C. E. STAHL.

EXCAVATING MACHINE.

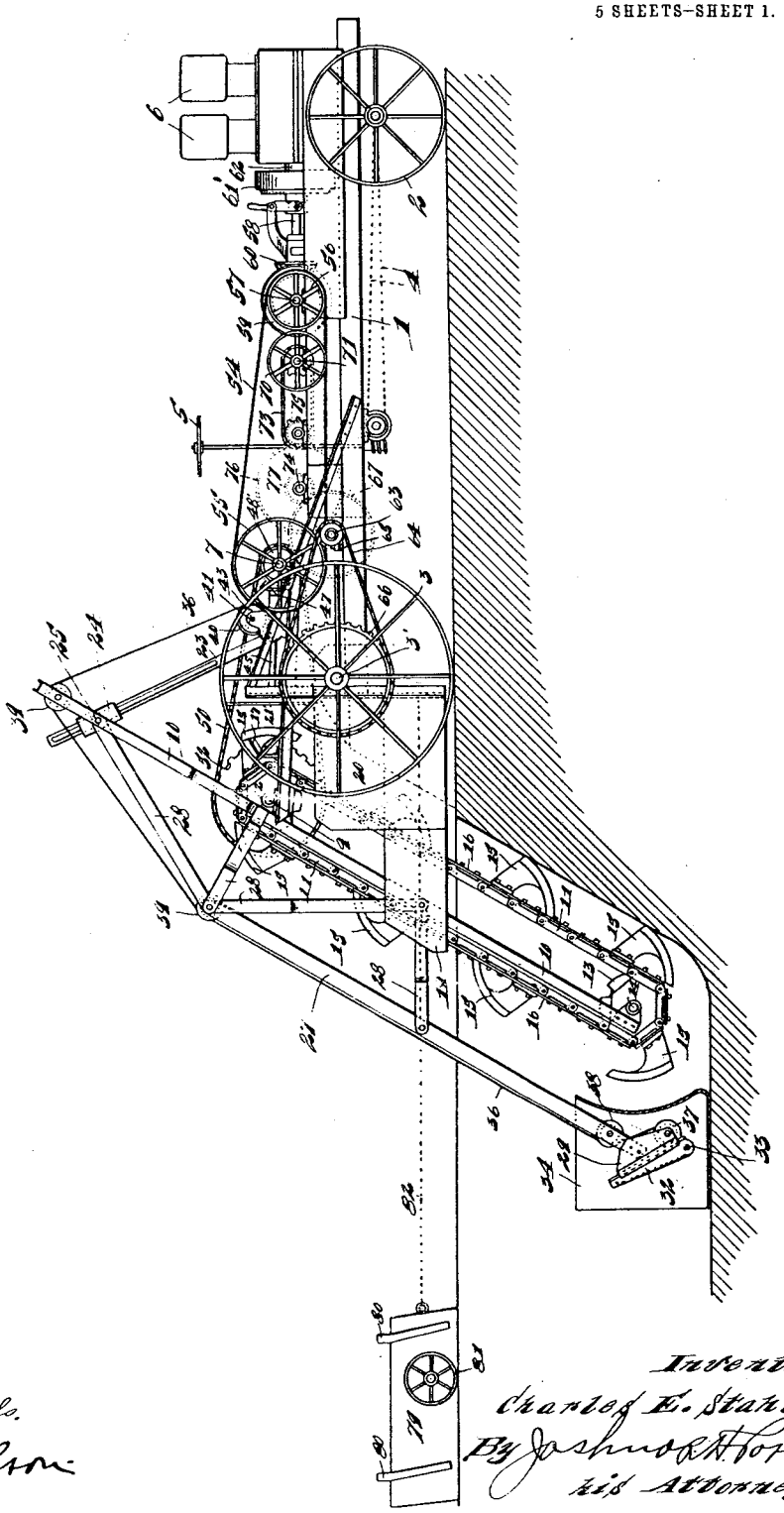
APPLICATION FILED MAY 19, 1913.

1,108,268.

Patented Aug. 25, 1914.

5 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
C. E. Vessels.
A. A. Olson

Inventor:
Charles E. Stahl,
By Joshua R. H. Potts
His Attorney.

C. E. STAHL.

EXCAVATING MACHINE.

APPLICATION FILED MAY 19, 1913.

1,108,268.

Patented Aug. 25, 1914.

5 SHEETS—SHEET 2.

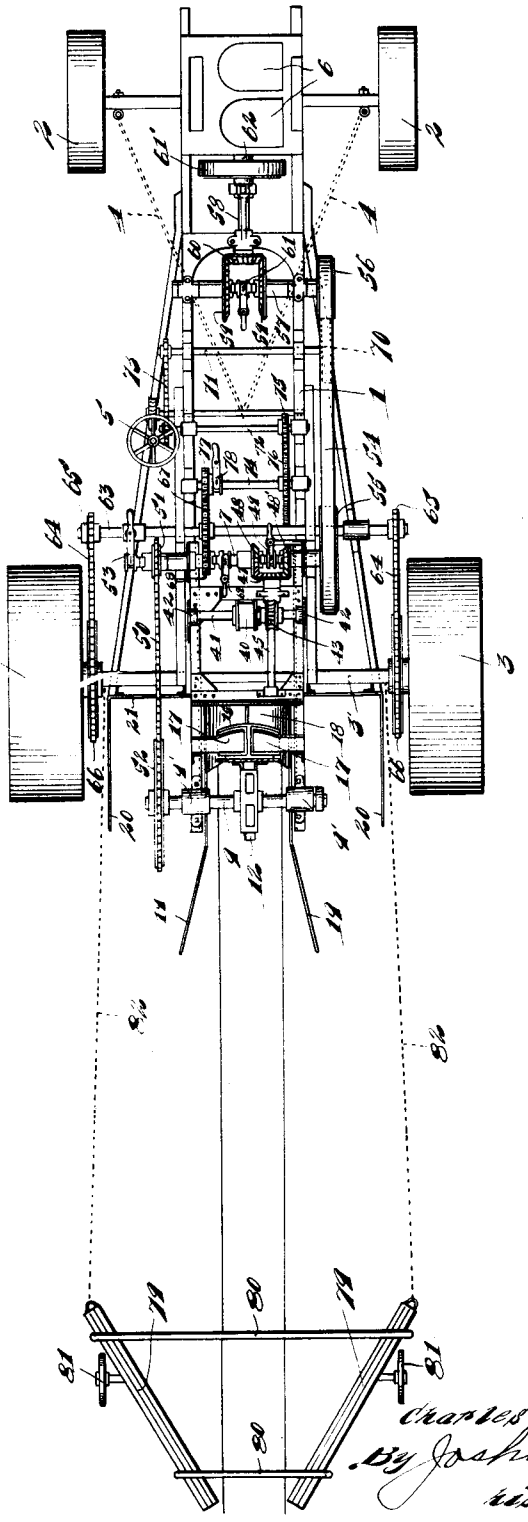


Fig. 2.

Witnesses:
C. E. Wessels.
A. A. Olson.

Inventor:
Charles E. Stahl
By Joshua N. Horne
his Attorney.

C. E. STAHL.

EXCAVATING MACHINE.

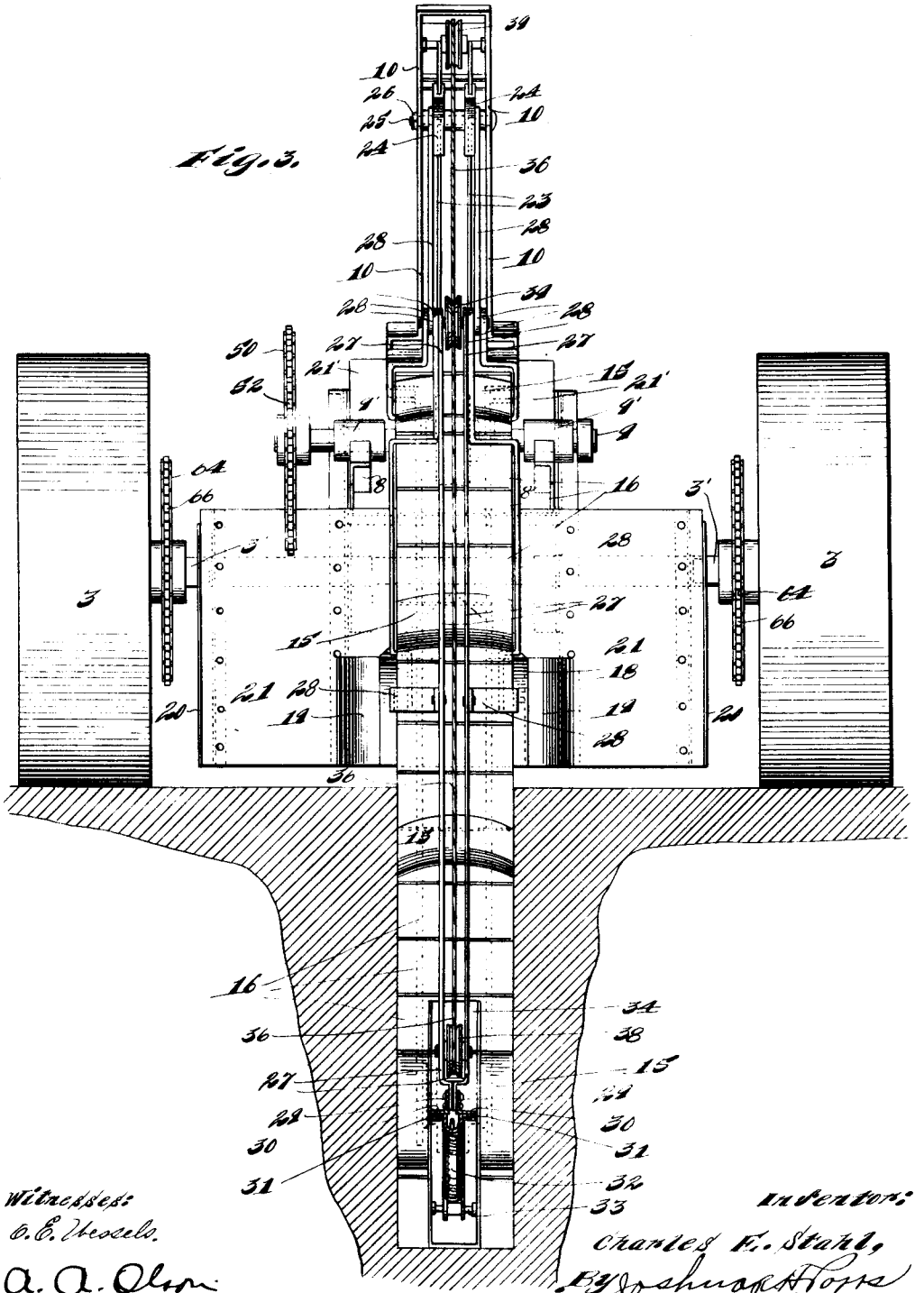
APPLICATION FILED MAY 19, 1913

1,108,268.

Patented Aug. 25, 1914.

5 SHEETS-SHEET 3.

Fig. 3.



Witnesses:
C. E. Wessels.
A. A. Olson.

Inventor:
Charles E. Stahl,
By Joshua R. H. Potts
his Attorney.

C. E. STAHL.

EXCAVATING MACHINE.

APPLICATION FILED MAY 19, 1913.

1,108,268.

Patented Aug. 25, 1914.

5 SHEETS—SHEET 4.

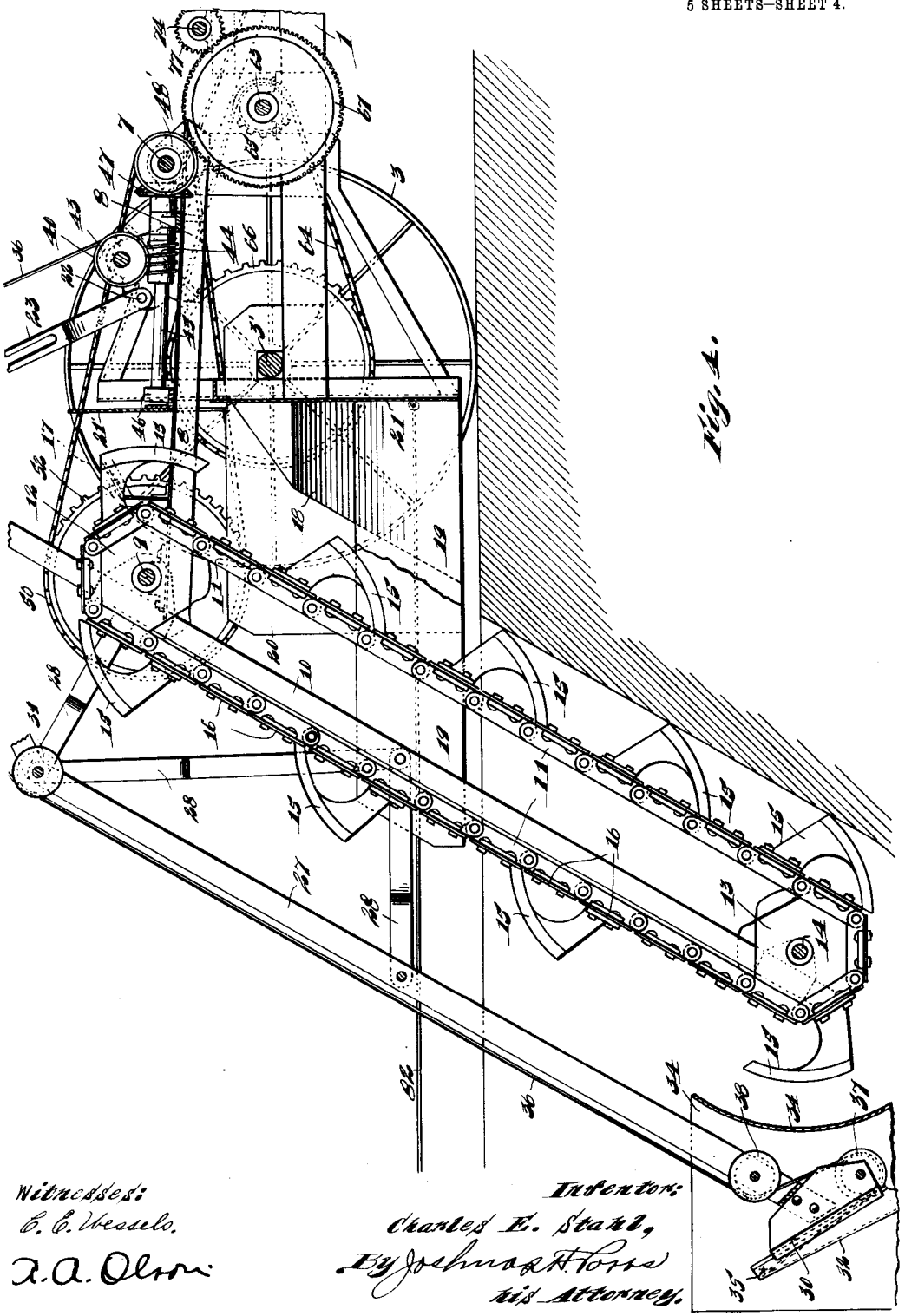


Fig. 4.

Witnesses:
C. C. Wessels.
A. A. Olson

Inventor:
Charles E. Stahl,
By Joshua R. H. Potts
his Attorney.

C. E. STAHL.

EXCAVATING MACHINE.

APPLICATION FILED MAY 19, 1913.

1,108,268.

Patented Aug. 25, 1914.

5 SHEETS—SHEET 5.

Fig. 5.

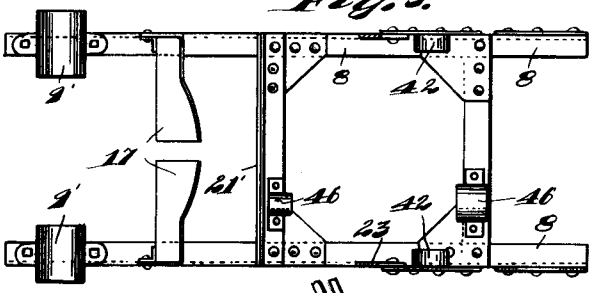


Fig. 6.

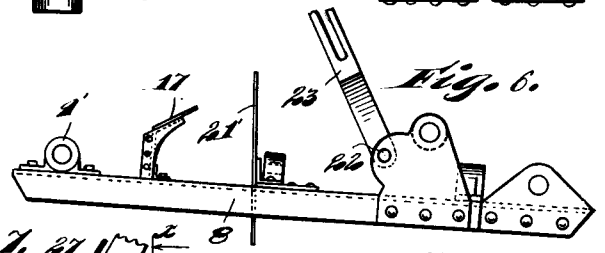


Fig. 7.

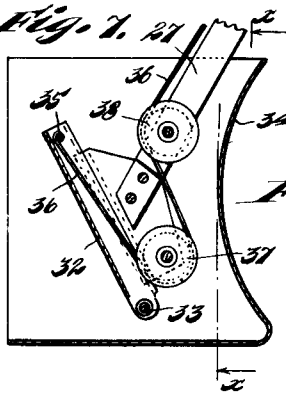


Fig. 8.

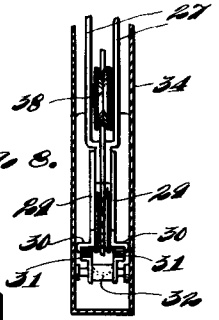
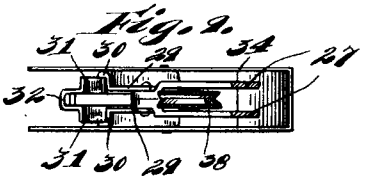


Fig. 9.



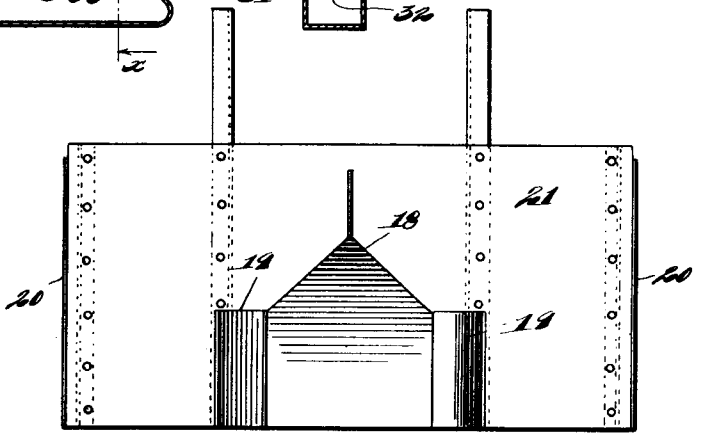


Fig. 10.

Witnesses:

C. E. Wessels.

A. A. Olson.

Inventor:

Charles E. Stahl.

By Joshua R. H. Potts

his Attorney.

UNITED STATES PATENT OFFICE.

CHARLES E. STAHL, OF HARTFORD CITY, INDIANA, ASSIGNOR TO JACOB B. STAHL, OF HARTFORD CITY, INDIANA.

EXCAVATING-MACHINE.

1,108,268. Specification of Letters Patent. Patented Aug. 25, 1914.

Application filed May 19, 1913. Serial No. 768,482.

To all whom it may concern:

Be it known that I, CHARLES E. STAHL, a citizen of the United States, and a resident of Hartford City, county of Blackford, and State of Indiana, have invented certain new and useful Improvements in Excavating-Machines, of which the following is a specification.

My invention relates to improvements in excavating machines and more particularly to that class thereof designed for use in the digging of a trench or ditch.

The object of my invention is the production of an excavator of the character mentioned which will be of durable and economical construction and efficient in operation.

Other objects will appear hereinafter.

With these objects in view my invention consists in the combinations and arrangements of parts hereinafter described and claimed.

The invention will be best understood by reference to the accompanying drawings forming a part of this specification, and in which,

Figure 1 is a side elevation of an excavating machine embodying my invention. Fig. 2 is a top plan view thereof with the beam which supports the endless chain carrying the digging members, omitted. Fig. 3 is a rear elevation of the machine, the shoe which supports the lower end of the excavator beam being shown partly in section to better illustrate the construction thereof. Fig. 4 is an enlarged substantially central, vertical section of the rearward end portion of the machine. Fig. 5 is a top plan view of the swingingly mounted arm which carries the excavator beam, detached. Fig. 6 is a side elevation of said arm. Fig. 7 is a detail central section of the shoe which supports the lower end of the beam. Fig. 8 is a transverse section taken on line x—x of Fig. 7. Fig. 9 is a top plan view of the construction shown in Fig. 7, and Fig. 10 is a rear elevation of the construction which deflects the excavations discharged from the digging members to either side of the trench and which confines said excavations in piles extending parallel with the sides of the trench.

The preferred form of construction as illustrated in the drawings comprises a supporting frame 1 mounted upon wheels 2 and 3. The wheels 2 are mounted for oscillation in order to adapt the same for use in steering the machine, said wheels being connected by chains 4 with a conventional steering mechanism which may be manually operated through the medium of the hand wheel 5. At the front end of the frame 1 is supported a motor 6 of any approved design.

Mounted in suitable bearings provided at the rearward end of the frame 1 is a transversely extending shaft 7. Having its forward end pivotally connected with the shaft 7 is a rearwardly extending arm 8 of a construction as clearly shown in Figs. 5 and 6. Mounted in bearings 9′ provided at the rearward free end of the arm 8 is a transversely extending shaft 9 upon which is mounted intermediate its extremities a beam 10, said beam being of such a length that, when the excavator is in use the lower end of said beam will be adapted to project into the ground. Mounted for travel around the lower end portion of the beam 10 is an endless sprocket chain 11 which passes around a sprocket wheel 12 fixed to the shaft 9 and a sprocket chain 13 mounted upon a shaft 14 which is provided at the lower end of said beam 10. Spaced at intervals upon the chain 11 are digging members or buckets 15 which coöperate with plates 16 secured to said chain to form compartments or buckets for the conveyance of excavations during the operation of the machine. The particular construction of these digging members is not important in this connection, the same being made the subject matter of a companion application filed by myself for digging mechanism for excavators, on May 19, 1913, Serial No. 768,481. Said digging members, however, are so arranged that when the same reach their upper terminals of movement or as the same are passing around the sprocket wheel 12 said buckets will be moved to discharging position, as clearly shown in Fig. 4 and the contents thereof scraped therefrom by scraper plates 17, as clearly shown in Fig. 2.

Arranged directly below the point at which the buckets 15 are moved to discharging position is an upwardly tapering deflecting member 18 upon which, when the buckets are dumped, the contents thereof will drop and be deflected to both sides of the trench which is in the course of forma-

tion. Rearwardly extending plates 19 and 20 coöperate to confine the excavations deflected by the member 18 into elongated piles which facilitate the refilling of the trench as will be understood, as the description proceeds. A transversely extending plate 21 secured to the rearward extremity of the frame 1 serves to prevent the excavations being thrown into the gearing which is arranged immediately in front of said plate. A similarly disposed plate 21′ carried by the arm 8 serves in a similar capacity.

The excavator beam 10, during the operation of the machine, is tilted about the shaft 9 in adjusting the same to cut a trench of any desired depth, it being clear that the more nearly vertical said arm is disposed the deeper will be the trench cut thereby, and conversely, the more nearly horizontal said beam is disposed the more shallow will be the trench formed thereby. Said beam after being tiltably adjusted to the position desired is locked in its position of adjustment by means of brace rods 23 pivoted at their lower ends as at 22 to the arm 8. The upper ends of the brace rods 23 slidably engage sleeves 24 carried at the upper end of the beam 10 between the parallel upper end portions of the bars which comprise said beam. The sleeves 24 are pivotally secured in position by a bolt 25 passing through the same, the brace rods 23 being provided with elongated slots as shown to afford clearance for said bolt. A nut 26 threaded upon the bolt 25 coöperates therewith in clamping the brace rods 23 against sliding movement in the sleeves 24, the locking of the upper end portions of said brace rods in said sleeves serving evidently to lock the excavator beam against tilting movement relative to the arm 8.

Arranged rearwardly of the beam 10 extending parallel therewith are bars 27 rigidly connected with the beam 10 by bars 28, said bars 28 together with the members of beam 10 at the points where the same intersect or register with the chain 11 being offset or formed with outwardly projecting loops in order to permit of the passage of the digging members 15. Rigidly secured to the lower ends of the bars 27 is an end member 29 provided at its opposite sides with rearwardly turned engaging flanges 30 which slidably engage the outwardly extending edges of flanges 31 of a plate 32. The lower end of the plate 32 is fulcrumed at 33 to a shoe 34 which is adapted to slide upon the bottom of the trench cut by the excavator when in operation, as clearly shown in Fig. 1. Having its lower extremity connected at 35 with the upper free end of the member 32 is a cord or cable 36. The cord 36 passes downwardly from the point 35 around a channel pulley 37 mounted at the lower end of the member 29 and thence upwardly over a pulley 38 mounted between the bars 27 adjacent said member 29. From the pulley 38 said cord passes upwardly along the bars 27, over guide pulleys 39, around the upper extremity of the excavator beam 10, and thence downwardly to connect with a drum 40 which is fixed to a transversely extending shaft 41 mounted in bearings 42 provided upon the arm 8. With this arrangement it will be seen that a bight will be formed in the cord 36 between the point 35 and the pulley 38, the pulley 37 resting in this bight, and that the lower end of the bars 27 and hence the excavator beam will be supported by said bight and therefore indirectly by the shoe 34. Also, it will be observed that the construction is such that by winding or unwinding the cord 36 upon or from the drum 40 this bight may be lengthened or contracted to vertically adjust the excavator beam. With this arrangement then, in the use of the excavator after an approximate adjustment of the excavator beam through tilting thereof as above mentioned, the same may be minutely adjusted in order to secure the cutting of a trench of the exact depth desired through manipulation of the cord or flexible element 36, such adjustment of the latter being, of course, secured through rotation of the drum 40. Rotation of the drum 40 as mentioned is secured through the medium of a worm wheel 43 which is fixed to the shaft 41, said worm wheel meshing with a worm 44 which is carried by the shaft 45 mounted in the bearings 46 provided upon the arm 8. The rearward end of the shaft 45 carries a bevel gear 47 which meshes with bevel gears 48 and 48′ loosely mounted upon the shaft 7. A manually operable double clutch 49 splined to the shaft 7 coöperates with the bevel gears 48 and 48′ to secure rotation of the bevel gear 47 and hence of the drum 40 which is operatively connected therewith in either direction. The shaft 7 is also operatively connected with the shaft 9 to effect driving of the excavator chain 11 by means of a sprocket chain 50 which travels around sprocket wheels 51 and 52 provided respectively upon said shafts 7 and 9. A suitable manually operable clutch 53 coöperates with the sprocket wheel 51 for connecting the same with the shaft 7, the excavating mechanism through the employment of this clutch being adapted to be disconnected from the shaft 7 to permit of rotation of the latter without affecting said excavating mechanism.

The shaft 7 is connected for driving by the motor 6 through the medium of an endless belt 54 which travels around a pulley 55 provided at one end of said shaft 7 and also around a pulley 56 which is fixed to a trans-

versely extending shaft 57 mounted in the frame 1 adjacent the front end thereof. The shaft 57 is connected with a longitudinally extending shaft 58 by means of bevel gears 59 loosely mounted upon the shaft 57 which mesh with a bevel gear 60 provided upon the shaft 58. A double clutch member 61 coöperates with the bevel gears 59 to operatively connect either one of said gears with the shaft 57 in order to secure rotation thereof in either direction. A manually shiftable clutch 61′ operatively connects the forward end of the shaft 58 with the power shaft 62 of the motor 6. Through the connection described the shaft 7 will be driven by the motor 6 at a comparatively high rate of speed, this speed being too great for the driving of the excavator chain when in operation. This speed, however, is utilized in the propulsion of the machine over the ground in transporting the same from place to place or when moving the machine over the ground with the digging mechanism inoperative. With this in view, the transversely extending shaft 63 mounted in the frame 1 which is operatively connected with the rear axle 3′ through sprocket chains 64 and coöperating sprocket wheels 65 and 66 is operatively connected with the shaft 7 through meshing gears 67 and 68, as clearly shown in Fig. 2. A manually operable clutch 69 splined to the shaft 7 serves to connect the gear 68 with said shaft, said gear, when said clutch is disconnected therefrom running free upon said shaft. In order to drive the shaft 7 at a lower rate of speed or at a speed which may be utilized in driving the excavator chain 11 and in gradually advancing the machine during the excavating operation, a friction wheel 70 is employed which contacts with the periphery of the pulley 56. The friction wheel 70 is mounted upon a transversely extending shaft 71 mounted in bearings provided upon the frame 1, said shaft 71 being connected through the medium of a sprocket chain 73 and coöperating sprocket wheels with a transversely extending shaft 72 also mounted in bearings provided upon the frame 1. The shaft 72 is connected with a transversely extending shaft 74 correspondingly mounted in the frame 1 and positioned rearwardly of said shaft 72 by means of meshing gears 75 and 76. Splined to the shaft 74 is a gear 77 which is adapted to mesh with the gear 76, as shown. A suitable manually operable switching fork 78 coöperates with the gear 77 to move the same into or out of mesh with the gear 67. With this arrangement then, it will be seen that, a connection is established between the shafts 57 and 63 through a train of reducing gearing whereby the shaft 63 will be rotated at a comparatively low rate of speed or at a rate of speed suitable for driving the excavator chain 11 and gradually advancing or propelling the excavator as the excavation proceeds. During the operation of the machine or when the mechanism is driven through the gear last described the belt 54 will, of course, be disengaged from the pulley 55. When the excavator is not in use and is being propelled along the ground from place to place the gear 77 will be moved by the shifting fork 78 out of mesh with gear 67, the clutch 49 being moved to neutral position and the clutch 53 to inoperative position or to disengage the sprocket wheel 51 from the shaft 7. This being done, the motor 6 will be connected only with the traction wheels 3, the excavating mechanism remaining inert.

Arranged behind the excavator proper at a suitable distance is a pair of vertically disposed plates 79 connected by cross bars 80 so that the rearward ends thereof converge to correspond substantially with the width of the trench cut by the machine when in operation, the forward ends of said plates 79 diverging to such an extent as to traverse a path of a width greater than the space between the plates 20. Said plates 79 are carried by wheels or trucks 81 and the same are connected by chains 82 with the excavating machine as shown. With this arrangement, upon the operation of the excavator, the elongated piles of excavations which are deposited upon the ground in lines extending parallel with the edges of the trench formed will be engaged by the plates 79 and deflected into the trench as will be readily understood. The members 79 are used only where the machine is employed in the formation of a trench or ditch for tiling and will, of course, be spaced behind the excavator a distance sufficient to allow for the insertion of the tiling into the trench or ditch before said plates operate to refill the trench or ditch.

While I have illustrated and described the preferred form of construction for carrying my invention into effect, this is capable of variation and modification without departing from the spirit of the invention. I, therefore, do not wish to be limited to the precise details of construction set forth, but desire to avail myself of such variations and modifications as come within the scope of the appended claims.

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

1. An excavator comprising a wheeled frame; an arm pivoted at one end to said wheeled frame; a beam pivoted to the other end of said arm; a lock locking said beam against pivotal movement on said arm; an endless digging element operatively mounted on said beam; a support carried by said beam; a shoe adjustably mounted on the lower end of said support; and means for

adjusting said shoe on said support to move said beam vertically and swing said arm on its pivotal connection with said frame, substantially as described.

2. An excavator comprising a wheeled frame; an arm pivoted at one end of said frame; a beam pivoted at a point intermediate its length to the other end of said arm; an endless digging element operatively mounted on said beam; a connecting link pivotally connected at one of its ends to said arm and adjustably connected to the upper end of said beam at its other end portion; supporting bars rigidly spaced from said beam and substantially co-extensive therewith; and a shoe adjustably mounted on the lower end of said bars and adapted with the pivotal connection between said arm and frame to support said beam, digging element, bars and arm, substantially as described.

3. An excavator comprising a wheeled frame; a beam; an endless element carrying digging members mounted for travel upon said beam; a pivotal connection between said beam and said frame permitting of vertical movement of said beam; a shoe adapted to slide in contact with the bottom of the trench cut by the excavator when operating; an adjustable connection between said shoe and said beam; and a flexible element connected at one end with said shoe and having its other end connected with said frame forming a bight in said element adapted to adjustably support said beam, substantially as described.

4. An excavator comprising a wheeled frame; a beam; an endless element carrying digging members mounted for travel upon said beam; a pivotal connection between said beam and said frame permitting of vertical movement of said beam; a shoe adapted to slide in contact with the bottom of the trench cut by the excavator when operating; a bar fixed to said beam and extending substantially parallel therewith at the lower portion thereof; a slidable connection between the lower end of said bar and said shoe permitting of relative vertical movement of said bar; and means for locking said bar against downward movement in positions of vertical adjustment relative to said shoe, substantially as described.

5. An excavator comprising a wheeled frame; a beam; an endless element carrying digging members mounted for travel upon said beam; a pivotal connection between said beam and said frame permitting of vertical movement of said beam; a shoe adapted to slide in contact with the bottom of the trench cut by the excavator when operating; a bar fixed to said beam and extending substantially parallel therewith at the lower end portion thereof; a slidable connection between the lower end of said bar and said shoe permitting of relative vertical movement of said bar; and a flexible element connected at one end to said shoe forming a bight in said element in which the lower end of said bar is supported, substantially as described.

6. An excavator comprising a wheeled frame; a beam; an endless element carrying digging members mounted for travel upon said beam; a pivotal connection between said beam and said frame permitting of vertical movement of said beam; a shoe adapted to slide in contact with the bottom of the trench cut by the excavator when operating; a bar fixed to said beam and extending substantially parallel therewith at the lower end portion thereof; a slidable connection between the lower end of said bar and said shoe permitting of relative vertical movement of said bar; a flexible element connected at one end to said shoe and having its other end adjustably fastened to said frame, forming a bight in said element adjacent said shoe; a roller at the lower end of said bar resting in said bight whereby said bar may be elevated by drawing upon said last mentioned end of said element; and rollers for guiding said element from said first mentioned roller to said frame, substantially as described.

7. An excavator comprising a wheeled frame; an arm arranged at the rearward end of said frame having its forward end pivotally connected with said frame for swinging in a vertical plane; a beam pivotally mounted intermediate its extremities upon the rearward end of said arm; an endless element carrying digging members mounted for travel around the lower end portion of said beam; means engaging with the upper end portion of said beam for releasably locking the latter in positions of pivotal adjustment relative to said arm; a shoe adapted to slide in contact with the bottom of the trench cut by the excavator when operating; a bar fixed to said beam and extending substantially parallel therewith at the lower end portion thereof; a slidable connection between the lower end of said bar and said shoe permitting of relative vertical movement of said bar; and means for locking said bar against downward movement in positions of vertical adjustment relative to said shoe, substantially as described.

8. An excavator comprising a wheeled frame; an arm arranged at the rearward end of said frame having its forward end pivotally connected with said frame for swinging in a vertical plane; a beam pivotally mounted intermediate its extremities upon the rearward end of said arm; an endless element carrying digging members mounted for travel around the lower end portion of

said beam; means engaging with the upper end portion of said beam for releasably locking the latter in positions of pivotal adjustment relative to said arm; a shoe adapted to slide in contact with the bottom of the trench cut by the excavator when operating; a bar fixed to said beam and extending substantially parallel therewith at the lower end portion thereof; a slidable connection between the lower end of said bar and said shoe permitting of relative vertical movement of said bar; a flexible element connected at one end to said shoe and having its other end adjustably fastened to said frame, forming a bight in said element adjacent said shoe; a roller at the lower end of said bar resting in said bight whereby said bar may be elevated by drawing upon said last mentioned end of said element; and rollers for guiding said element from said first mentioned roller to said frame, substantially as described.

9. An excavator comprising a wheeled frame; a motor mounted in said frame; a drum connected for driving by said motor; a beam; an endless element carrying digging members mounted for travel upon said beam; a pivotal connection between said beam and said frame permitting of vertical movement of said beam; means for releasably locking said beam in positions of pivotal adjustment; a shoe adapted to slide in contact with the bottom of the trench cut by the excavator when operating; an adjustable connection between said shoe and said beam permitting of vertical movement of said beam relative to said shoe; and a flexible element connected at one end with said shoe and having its other end connected with said drum forming a bight in said element for the adjustable support of said beam, substantially as described.

10. An excavator comprising a wheeled frame; a motor mounted in said frame; a transversely extending shaft connected for driving by said motor; an arm having its forward end swingingly connected with said shaft; a beam pivotally mounted upon the rearward end of said arm; an endless element carrying digging members mounted for travel upon said beam; an operative connection between said shaft and said endless element; means for locking said beam in positions of pivotal adjustment relative to said arm; a shoe adapted to slide in contact with the bottom of the trench cut by the excavator when operating; an adjustable connection between said shoe and said beam permitting of vertical movement of said beam relative to said shoe; and a flexible element connected at one end with said shoe and having its other end connected with said drum forming a bight in said element for the adjustable support of said beam, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHAS. E. STAHL.

Witnesses:
JACOB B. STAHL,
HARLEY F. HALL.