

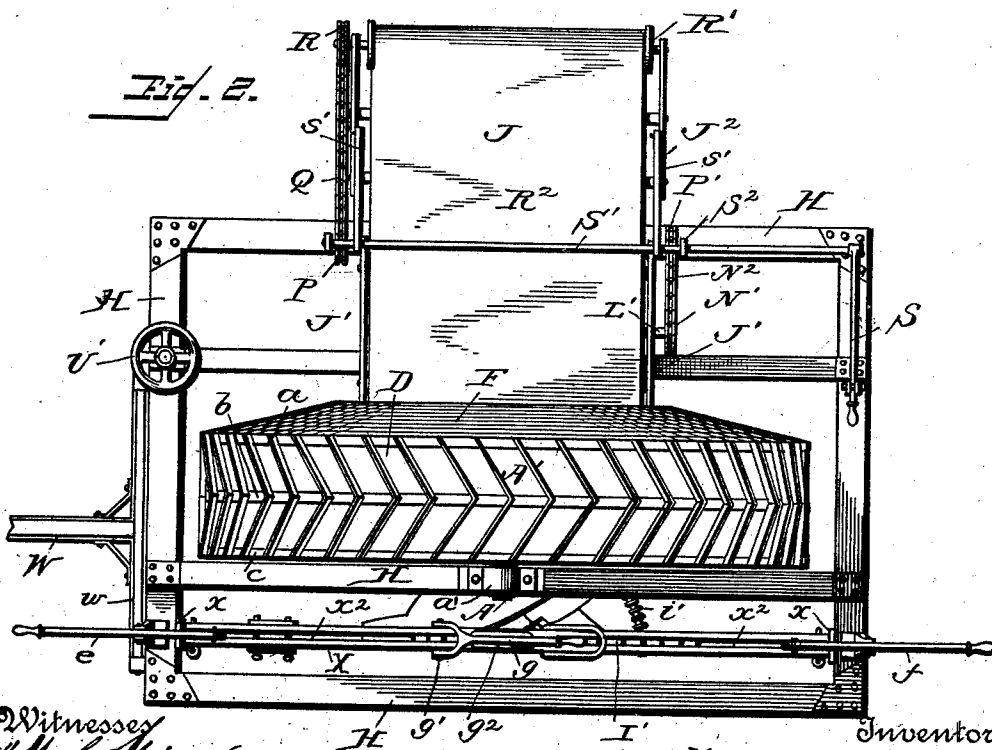
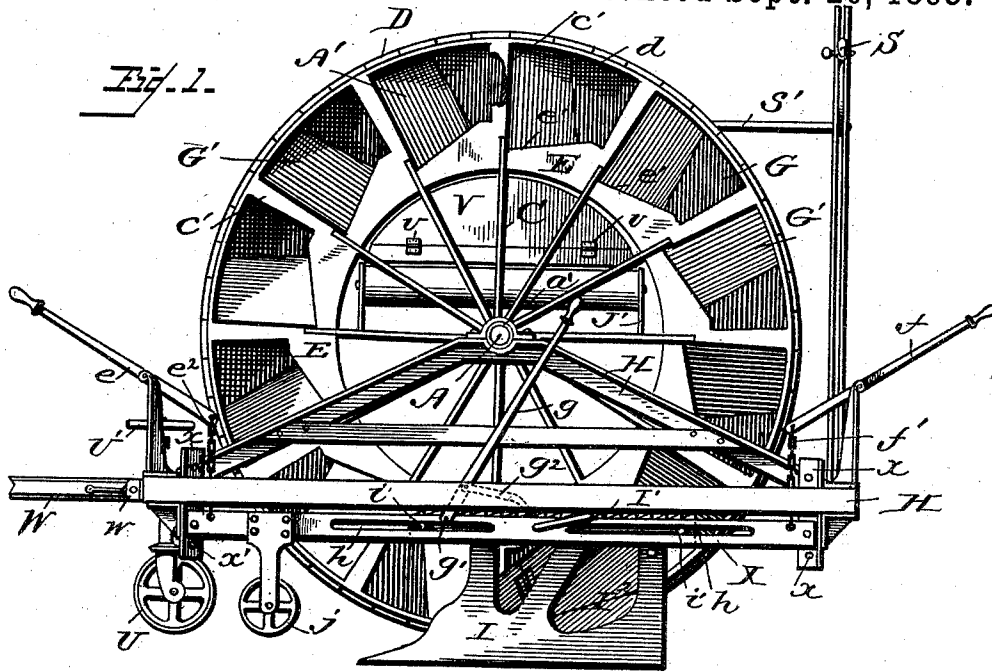
(No Model.)

2 Sheets—Sheet 1.

W. M. GROSS.
EXCAVATING MACHINE.

No. 505,460.

Patented Sept. 26, 1893.



Witnesses
Alfred Spinden
Albert Spinden

I Inventor
William Milton Gross
By Attorney Matthew Lowrey

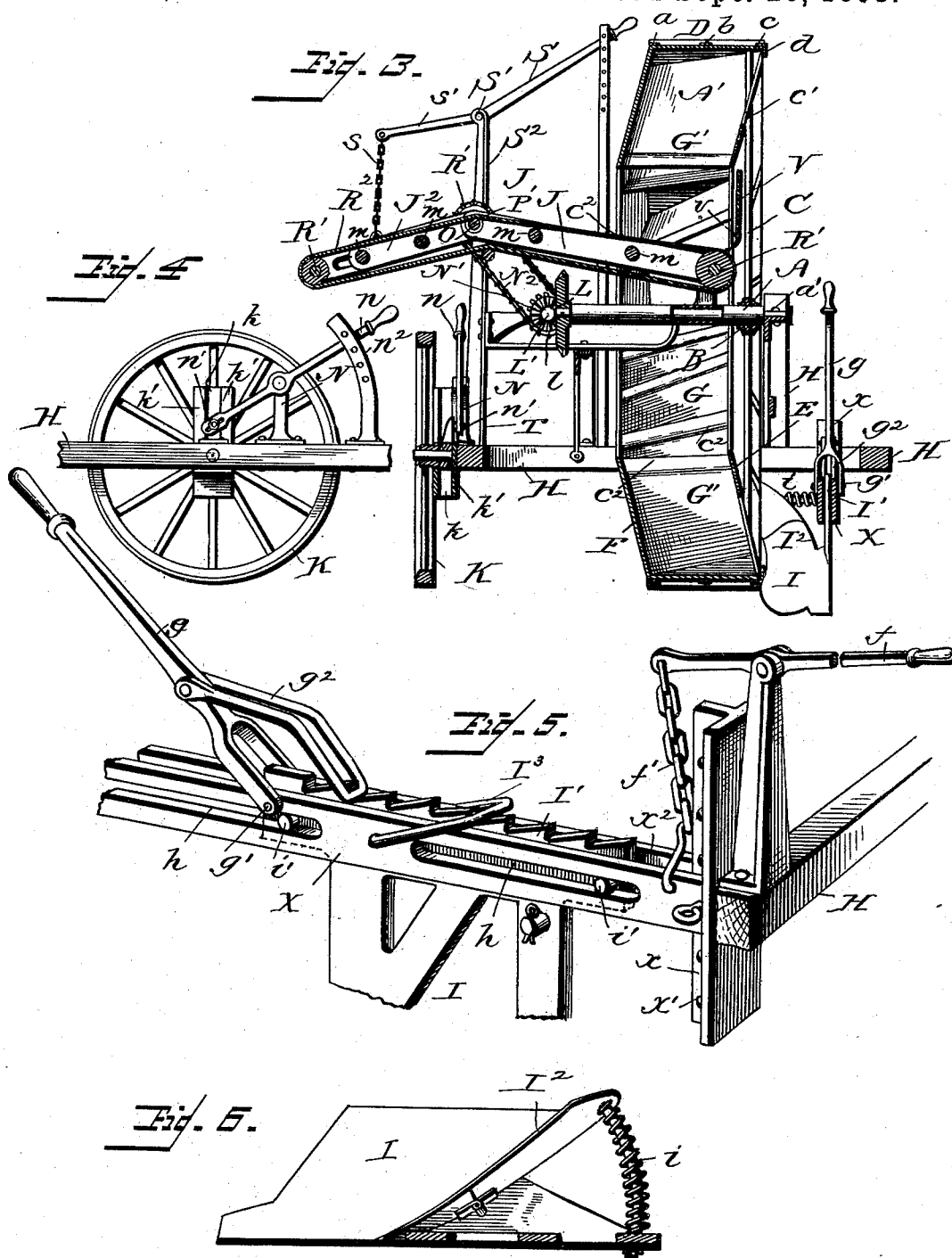
(No Model.)

2 Sheets—Sheet 2.

W. M. GROSS.
EXCAVATING MACHINE.

No. 505,460.

Patented Sept. 26, 1893.



Witnesses
~~Mr. J. H. Kinder.~~
 Albert Kinder.

Inventor
William Milton Gross
By Attorney *Wm. L. Lowrey*

UNITED STATES PATENT OFFICE.

WILLIAM MILTON GROSS, OF SPOKANE, WASHINGTON, ASSIGNOR OF ONE-HALF TO GEORGE L. WALKER, OF SAME PLACE.

EXCAVATING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 505,460, dated September 26, 1893.

Application filed September 3, 1892. Serial No. 445,022. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM MILTON GROSS, a subject of the Queen of Great Britain, residing at Spokane, in the county of Spokane and State of Washington, have invented certain new and useful Improvements in Excavators, of which the following is a specification.

The object of my invention is to provide a simple, efficient and adjustable excavator for elevating earth, sand and like material in street and road grading, excavating, ditching and building dikes and embankments, grading of railroads and work of similar character.

My invention relates to the class of wheel and carrier excavators in which the material excavated by a plow or other suitable device is deposited thereby on a wheel or other device which elevates and delivers the material onto a carrier by which it is finally discharged on the dump or embankment, or into the cart as the case may be.

My invention consists in the particular means whereby the material is automatically excavated, raised and discharged, in means whereby the excavator may be maintained at any desirable angle to a hillside or embankment as the case may require; in the vertical and horizontal adjustment of the plow or excavator proper; in the peculiar construction of the buckets in the excavator wheel; in the adjustable construction and location of the carrier in respect to the wheel; in the automatic gear connection between the excavator wheel and the carrier operating mechanism; in the yielding mold board of the excavator plow; in the location of plow and carrier on opposite sides of the bucket wheel offering peculiar facilities for perpendicular excavation and in other details hereinafter specified.

In the accompanying drawings which illustrate my invention: Figure 1 is a side elevation; and Fig. 2 is a plan view of the excavator. Fig. 3 is a view in cross section of the same showing the gear which actuates the carrier; and Figs. 4, 5, and 6 are views of various details of my invention.

A' is the main wheel mounted on the axle A turning in its bearing a' in the supporting frame H.

K is the supporting wheel located at the

delivery side of the frame and having its axle secured to a frame k sliding vertically in guides k' k' on the frame H (see Fig. 4).

n is a hand lever pivoted to a bracket N on the frame H and having one arm connected to the sliding frame k at n' and the other arm engaging with the rack n² by which it is held securely in place. By raising or depressing the lever n it is evident that the discharging end of the supporting frame H is raised or lowered.

U is a swiveled caster wheel placed under the forward part of the frame H to hold the frame level and also to allow the whole machine to be turned around on its two main wheels K and A'. U' is a hand wheel by which it is controlled.

X is a plow beam parallel with the land or receiving side of the excavator frame H, and moves vertically in guides x x secured to the frame H at each extremity of the plow beam. The plow beam X is raised and lowered at either end by means of the hand levers e f pivoted to suitable standards on the frame H, and connected to the plow beam by the links e² f'.

Apertures x' in the guides x coincide with suitable apertures in the plow beam ends through which may be passed a pin to fasten the plow beam in any suitable position.

I is a plow having a rack frame I' moving horizontally in a vertical longitudinal slot x² in the plow beam X where it is held by means of the studs i' i' moving in the longitudinal slots h h in the sides of the plow beam.

A hand lever g pivoted at g' to the plow beam X carries a freely swinging stirrup g² which engages with the teeth of the rack frame I' projecting above the slot x² in the plow beam; and serves to move the plow horizontally into such position in respect to the bucket wheel A' that the earth discharged from the plow shall always be delivered within the rim of the wheel.

I³ is a loop loosely pivoted to the plow beam X to hold the plow in place when moved along the beam.

The mold board I² of the plow is jointed or hinged and held in its position by the coiled spring i interposed between it and the plow frame, so that a rock or other substance wedg-

ing between the mold board and the wheel A' causes the mold board to yield, expelling the obstacle whereupon the spring *i* returns it to its normal position.

- 5 *j* is a gage wheel secured under the plow beam H.

The main wheel A' has a broad rim or tread D connected on the land side by the spokes C to the hub B; a ledge or rim *d* projects somewhat beyond the spokes on the land side and it is turned up and in forming a narrow flange, while the broad part of the tread forming the bottom of the buckets G extends toward the delivery side of the frame. The tread of the wheel is encircled by metal tires *a b c* which serve to strengthen it. The backs of the buckets G are formed by a broad ring F secured to the edge of the tread D on the delivery side of the wheel and dished away from the center of the wheel for a purpose hereinafter described. Diagonal partitions G' forming the sides of the buckets extend from the ring F diagonally across the interior of the tread D where they are attached to the spokes C over which they are flanged at *c'* to form a cutting edge on the land side of the wheel A'. The inner edge of the partitions G' extending toward the axle of the wheel A' are also flanged or turned up at *c''* at an angle that will hold the earth from falling off the buckets during the forward motion of the wheel until the buckets reach a point vertically above the axle A, when they empty by gravity.

E is a scalloped ring located on the land side of the wheel at a suitable distance above the rim *d* to allow the material excavated by the plow I to fall between it and the rim *d* into the buckets; the ring E is dished inwardly and secured to the spokes C and the edge of the partitions G' thus forming the mouth of the buckets. The scallops on the ring E are formed by cutting out a triangular piece at *e'* from its outer edge extending across the mouth of the bucket, so that when the latter comes opposite the plow it will present an enlarged aperture to the material delivered from the mold board.

J is the carrier consisting of the fixed carrier frame J' extending within the circumference of the bucket wheel A' to its land side above the axle A and below the interior openings of the buckets G when vertically above the axle; it is secured above the supporting wheel K by the braces T attached to the main supporting frame H.

J² is a jointed extension of the carrier frame projecting over the wheel K.

R' R' are the carrier rollers mounted in the frame J J', and *m m* are small sprocket wheels or rollers on shafts also mounted in the frame J J' at proper intervals between the rollers R' R' to assist in carrying the belt or draper R².

To convey motion to the rollers R' and belt R² the bevel gear L is mounted on the axle A of the bucket wheel. A shaft L' held in bearings on the braces T carries at its inner end a bevel gear *l* which meshes with the gear L

on the axle A and at its outer end a sprocket wheel N'; an endless chain N² connects the sprocket wheel N' with a sprocket wheel P' mounted on the carrier shaft O turning in bearings in the fixed carrier frame J. An endless chain Q passing over a sprocket wheel P at the other end of the shaft O conveys motion to the sprocket wheels R R mounted on the rollers R' R'.

To raise and lower the hinged carrier frame J² it is connected by links *s* to arms *s'* projecting from a shaft S' turning in fixed bearings in the standards S² on the fixed frame J; a hand lever S attached to the shaft S' serves to turn the shaft to raise and lower the hinged carrier frame J².

V is a shield hinged at its lower end *v v* to the receiving end of the carrier frame J within the bucket wheel A' forming an extension over the carrier belt of the interior edge of the ring E on the mouth of the buckets G when the latter are inverted above the axle and prevents the falling of a rock or stone from off the end of the carrier into the spokes of the wheel and also serves as a chute together with the outwardly dished back F to direct the material from the buckets onto the carrier. The hinges *v v* allow it to swing with the motion of the carrier permitting small obstacles to pass.

W is the tongue or pole attached to the forward end of the frame H.

The operation of my invention is as follows: The angle of the bucket wheel A' to the embankment being adjusted by raising or lowering the supporting wheel K in respect to the frame H, the plow I is raised or lowered as required by the levers *e f*, and advanced into proper position with respect to the buckets G by means of its rack frame I, hand lever *g* and stirrup *g''*. As the excavator advances the material dug up by the plow is delivered into the buckets G lifted by the rotation of the bucket wheel A', dumped on to the endless belt R² to which motion is communicated by the axle gear, and finally discharged into a cart or on the earth at the side of the excavator over the hinged portion J² of the carrier which is raised or lowered according to the height of the receptacle for the material. At the end of the trench or cut the excavator is turned on its bucket wheel as a pivot by means of the swivel caster wheel U. Obstacles encountered pass between the bucket wheel A' and the yielding moldboard I² which at once returns to its normal position.

It is evident that by means of the horizontal adjustment of the plow in a straight line parallel with the side of the bucket wheel and with the surface being excavated, I am enabled to adjust it in one movement to deliver into the lowest bucket without varying the depth of the cut or lifting the entire weight of the excavator on the plow as is the case where the latter is advanced by a pivotal movement in the line of an arc, and my

invention presents the additional advantage, that whatever adjustment may be given to the plow, the latter is held rigidly and firmly to its work by its attachments through the rack frame and plow beam to the main frame without the possibility of yielding either horizontally or vertically.

It is also evident that in view of the peculiar construction of the buckets forming a chute or delivery over and onto the carrier belt which lies directly under them, the shield V may be dispensed with, without interfering with the operation of the buckets and carrier. I thus provide an excavator turning in a very small space, adjustable to any angle of the surface worked over, having an adjustable relation between the excavator plow and the bucket wheel, and adjustable carrier discharge, and further capable of excavating the material close up to an embankment or obstruction and of making therein a nearly perpendicular cutting, and thus effecting a great economy of time and labor.

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

1. In an excavating machine, the combination with the supporting frame, of a bucket wheel having a construction adapted to receive, elevate and discharge the material therein, an unyielding excavator support in the frame, an excavator held rigidly therein, and means actuated by a single lever for adjusting the excavator horizontally in a straight line, substantially as described.

2. In an excavating machine, the combination with the supporting frame, of a bucket wheel having a construction adapted to receive, elevate and discharge the material deposited therein, an unyielding adjustable excavator support in the frame, an excavator held rigidly therein, means for adjusting the excavator support vertically in respect to the rotating device and frame, and means actuated by a single lever for adjusting the excavator horizontally in a straight line, substantially as described.

3. In an excavating machine, the combination with the supporting frame, of a rotating device having a construction adapted to receive, elevate and discharge the material deposited therein, a plow beam supported in said frame and having a vertical longitudinal slot and lateral longitudinal slots, a plow having a rack frame moving horizontally in said vertical slot, studs on the rack frame sliding in said lateral slots, a lever pivoted to said plow beam and having a stirrup engaging with said plow rack frame, and a gage wheel on said plow beam, substantially as described.

4. In an excavating machine, the combination with the supporting frame, of a rotating device having a construction adapted to receive, elevate and discharge the material deposited therein, a plow beam supported in said frame and having the vertical and lateral longitudinal slots, as described, vertical

guides secured to the supporting frame at each extremity of and retaining the plow beam, means for fastening the plow beam to the guides, a plow having a rack frame moving horizontally in said vertical slot, studs on the rack frame sliding in said lateral slots, a lever pivoted to said plow beam and having a stirrup engaging with said rack frame, levers pivoted to standards secured to the supporting frame and connected to said plow beam ends as described, and a gage wheel on said plow beam, substantially as described.

5. In an excavating machine, the combination with the supporting frame, of a bucket wheel adapted to receive, elevate and discharge the material deposited therein, an unyielding adjustable excavator support in the frame, an excavator held rigidly therein, means for adjusting the excavator support vertically in respect to the rotating device and frame, means actuated by a single lever for adjusting the excavator horizontally in a straight line, and a supporting wheel vertically adjustable in respect to the supporting frame, substantially as described.

6. In an excavating machine, the combination with the supporting frame, of a rotating device adapted to receive, elevate and discharge the material deposited therein, a plow beam supported in said frame and vertically adjustable therein, a plow supported in said plow beam and horizontally adjustable therein, a gage wheel on said plow beam, a vertical sliding frame secured to said supporting frame, a wheel having its axle sliding in said frame, a lever pivoted to the supporting frame and suitably connected to said wheel axle for raising and lowering the same, and a locking device on said supporting frame for locking the lever in position as described.

7. In an excavating machine, the combination with the supporting frame, of a rotating device having a construction adapted to receive, elevate and discharge the material deposited therein, and a plow supported by the frame and having a hinged mold board and yielding spring connection between the mold board and the plow frame, as described.

8. In an excavating machine, the combination with the supporting frame H, of the bucket wheel A' having a construction adapted to receive, elevate and discharge the material deposited therein, the plow beam X supported in said frame and sliding vertically in the guides x secured to the supporting frame at each extremity of the plow beam, the standards secured to the supporting frame H, the levers $f e$ pivoted to said standards and the links $f' e'$ connected to said plow beam and levers whereby the plow beam can be elevated and lowered the locking device consisting of apertures $x x'$ in said plow beam and guides and a pin to secure them together, the plow I and the gage wheel j both secured to said plow beam, substantially as described.

9. In an excavating machine, the combination with the supporting frame, of an exca-

vator supported therein, and a bucket wheel having a broad rim or tread D secured near the receiving edge to the spokes of the wheel and forming the bottom of the buckets, the outwardly dished ring F on its delivery side forming the back of the buckets, the interior diagonal partitions G connecting the ring F with the spokes having the cutting and retaining flanges as described and forming the sides of the buckets, and the inwardly dished scalloped ring E on the receiving side forming the mouth of the buckets, substantially as described.

10. In an excavating machine, the combination with the supporting frame, of an excavator, a bucket wheel having the rim D, the outwardly dished ring F, the interior diagonal partitions G and the inwardly dished scalloped ring E, and a carrier supported by the frame and extending within the bucket wheel and adapted to receive and discharge the material delivered from the buckets, substantially as described.

11. In an excavating machine, the combination with the supporting frame, of an excavator, a bucket wheel having the rim D, the outwardly dished ring F, the interior diagonal partitions G and the inwardly dished scalloped ring E, a carrier supported by the frame, extending within the bucket wheel and adapted to receive and discharge the material delivered from the buckets, and the shield V secured to the carrier frame and adapted to form with the ring E of the bucket wheel a delivery chute onto the carrier, as described.

12. In an excavating machine, the combination with the supporting frame, of an excavator, a bucket wheel having the rim D, the outwardly dished ring F, the interior diagonal partitions G and the inwardly dished scalloped ring E, a carrier frame extending within the circumference of the bucket wheel and having an endless carrier running upon rollers mounted in the frame a gear wheel on the bucket wheel axle, and suitable gear connection between it and the carrier rollers, substantially as described.

13. In an excavating machine, the combination with the supporting frame, of an excavator, a bucket wheel having the rim D, the outwardly dished ring F, the interior diagonal partitions G and the inwardly dished scalloped ring E, a carrier frame having a fixed receiving end extending within the circum-

ference of the bucket wheel and a hinged outer delivery end, an endless carrier mounted upon rollers in said carrier frame, suitable gearing between the bucket wheel axle and the carrier rollers, and suitable means for raising and lowering the delivery end of the carrier, as described.

14. In an excavating machine, the combination with the supporting frame, of an excavator, a bucket wheel having the axle A and the buckets formed by the rim D, the outwardly dished ring F, the interior diagonal partitions G and the inwardly dished scalloped ring E, the carrier J having the fixed frame extending within the circumference of the bucket wheel, and the hinged delivery frame, the endless carrier traveling over the rollers in said fixed and hinged frames, the sprocket wheel Q on the hinged frame roller, the shaft O mounted in the outer extremity of said fixed frame, the sprocket wheel P on said shaft, the chain connection between the sprocket wheels on the shaft and rollers, the bevel gear L on said bucket wheel axle, its pinion shaft and sprocket wheel N and the chain connection with the carrier shaft O, the lever S pivoted to the fixed carrier frame and suitably connected to its hinged delivery end, and the shield V secured to the carrier frame, as described.

15. In an excavating machine, the combination with the supporting frame, of the vertically adjustable supporting wheel, the swivel wheel secured to the forward end of said frame, the plow having the hinged mold board and spring as described, and adjustable vertically and horizontally in said frame, the bucket wheel mounted in said frame and having the rim, partitions and rings as described, the endless carrier having the fixed and hinged portions extending within the circumference of said bucket wheel as described, the gear for operating the carrier directly from the axle, the lever connection for operating the hinged end of the carrier, and the carrier shield, all constructed and operating, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

WILLIAM MILTON GROSS.

Witnesses:

J. N. RUSSELL,
G. W. PEDDYCORD.