No. 794,624. PATENTED JULY 11, 1905.

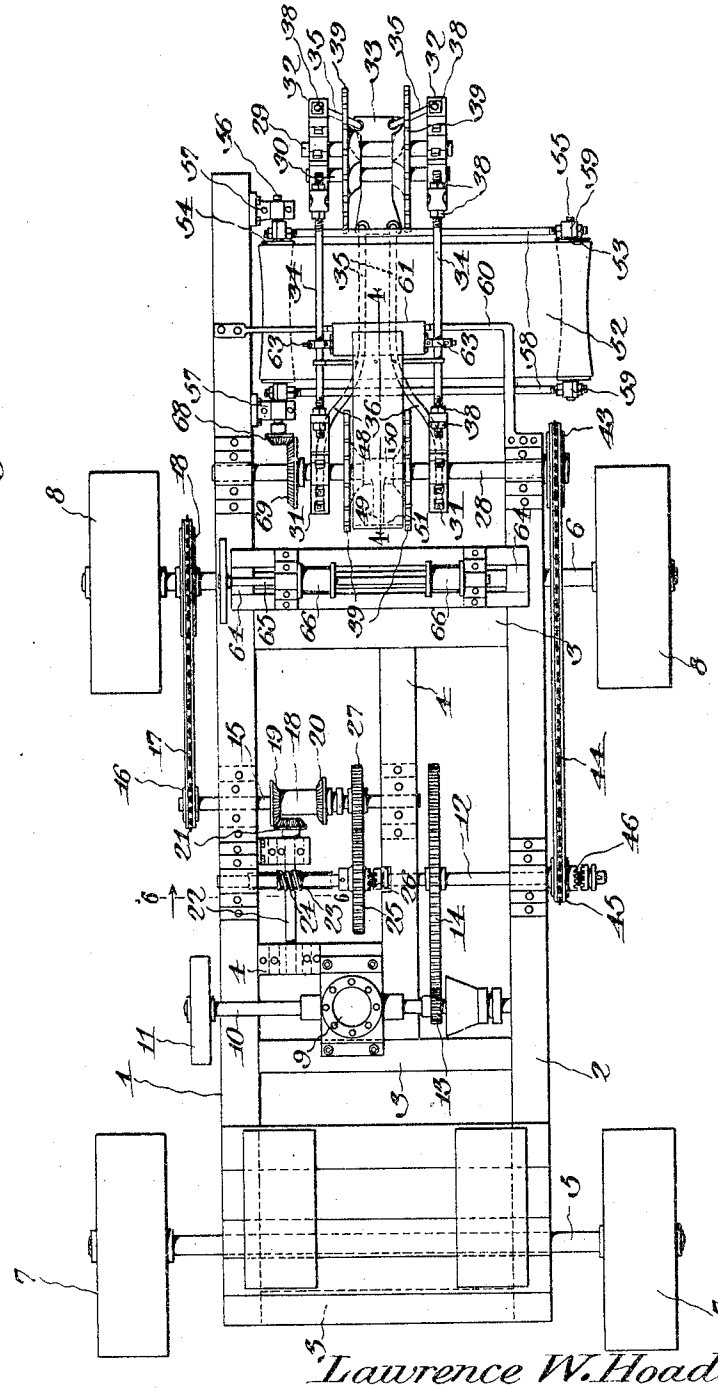
L. W. & H. W. HOADLEY.

EXCAVATING MACHINE.

APPLICATION FILED MAR. 28, 1905.

4 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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4 SHEETS—SHEET 2.

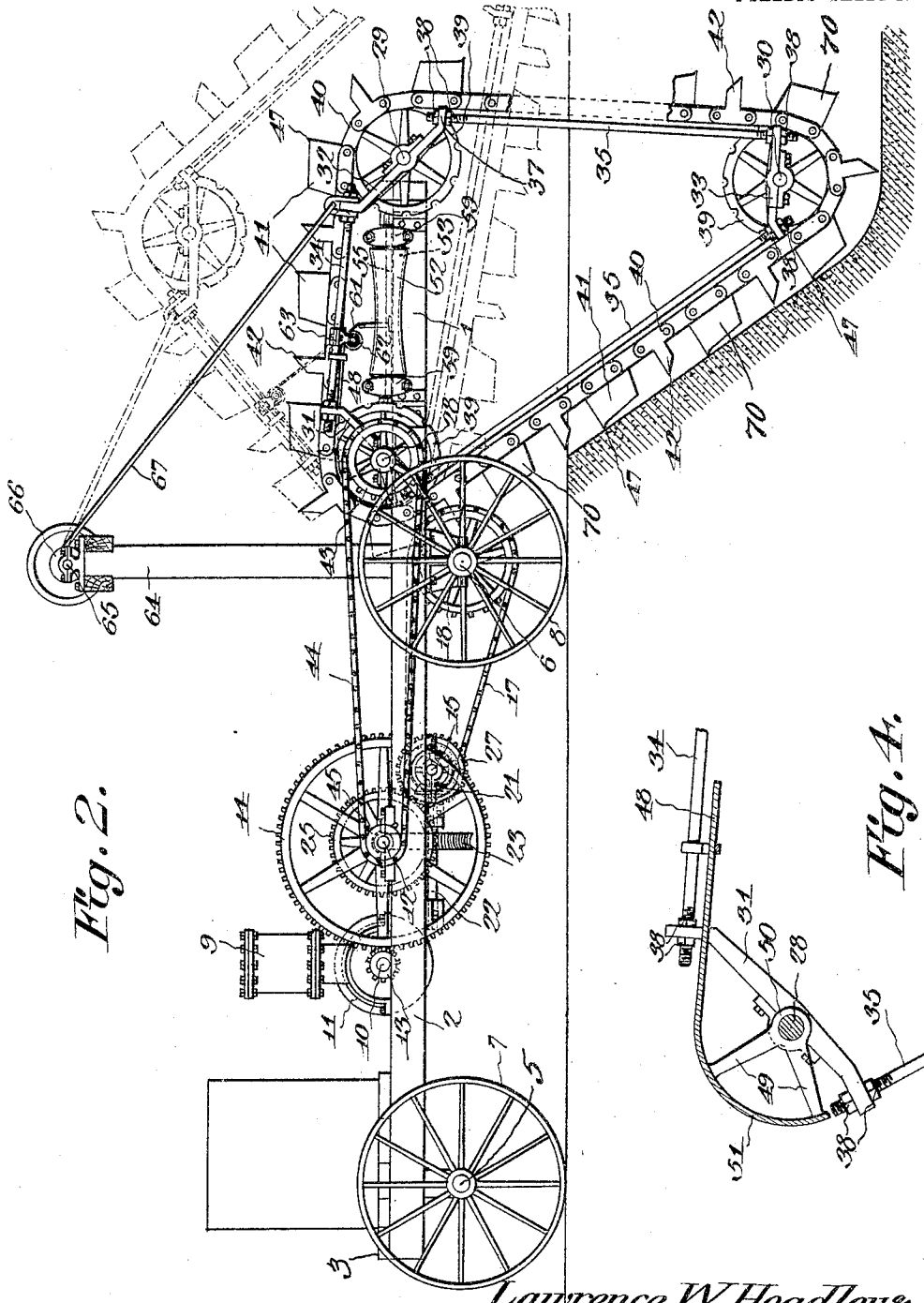


Fig. 2.

Fig. 4.

Witnesses

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4 SHEETS—SHEET 3.

Fig. 3.

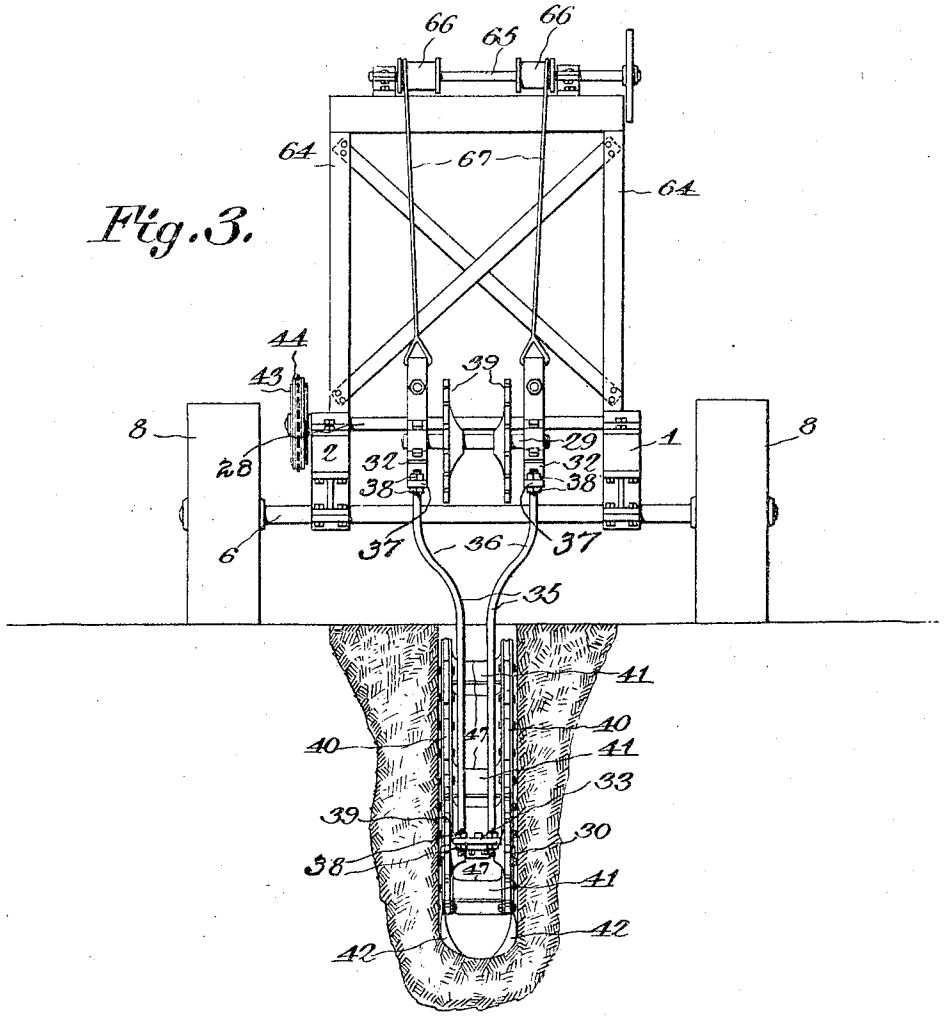
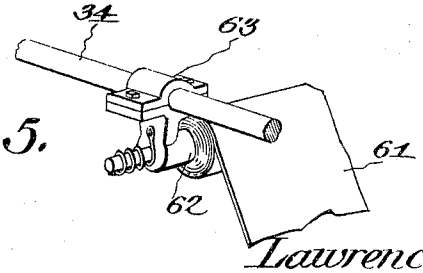


Fig. 5.



Witnesses

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4 SHEETS—SHEET 4.

Fig. 7.

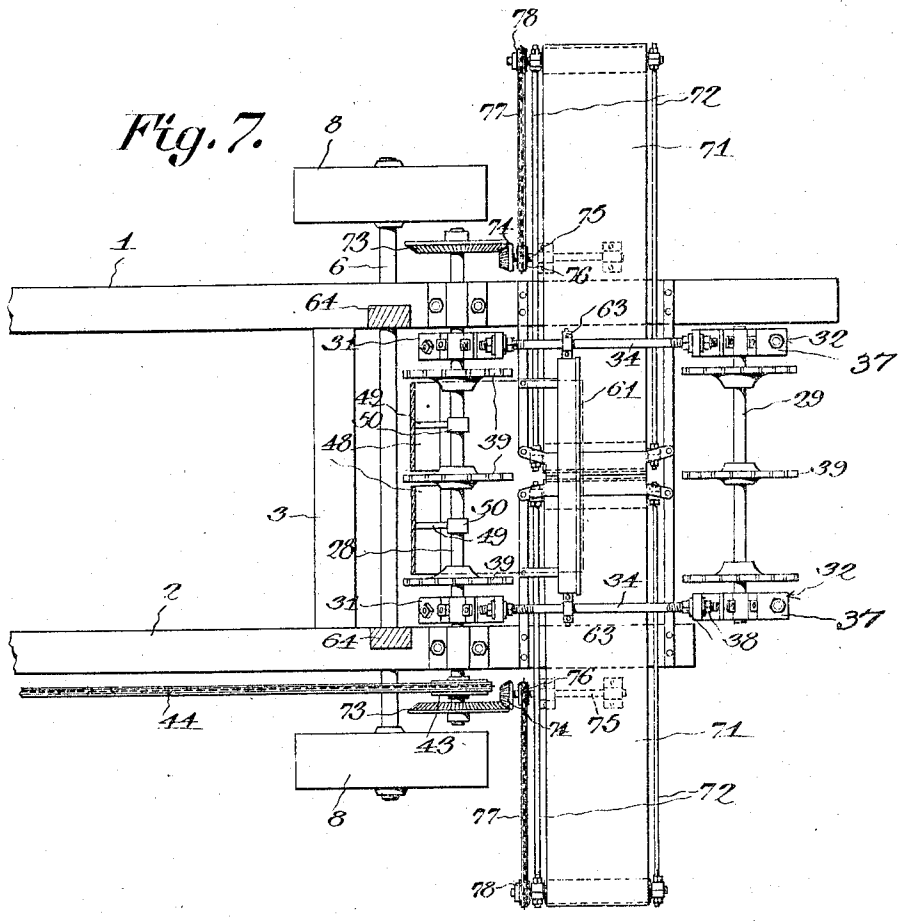
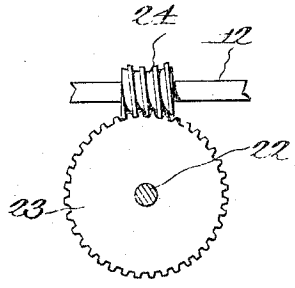


Fig. 6.



Witnesses

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No. 794,624. Patented July 11, 1905.

UNITED STATES PATENT OFFICE.

LAWRENCE W. HOADLEY AND HARRY W. HOADLEY, OF FINDLAY, OHIO

EXCAVATING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 794,624, dated July 11, 1905.

Application filed March 28, 1905. Serial No. 252,559.

To all whom it may concern:

Be it known that we, LAWRENCE W. HOADLEY and HARRY W. HOADLEY, citizens of the United States, residing at Findlay, in the county of Hancock and State of Ohio, have invented a new and useful Excavating-Machine, of which the following is a specification.

This invention relates to excavating-machines of that class which are used for digging ditches or trenches, the principal object of the invention being to simplify and improve the construction and operation of this class of devices.

With these and other ends in view, which will readily appear as the nature of the invention is better understood, the invention consists in the combination, with a carrying-truck, of a swinging frame equipped with endless carriers upon which the excavating-buckets are mounted.

The invention further consists in the combination, with the excavating-buckets, of earth-loosening cutting devices.

The invention further consists in the combination, with the swinging frame and the excavating-buckets, of means for retaining the excavated material in said buckets until the point is reached where it is desired to dump said contents.

The invention further consists in an extensible guide adapted to be wound upon a spring-actuated roller for conveying the dumped material onto a suitably-arranged conveyer or conveyers, whereby said material will be carried to the sides of the ditch or trench.

The invention further consists in the improved construction and novel arrangement and combination of parts, which will be hereinafter fully described, and particularly pointed out in the claims.

In the accompanying drawings has been illustrated a simple and preferred form of embodiment of the invention, it being, however, understood that no limitation is necessarily made to the precise structural details therein exhibited, but that the right is reserved to any changes, alterations, and modifications to which recourse may be had within the scope of the invention and without departing from the spirit or sacrificing the efficiency of the same.

In said drawings, Figure 1 is a top plan view of a machine constructed in accordance with the principles of the invention. Fig. 2 is a side elevation of the same, showing the machine in position for operation. Fig. 3 is a rear elevation. Fig. 4 is a sectional detail view, enlarged, taken on the plane indicated by the line 4 4 in Fig. 1. Fig. 5 is a perspective detail view showing a portion of the spring-actuated roller and a portion of the flexible guide carried thereby. Fig. 6 is a sectional detail taken on the line 6 6 in Fig. 1. Fig. 7 is a plan view, partly in section, of the excavating-frame and related parts, illustrating a modification.

Corresponding parts in the several figures are indicated throughout by similar characters of reference.

The frame of the improved excavator includes a pair of side beams 1 2, which are suitably connected at intervals by end and cross pieces, as 3 3, and braces, as 4 4, the said members being suitably mortised or joined together in such a manner as to present a frame structure of the proper dimensions and of sufficient strength to resist strains. Said frame is supported upon the front and rear axles 5 6, provided with transporting-wheels 7 8, said wheels having wide treads to enable them to support heavy weights without sinking deeply into the ground. The rear axle 6 has been shown as a live-axle supported for rotation in its bearings. The frame supports an engine or motor 9, the driven shaft of which, 10, has a fly-wheel 11.

12 is the main shaft of the machine, which receives motion from the engine-shaft through the medium of a pinion 13 upon the latter meshing with a spur-wheel 14 upon the main shaft.

15 is a counter-shaft which carries a sprocket-wheel 16, connected, by means of a chain 17, with a sprocket-wheel 18 upon the live-axle 6, to which motion may thus be communicated. The counter-shaft 15 carries a sleeve 18′, which is splined or feathered thereon to rotate therewith, and said sleeve is provided at its ends

with bevel-gears 19 and 20, facing each other, either one of said bevel-gears being adapted for engagement with bevel-pinions 21 upon a shaft 22, which is supported at an angle to the main shaft and which carries a worm-gear 23, meshing with a worm 24 upon said main shaft. The latter also carries a spur-wheel 25, which is mounted loosely thereon, but is adapted to be connected therewith for rotation by means of a clutch member 26, slidable upon said main shaft, with which it is connected for rotation by means of a feather or spline. The spur-wheel 25 meshes with a pinion 27 upon the counter-shaft 15, and the sleeve 18′, as already stated, is slidable upon said counter-shaft, so that either one of the bevel-gears 19 20 may be placed in engagement with the pinion 21, or the latter may occupy a position intermediate said pinions and out of mesh with both. Ordinary lever means or means of any well-known kind are to be provided for effecting the desired adjustment of the sleeve 18′ and of the clutch member 26; but such means are well known in the art and have not been shown in the main views of the drawings.

It will be seen that when the main shaft 12 is driven by the engine motion may be communicated to the counter-shaft 15, either directly by means of the spur-wheel 25 and pinion 27 or indirectly by means of the worm-gear 23, worm 24, and bevel-pinion 21, which latter may be placed in mesh with either of the bevel-gears 19 or 20. When the transmission of power is through the spur-wheel 25 and pinion 27, the sleeve 18′ is adjusted to a position in which the bevel-gears 19 and 20 will be out of mesh with the pinion 21. This mode of transmission being comparatively rapid is employed when the machine is to be transported. When, on the other hand, the machine is in operation for excavating purposes, as will be hereinafter described, the clutch 26 will be disengaged from the spur-wheel 25, which latter is thus permitted to rotate loosely upon the main shaft, and the sleeve 18′ will be adjusted to cause either of the bevel-gears 19 or 20 to mesh with the pinion 21, thus causing motion to be transmitted at slow speed to the live-axle for the purpose of driving the machine or propelling the same while an excavation is being made. Normally of course the movement will be in a forward direction; but in case of necessity the machine may be quickly reversed and backed by simply shifting the position of the sleeve 18.

The side beams of the frame are provided with bearings for a transverse shaft 28, which supports the swinging excavator-frame. Said frame is preferably of triangular outline and has in the drawings been shown as being in the shape of an approximately right-angled triangle, although it is to be understood that the precise contour is non-essential. Said frame includes, in addition to the shaft 28, shafts 29 and 30, which are mounted in bearings near the corners of the triangle, said bearings being composed in part of bracket members 31, 32, and 33, said bracket members being disposed in pairs, as will be best seen in Fig. 1 of the drawings. The bracket members 31 32 are connected with each other by means of parallel rods 34, and said bracket members are connected with the bracket members 33 by means of rods 35, the latter being provided with shoulders 36, whereby they are offset inwardly in the direction of each other, so as to form a comparatively narrow portion, which may be called the "trench-engaging" portion of the frame. The several connecting-rods have screw-threaded ends extending through upturned lugs 37 at the ends of the respective bracket members and connected adjustably therewith by means of clamp-nuts 38. The several shafts 28, 29, and 30 are provided with chain-wheels 39, supporting endless chains 40, carrying the scoops or buckets 41, which alternate with cutting members 42, which precede said scoops and serve to loosen the dirt in advance thereof during the process of excavating. By properly adjusting the clamp-nuts upon the connecting-rods 34 and 35 the frame may be expanded, as will be readily understood, for the purpose of taking up slack in the chains 40, so as to cause the latter to run smoothly and evenly. The shaft 28, upon which the excavator-frame is hingedly mounted, is provided with a sprocket-wheel 43, connected by a chain 44 with a sprocket-pinion upon the main shaft 12, said pinion being shown at 45. The sprocket-pinion 45 is loose upon the shaft 12, but may be connected with the latter for rotation by clutch means, (indicated at 46.)

The scoops of the excavator are provided with cutting or engaging edges 47, and their inner sides are open, so that the contents of said buckets will be discharged while the buckets traverse the upper lead of their course of travel. In order, however, to prevent the contents of the buckets from being prematurely discharged, a shield 48 is provided, having arms 49, carrying a hub 50, mounted for rotation upon the shaft 28. The inner end of the shield is curved, as shown at 51, to engage the open inner sides of the scoops, and the outer portion of the shield is flat and is disposed between the connecting-rods 34, with which it is suitably connected, said shield terminating at the point where it is desired that the contents of the bucket is to be discharged.

A dirt-conveyer is provided, the same consisting of an endless belt 52, supported upon rollers 53 and 54, mounted upon shafts 55 and 56, the latter of which is journaled in suitably-supported bearings 57. The shaft 56 is connected, by means of rods 58, with the bearings 59 of the shaft 55, said rods having thread-

ed ends extending through perforations in the bearings 57 and provided with clamp-nuts 59, whereby adjustment may be effected to take up slack in the conveyer-belt. The rollers supporting the latter are preferably concaved, as shown, causing the conveyer-belt to dish inwardly for the purpose of preventing material from being spilled over its edges.

Suitably connected with the frame of the machine above the conveyer-belt is a bracket member 60, to which is attached one end of a flexible guide 61, the other end of which is wound upon a spring-actuated roller 62, journaled in bearings 63, which are mounted adjustably upon the connecting-rods 34 of the excavator-frame.

The main frame of the machine is provided with uprights 64, supporting for rotation a shaft 65, carrying a drum or drums 66, upon which may be wound flexible members, such as cables 67, which are connected with the rear or outer corner of the excavator-frame, which latter by rotating the shaft 65 so as to wind or unwind the flexible members 67 may be raised or lowered, as will be readily understood. The shaft 65 may be operated by hand or by power transmitted thereto in any convenient manner.

In operation at the start the means for propelling the frame-truck are thrown out of gear, and the excavator-frame, which during transportation has been hoisted to an out-of-the-way position, is lowered until the lower lead of the buckets rests upon the ground. Motion is now transmitted from the source of power to the shaft 28, thus setting in motion the chains carrying the buckets or scoops and the cutters, which will dig into the ground and carry the material over the slide 48 to the point of discharge, where it is dropped upon the flexible guide 61 and is thereby guided onto the conveyer 52, the latter being operated by a bevel-pinion 68 upon the shaft 56, meshing with the bevel-gear 69 upon the shaft 28. When the operation begins, the flexible guide 61 will be partly unwound from the spring-actuated roller 62; but as the excavating-frame enters into the ground said spring-actuated roller will gradually take up the slack caused by the shortening of the flexible guide 61. The excavating-frame may be suffered to enter the ground to its extreme capacity, or it may be supported at some intermediate point if it be desired to dig a shallower trench than the machine is capable of producing. When the excavating-frame has been adjusted at the proper depth, where it is sustained by the flexible members 67, power is applied to the driving-axle 6, and the machine will now be slowly propelled in a forward direction, the operation of digging continuing in the meanwhile. In case of obstructions being encountered the machine may be stopped or reversed by the means provided for the purpose. It is also desired to be understood that friction means may be included in the means for transmitting motion from the engine-shaft to the operative parts of the machine for the purpose of avoiding breakage in case of serious obstructions.

Under a modified construction illustrated in Fig. 7 of the drawings the capacity of the machine is increased by mounting upon the shafts 28, 29, and 30 of the excavating-frame a number of chain-carrying sprocket-wheels sufficient to carry a plurality of buckets arranged side by side, a plurality of cutting members being also employed. Under this modification it is also preferred in order to dispose of the increased quantity of dirt to use a pair of dirt-conveyers 71, the general construction of which is practically the same as that hereinbefore described, the shafts of said conveyers being supported upon rods 72, having means whereby the slack in the conveyers may be taken up. The dirt guide or fender 61 will in this case straddle the inner or meeting ends of the dirt-conveyers, and the latter will be independently driven by bevel-gears 73 upon the shaft 28, meshing with bevel-pinions 74 upon suitably-supported shafts 75, having sprocket-wheels 76 connected by chains 77 with sprocket-wheels 78 upon the outer shafts of the respective conveyers. In other respects the construction is the same as that hereinbefore shown and described.

From the foregoing description, taken in connection with the drawings hereto annexed, the operation and advantages of this invention will be readily understood by those skilled in the art to which it appertains.

The construction of the improved excavator is free from unnecessary complications and is therefore inexpensive, easily manipulated, and not liable to get out of order. When the machine is being transported, the excavating-machine may be raised to a position where it is entirely out of the way, and the machine may be propelled at speed from one place to another.

Having thus described the invention, what is claimed is—

1. An approximately triangular excavating-frame having shafts at the corners thereof including a suitably-supported driven shaft, bearing members for said shafts having upturned lugs at the ends thereof, spacing and connecting rods having screw-threaded ends engaging the upturned lugs of the bearing members, and clamping-nuts.

2. An angular excavating-frame having shafts at the corners thereof including a suitably-supported driven shaft, bearing members for said shafts having upturned perforated lugs, means for spacing and adjustably connecting said bearing members, chain-wheels upon the shafts, and screw-carrying chains engaging said wheels.

3. An angular excavating-frame having shafts at the corners thereof including a suitably-supported driven shaft, bearing members for said shafts having upturned perforated lugs, screw-threaded connecting members engaging said lugs, and clamp-nuts; said connecting members including rods provided with shoulders and inwardly-offset portions.

4. An angular excavating-frame having shafts at the corners thereof, bearings for said shafts, and spacing members for said bearings; said frame having an inwardly-offset trench-engaging portion.

5. An excavating-frame having an inwardly-offset trench-engaging portion.

6. An excavating-frame comprising spaced side members having laterally-offset trench-engaging portions.

7. A pivotally-supported excavating-frame having laterally-offset trench-engaging portions, chain-wheels at the corners of said frame, and scoop-carrying chains engaging said wheels.

8. An angular excavating-frame having shafts at the corners thereof including a suitably-supported driven shaft, endless chains supported in said frame, and scoops and cutting members connected in alternate order with said chains.

9. An angular excavating-frame having shafts at the corners thereof including a suitably-supported driven shaft, chain-wheels upon said shafts, scoop-carrying chains engaging said wheels, and a shield pivotally connected with the driven shaft and engaging the inner sides of the scoops to regulate the point of discharge of the contents of the scoops.

10. A pivotally-supported excavating-frame having endless movable excavating devices, a dirt-conveyer, a spring-actuated roller carried by the excavating-frame, a flexible dirt-guide connected with said roller, and means for supporting the free end of said dirt-guide adjacent to the dirt-conveyer.

11. A pivotally-supported excavating-frame including a suitably-supported driven shaft, endless chains movable in said frame, dirt-excavating scoops connected with said chains and having dirt-engaging edges and open inner sides, a hub supported upon the driven shaft and having arms, a shield supported by said arms and having a curved portion concentric with the shaft and a suitably-supported straight portion said shield adapted to engage the open inner sides of the scoops, and a dirt-conveyer supported to receive the material discharged from the scoops over the edge of the shield.

12. A pivotally-supported excavating-frame, an endless dirt-conveyer, a flexible dirt-guide having one edge supported adjacent to said conveyer, and means supported in the frame for winding and taking up slack in the guide.

13. A pivotally-supported excavating-frame, an endless dirt-conveyer, a flexible dirt-guide having one edge supported adjacent to said conveyer, and a spring-actuated winding member for said guide supported in the frame.

14. A pivotally-supported excavating-frame, means for adjusting and supporting said frame, an endless dirt-conveyer supported within and transversely to the excavating-frame, endless excavating means carried by the frame, flexible means for guiding the dirt discharged by the excavating means onto the conveyer, and means for taking up slack in said flexible guide means and for keeping the latter taut in all positions of the excavating-frame.

15. An angular pivotally-supported excavating-frame, and an endless dirt-conveyer supported within and transversely to the excavating-frame in a position to receive material discharged from excavating members movably supported by said frame.

16. A machine of the class described, a motor-carrying supporting-truck having a live-axle, a main shaft driven by the motor, independent means for transmitting motion at variable speeds and in opposite directions from the main shaft to the live-axle, a pivotally-supported excavating-frame including a shaft supported for rotation upon the truck, and means for transmitting motion to said shaft direct from the main shaft.

In testimony that we claim the foregoing as our own we have hereto affixed our signatures in the presence of two witnesses.

LAWRENCE W. HOADLEY.
HARRY W. HOADLEY.

Witnesses:
C. HEYN,
L. A. CARABIN.