so in the case of wear such wear comes upon the tracks and not upon the boom. When wear does occur it is readily taken up by adjusting the wedges 55 so that the slides may always move snugly along the boom, and yet with sufficient freedom for the purposes of the invention.

The rear end of the bucket is supported by rigid hangers 62 riveted or otherwise made rigidly fast to the rear of the bucket and rising therefrom and connected by bolts 63 or otherwise to what constitutes the rear ends of the spacer bars 51. Each hanger 62 has but one bolt connection 63 to the spacer bar, so that the hanger may pivot about the bolt to permit the raising and lowering of the front end of the bucket, which raising and lowering is provided for by the series of holes or passages 47 in the upstanding arms 45 on the front hanger. The adjustment thus provided for the front of the bucket is advantageous in providing for deep or shallow cutting, while the adjustment of the bottom of the bucket provides for the inclination of the teeth whether the bucket itself be adjusted for deep or shallow cutting.

In the operation of the bucket the latter is assumed to be at that end of the boom toward the excavating machine, and the outer end of the boom is lowered until the teeth of the bucket are in entering relation to the surface to be excavated. By the application of power to the cable 17 the bucket is drawn along the boom toward the outer end of the latter with the cutting teeth 26 entering the ground and loosening the latter, so that the loosened earth moves into the bucket as the latter is in turn moved along the surface of the ground. When the bucket is full, at which time it has been drawn toward the front end of the boom, the latter is lifted by the cable 11 until the bucket is so inclined that its front end is lifted and the rear end is at a lower level, thus retaining the gathered earth in the bucket. By the action of the cable 8 the boom is swung about its upright axis of movement to one side or the other until the bucket is located over the

point where it is desired to release the dirt contained in it. Then the jerk line 43 is manipulated, thus moving the latch lever in a direction to carry the nose 33 out of engagement with the latch plate 28 and the weight of the bottom 24, as well as the weight of the dirt contained in the bucket, causes the bottom 24 to swing away from the bucket, thus releasing the excavated earth, and the latter falls into a suitable receptacle or at a suitable place where it is desired to deposit the earth. In this position of the parts the boom has an upward inclination, and then by a movement of the cable 11 the bottom 24 may be caused to swing toward the closed position to be caught in the closed position by the latch end 33 of the lever 31, whereupon by slackening the cable 17 the bucket will gravitate toward the lower or pivoted end of the boom ready to be again drawn lengthwise of the boom when in engagement with the surface to be excavated.

The latch guard 29 is provided to prevent the surface over which the bucket is drawn from engaging the nose end 33 of the latch lever, and by frictional action move the latch lever to the released position.

The shoes of wood or other suitable material have sufficient anti-friction characteristics to permit a relatively snug fit without binding, so that the weight of the bucket is ample to cause it to travel toward the lower end of the boom, when the latter is inclined, solely by the action of gravity. At the same time the fit of the shoes is sufficiently snug to prevent any undue accumulations of sand or clay or other material liable to cut the sliding parts, so that such accumulations are in a large measure wiped off. However, there is some wear, but this wear is relatively slow and by occasionally taking it up by adjustments of the wedges 55 the slides may be maintained in good working condition. Ultimately, however, the wooden shoes become so worn that they must be replaced, but this is a simple and inexpensive operation, since the shoe 53 is removed from the spacer bar on removal of the screws 54, and the wedges 55 are removed from the spacer bar by removing the nuts 60, and then new shoes are readily substituted. Ultimately the tracks or runways 61 become sufficiently worn to warrant their renewal, and this may be done inexpensively, since the boom itself is not at all subjected to wear.

What is claimed is:—

1. An excavating bucket provided with a dumping bottom hinged to the body of the bucket at the front end thereof and provided with cutting teeth at its front end, said dumping bottom and bucket body having coacting latch means for holding the bottom in the closed position, said bottom being of a width and length with respect to the body of the bucket to enter the latter, and the latch means on the bucket being adjustable to hold the bottom in different positions of inclination with reference to the body of the bucket to correspondingly vary the inclination of the teeth with respect to the line of travel of the bucket in excavating.

2. An excavating bucket provided with a dumping bottom having earth-entering means and hinged to the body of the bucket, said bottom and bucket body having means for holding the dumping bottom in the closed position in different degrees of pitch with relation to the bucket to correspondingly vary the inclination of the earth-entering means with respect to the line of travel of the bucket in excavating.

3. An excavating bucket provided with a dumping bottom hinged near the front end to the bucket and beyond the front end of the bucket provided with cutting teeth, a portion of the dumping bottom underriding the body of the bucket being of less length and width than the body of the bucket to there enter the latter, and coacting means on the bucket body and dumping bottom for holding the latter in different relations of pitch with respect to the body of the bucket to correspondingly vary the inclination of the teeth with respect to the line of travel of the bucket in excavating.

4. An excavating bucket provided with a dumping bottom hinged near the front end to the front of the bucket and projecting therebeyond and provided at the front edge with cutting teeth, the rear end of the dumping bottom and the rear end of the bucket having coacting latch means with the latch means on the bucket adjustable toward and from the bottom of the bucket to correspondingly tilt the dumping bottom when in the closed position to vary the inclination of the cutting teeth with respect to the line of travel of the bucket in excavating.

5. An excavating bucket provided with a dumping bottom having an earth-entering end and said bottom being movable into and out of the bucket body, and means for adjusting the bottom in the closed position into different angles of inclination with respect to the body of the bucket to correspondingly vary the entering angle of the earth-entering end of the bottom of the bucket.

6. An excavating bucket having a dumping bottom hinged to the front end of the bucket near the front end of the dumping bottom and with the front end of the dumping bottom provided with earth entering means, a latch member on the rear end of the dumping bottom, and another latch member on the rear end of the body of the bucket adjustable in the direction of the height of the bucket to vary the

angle of inclination of the bottom of the bucket in the closed position with respect to the body of the bucket.

7. An excavating bucket having a dumping bottom hinged to the front end of the bucket near the front end of the dumping bottom and with the front end of the dumping bottom provided with cutting teeth, a latch member on the rear end of the dumping bottom, and another latch member on the rear end of the body of the bucket adjustable in the direction of the height of the bucket to vary the angle of inclination of the bottom of the bucket in the closed position with respect to the body of the bucket, the rear end of the bucket being provided with a notch or recess for the entry of the latch means on the dumping bottom and the latter being of a size to enter the bottom of the bucket.

8. An excavating bucket having a dumping bottom hinged to the front end of the bucket near the front end of the dumping bottom and with the front end of the dumping bottom provided with cutting teeth, a latch member on the rear end of the dumping bottom, and another latch member on the rear end of the body of the bucket adjustable in the direction of the height of the bucket to vary the angle of inclination of the bottom of the bucket in the closed position with respect to the body of the bucket, the rear end of the bucket being provided with a notch or recess for the entry of the latch means on the dumping bottom and the latter being of a size to enter the bottom of the bucket, and the body of the bucket having an adjustable bumper plate associated with the notch to limit the entering movement of the bottom of the bucket into the body of the bucket.

9. An excavating bucket, comprising a body member with a dumping bottom, a latch member on and projecting outwardly from the rear end of the dumping bottom, a vertically-disposed latch member at the rear of the body member and provided with a nose for engaging the first-named latch member, said nose end projecting below the dumping bottom, and a latch guard on the under face of the dumping bottom projecting in rear thereof contiguous to and in a plane below and in advance of the nose of the latch member on the body of the bucket, thereby to protect said nose end from engagement with the surface being excavated.

10. In an excavating machine, a boom having longitudinally extended runways thereon, and an excavating bucket or scoop carried by the boom for travel lengthwise thereof, said bucket being provided with slides adapted to the runways of the boom, and suspending devices carried by the slides and spaced apart on the latter lengthwise of the boom, one suspending device being pivoted to the slides and the other suspending device being connected to the slides for tilting the bucket with respect to its line of travel along the boom, said bucket being also provided with a dumping bottom hinged to the body of the bucket and provided with cutting teeth, and said bucket and bottom having coacting latch means adjustable with respect to the bucket for holding the dumping bottom in different degrees of inclination to the body of the bucket.

11. In an excavating machine, a boom, and an excavating bucket carried by and movable lengthwise of the boom, said bucket having means for varying its inclination with respect to the direction of travel along the boom and also being provided with a dumping bottom having earth entering means thereon with the dumping bottom and bucket body provided with means for holding the dumping bottom in the closed position in different degrees of inclination with respect to the body of the bucket.

12. In an excavating machine, an excavating bucket provided with a dumping bottom hinged thereto and having excavating means at the front end, said bucket and dumping bottom having coacting latch means for holding the bottom in the closed position, the latch means on the bucket comprising a latch lever adjustable in the height of the bucket to vary the inclination of the dumping bottom to the body of the bucket.

13. In an excavating machine, an excavating bucket provided with a dumping bottom hinged thereto and having excavating teeth at the front end, said bucket and dumping bottom having coacting latch means for holding the bottom in the closed position, the latch means on the bucket comprising a latch lever adjustable in the height of the bucket to vary the inclination of the dumping bottom to the body of the bucket, and the latch lever having means for its actuation to the unlatched position irrespective of the adjustment of the latch lever up and down of the bucket body.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

ROBERT M. DOWNIE.

Witnesses:
CHARLES THEO. SMITH,
R. G. FORBES.