

H. H. HARRIS.
 EXCAVATING MECHANISM.
 APPLICATION FILED MAR. 22, 1911.

1,002,685.

Patented Sept. 5, 1911.

2 SHEETS—SHEET 1.

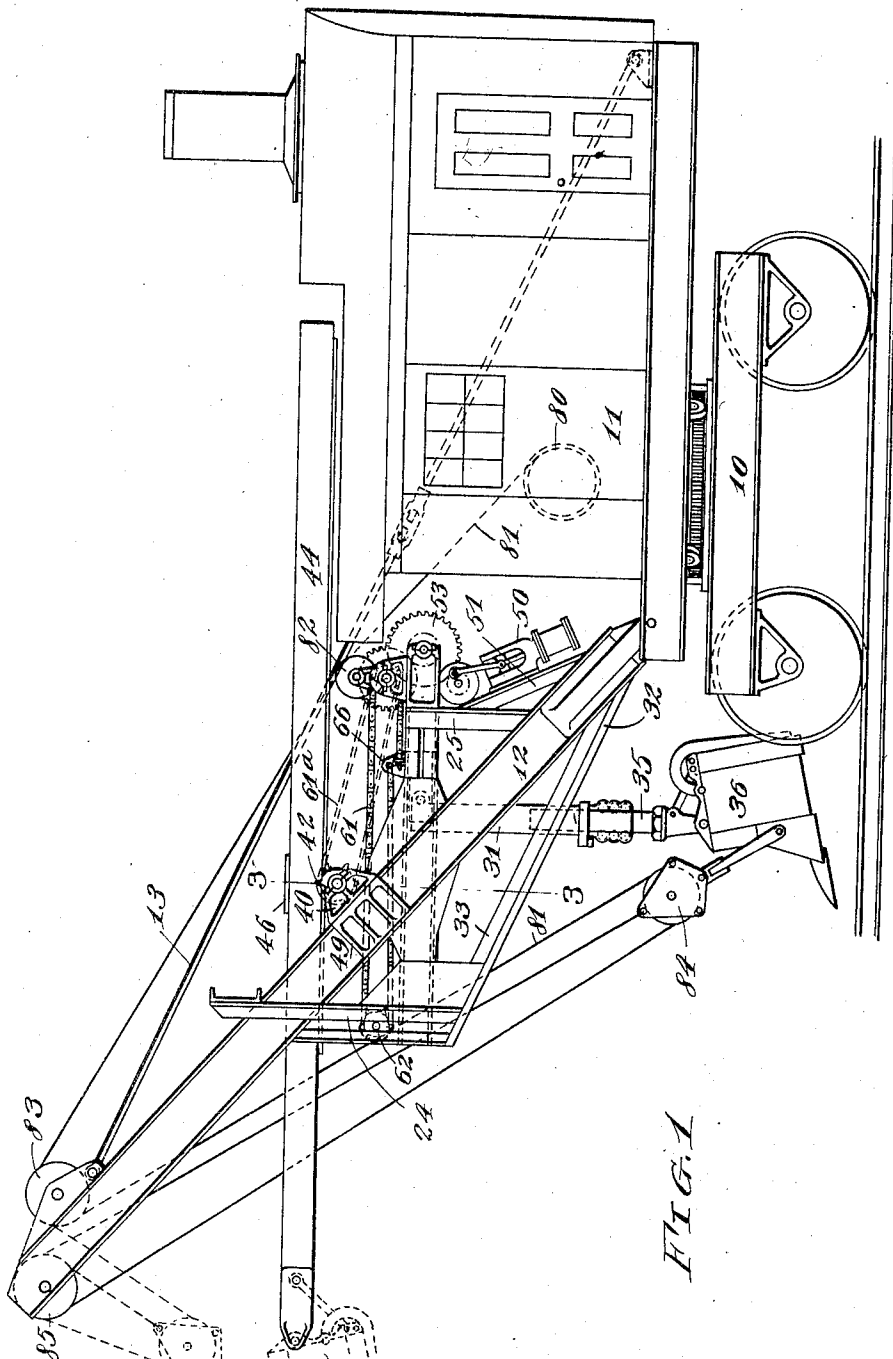


FIG. 1

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 Bennett B. West.
 Oliver M. Kappeler.

Inventor.
 Hollis H. Harris,
 By Albert H. Baker,
 Atty.

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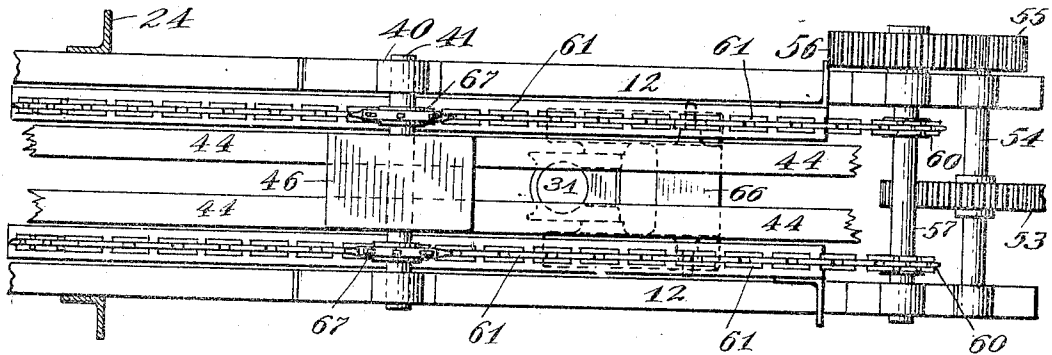
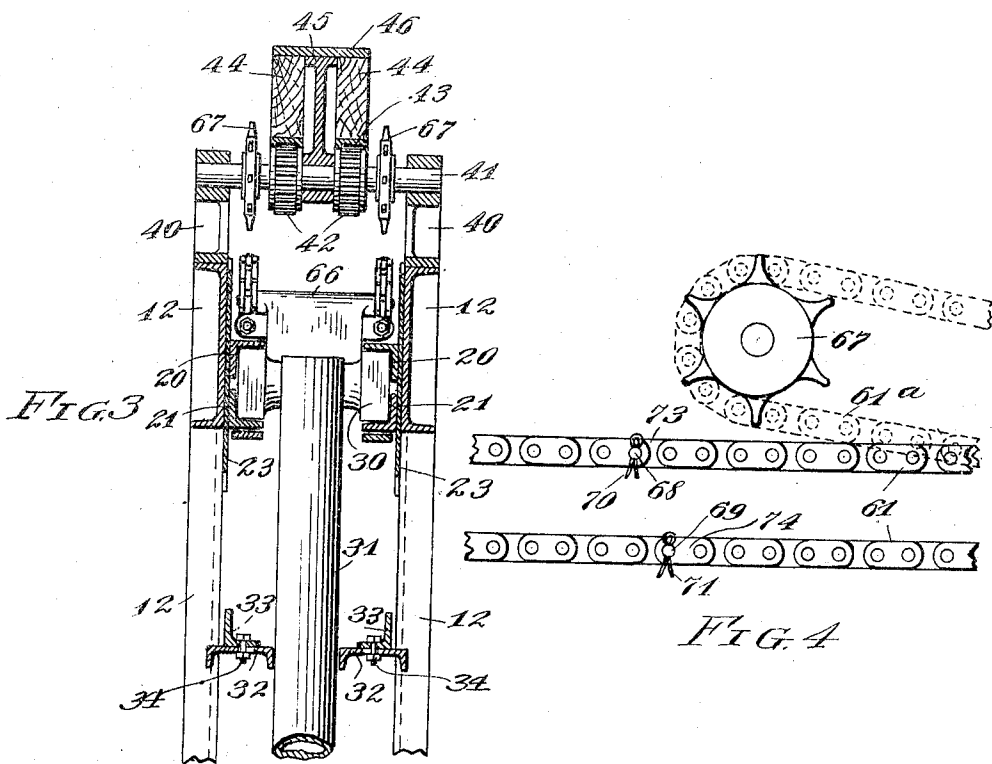


FIG. 2



Witnesses:
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UNITED STATES PATENT OFFICE.

HOLLIS H. HARRIS, OF LORAIN, OHIO, ASSIGNOR TO THE THEW AUTOMATIC SHOVEL COMPANY, OF LORAIN, OHIO, A CORPORATION OF OHIO.

EXCAVATING MECHANISM.

1,002,685.

Specification of Letters Patent. Patented Sept. 5, 1911.

Application filed March 22, 1911. Serial No. 616,254.

To all whom it may concern:

Be it known that I, HOLLIS H. HARRIS, a citizen of the United States, residing at Lorain, in the county of Lorain and State of Ohio, have invented a certain new and useful Improvement in Excavating Mechanism, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

The object of this invention is to provide a power excavating mechanism which, while being simple in construction, shall be adapted for a wide variety of uses. In steam shovel work, for some uses, it is very desirable to cause the upper end of the dipper handle to travel in and out in a horizontal path to enable the dipper to dig to a substantially level bottom. For other uses, as for deeper excavations, it is desirable to provide a long dipper handle which may be moved up and down. Heretofore, some steam shovels have been designed to operate on one of these principles and others on the other principle. The present machine is designed to embody, in one machine, mechanism whereby either system of digging may be used at will from the same driving engine and with the same boom.

The invention comprises the means by which I attain this object, as herein illustrated and as hereinafter more fully described.

In the drawings, Figure 1 is a side elevation of an excavating mechanism embodying my invention; Fig. 2 is a partial plan just above the long dipper handle shown in Fig. 1; Fig. 3 is a vertical transverse section, as indicated by the line 3-3 of Fig. 1; Fig. 4 is a diagram, in the nature of a side elevation, showing the driving chain.

Referring first to Fig. 1, 10 represents a wheeled truck and 11 a suitable superstructure swiveled thereon. Carried by this superstructure and projecting forwardly therefrom is the diagonal boom 12. This boom is shown as comprising a pair of outwardly facing channel beams spaced apart and suitably secured at their upper and lower ends.

13 indicates a suitable tie rod for anchoring the upper end of the boom.

Mounted on the boom is a horizontal trackway, shown as provided by four angle bars 20 and 21 having inwardly projecting flanges. Between the angle bars and the inner faces of the channel beams are shown stiffening plates 23, while the trackway is braced at its forward end by bars 24 depending from the boom and near its rear end by bars 25 rising from the boom.

Slidably mounted in the horizontal trackway is a suitable head 30 with which is pivotally connected the dipper arm 31. This dipper arm depends between the guide bars 32, which are adjustably mounted on the angle bars 33, which latter lead from the lower ends of the bars 24 rearwardly to the boom. The adjustability mentioned may be accomplished in any suitable manner, as, for example, by transversely slotting the members 32 and bolting them through such slots to the member 33. This is illustrated in Fig. 3, where the bolt is designated 34. The dipper arm 31 is shown as tubular and may be provided with the adjustably telescoping extension 35 to the lower end of which is secured the dipper or scoop 36. Accordingly, this construction provides for a short dipper handle which may be moved in or out along a horizontal trackway.

Secured on the upper faces of the channel beams 12, at an intermediate position, are brackets 40, braced below by reinforces 49 within the channel beams. In these brackets is journaled a transverse shaft 41. On this shaft are a pair of pinions 42 adapted to mesh with racks 43 on the inner or under side of the two parallel wooden bars 44 which constitute the long dipper handle. These bars are connected at their lower ends to a suitable scoop, as indicated by 36^a in dotted lines, Fig. 1, and near their upper ends they may be suitably secured together by means not shown. Intermediately they pass on opposite sides of the arm 45, which is journaled at the mid portion of the shaft 41 and carries at its upper end a cross plate 46 which serves to hold the sticks 44 in co-

action with the pinions. This pinion mechanism, in connection with the long handles 44 provides means for raising and lowering the dipper as desired.

5 To enable the efficient operation of the pinions 42 or the shifting in or out the head 30, I provide the following mechanism. Suitably carried by the boom is a driving engine or motor 50. This engine is shown
10 as a steam engine mounted on a base 51 connecting the boom proper with the upright braces 25. The connecting rod of the engine leads to a crank shaft on which is a pinion meshing with the gear 53 and this
15 gear is shown as being on a shaft 54 which has a pinion 55 meshing with a gear 56 on the shaft 57. These shafts 54 and 57 are carried by the trackway by suitable bearing brackets thereon. On the shaft 57 are a
20 pair of sprocket wheels 60 over which run a pair of sprocket chains 61. These chains may pass over the sprocket wheels 62 carried near the forward end of the horizontal trackway, and may have their ends anchored
25 to ears on a suitable block 66 extending upwardly from the head 30. This is the construction shown in full lines in Fig. 1 and enables the engine, when operated, to shift
30 the upper end of the short dipper arm 31 in or out along the trackway, according to the direction of operation of the engine.

To enable the same engine and gearing to elevate or lower the long handles 44 I provide sprocket wheels 67 on the shaft 41 and
35 I connect such wheels with the sprocket wheels 60 by endless sprocket chains, 61^a, shown in dotted lines in Fig. 1. These endless chains may be a portion of the same chains 61, which are shown, in full lines,
40 as anchored to the block 66 and passing around the sprocket wheel 62. To make the change from the latter construction to that where the chains drive the pinions 42, it is only necessary to disconnect the chains from
45 the block 66, remove a section of chain and connect them around the wheels 67 in place of the wheels 62. This is illustrated in the diagram of Fig. 4, wherein 61 represents the chain in its horizontal position and 61^a
50 the chain in its diagonal position where it passes around the wheel 67. To enable the change to be made conveniently I make suitable ones of the chain pins removable. This is illustrated by the pins 68 and 69,
55 which are shown as held by cotters 70 and 71. The removal of the cotters allows the removal of the respective pins, which enables the corresponding portion of the chain to be removed and then the remaining portion may be connected so that the then end
60 links 73 and 74 are connected together by one pin. This will bring the chain to the size shown in dotted lines at 61^a.

The same cable raising mechanism is em-

ployed whichever dipper handle is used. 65
This raising mechanism is shown as comprising a winding drum 80 on the swiveled superstructure and a cable 81 which passes forwardly and upwardly therefrom over a
70 guide sheave 82 adjacent to the rear of the trackway and another guide sheave 83 near the upper end of the boom. This cable is shown as passing around a movable pulley 84 connected with the dipper and thence upwardly around the sheave 85 on the boom
75 and downwardly to the frame of the movable pulley. This multiplication, however, may be varied, as desired.

It is to be understood that, in practice, the dipper shown in full lines at 36 and that
80 shown in dotted lines at 36^a will be one and the same dipper and connected, as desired to either dipper arm. There is space above the superstructure for holding the long sticks 44 horizontally over the super-
85 structure roof when these sticks are idle, as is shown in Fig. 1. Similarly, there is space at the inner end of the trackway for holding the short dipper handle out of the way when it is idle. It will be noticed that
90 the dipper arm 31 is of less diameter than the distance between the outer sides of the two sticks 44. Accordingly, to accommodate either arm between the guides 32 I
95 make them adjustable on the bars 33. This may be accomplished by having transverse slots around the connecting bolts, or the bolts may be removed and the bars set farther back. The angle bars 33 and the lower
100 bars of the trackway stand far enough apart to enable the wider dipper arm 44 to swing conveniently between them. It will, accordingly, be seen that to transform the machine from one type of shovel to another,
105 it is simply necessary to disconnect the bucket, move its former handle to idle position, connect the bucket to the other handle and disconnect the chain and reassemble it for the other drive and adjust the guides
110 32. These changes may be quickly and easily accomplished. It will be seen that the double capacity for operation provided by my invention requires little mechanism in addition to that required for either operation alone.

115 Having thus described my invention, what I claim is:—

1. In an apparatus of the class described, the combination of a dipper or scoop, two interchangeable handles therefor, and mechanism for raising and lowering one handle
120 and for shifting in and out the other handle.
2. In an apparatus of the class described, the combination of a boom, a horizontal trackway thereon, a pinion carried by the
125 boom, a dipper handle coacting with the pinion, a dipper handle movable in and out on the trackway, common driving mecha-

nism for the two handles, and mechanism connecting the same with either handle.

3. In an apparatus of the class described, the combination of a boom, a horizontal trackway carried thereby, a pinion carried by the trackway, a dipper arm whose upper end is guided on the trackway, a dipper arm coacting with the pinion, a motor, gearing driven thereby, and a sprocket chain adapted to connect said gearing, either with the upper end of the horizontally guided dipper arm or with said pinion.

4. In a mechanism of the class described, the combination of a diagonal boom, a horizontal trackway carried thereby, an engine mounted on the boom, gearing driven thereby, a short dipper arm whose upper end is guided by the trackway, a shaft carried by the boom above the trackway, a pinion thereon, a long dipper handle coacting with said pinion, and flexible mechanism connecting the driving gearing with either the upper end of the short dipper handle or with said pinion.

5. In a mechanism of the class described, the combination, with a boom, of a horizontal trackway, a dipper handle, means for guiding its upper end in the trackway, a pair of sprocket chains anchored to such upper end, sprocket wheels for said chains, means for driving said sprocket wheels, a long dipper handle, a pinion for moving the same, a pair of sprocket wheels for driving said pinion, said sprocket wheels being located directly over the path of said chain when shifting the short dipper handle, whereby the same driving pinions may drive the chain for either dipper handle.

6. In a mechanism of the class described, the combination of a boom composed of two members spaced apart, a shaft carried by said boom, a dipper handle operating in the space between the boom, a rack on the dipper handle, and a pinion on said shaft, a trackway secured to the inner side of the boom members and thus spaced apart, a short dipper arm, means for shifting the same in or out on the trackway, and means for swinging the long dipper handle in the space within the trackway.

7. In a mechanism of the class described, the combination of a boom having two members side by side and spaced apart, a long dipper handle operating in the space between the members of the boom, said dipper handle comprising two parallel bars, a shaft carried by the boom, a pair of pinions on said shaft meshing with a pair of racks on the long dipper handle, an arm mounted on the shaft between the pinions and holding the long dipper handle to the pinions, a horizontal trackway carried on the inner sides of the two members of the boom and spaced apart to enable the long dipper han-

dle to swing between them, a short dipper handle, a head for the same mounted in the trackway, and means for shifting said head in or out and for rotating the shaft carrying the pinions.

8. In a mechanism of the class described, the combination, with a boom, of a trackway carried thereby and a pinion carried thereby, a short dipper arm whose upper end is movable in or out on the trackway, a long dipper arm operated by said pinion, and a guide-way beneath the trackway adjustable for the different dipper arms.

9. In a mechanism of the class described, the combination, with a diagonal boom, of a horizontal trackway carried thereby and having two spaced members, a dipper arm having a head guided in said trackway, gearing at the rear of the trackway, a motor for driving said gearing, a shaft carried by the boom above the trackway, a dipper arm having a rack engagement with a pinion on the shaft, said dipper arm being adapted to swing in the space between the members of the trackway, and mechanism connecting said gearing with the shaft and with the head movable in the horizontal trackway.

10. In a mechanism of the class described, the combination, with a diagonal boom, of a horizontal trackway carried thereby, a dipper arm having a head guided in said trackway, gearing at the rear of the trackway, a motor for driving said gearing, a shaft carried by the boom above the trackway, a dipper arm having a rack engagement with a pinion on the shaft, said dipper arm being adapted to swing in the space between the trackway, a pair of wheels on said shaft, a pair of wheels in alinement therewith on the driving gearing, a pair of wheels also in alinement therewith near the forward end of the trackway, and flexible driving mechanism adapted to connect the wheels on the driving gearing with the two wheels on the shaft or pass over the other wheels and connect with the head of the dipper arm.

11. In a mechanism of the class described, the combination, with a boom and a horizontal trackway, of two dipper handles, one movable up and down across the boom and one shiftable in and out on the trackway, of driving mechanism common to both operations and connecting mechanism between the same and the two dipper arms respectively.

12. In a mechanism of the class described, the combination, with a wheel truck and a superstructure swiveled thereon, of a boom carried by the superstructure, a trackway carried by the boom, a driving pinion carried by the boom, a comparatively short dipper arm whose upper end is guided in the trackway, a comparatively long dipper arm passing through the boom and coacting with said pinion, and means whereby said latter

dipper arm may stand substantially horizontally above the superstructure when idle and the former dipper arm may depend substantially idle at the rear of the track-
5 way, and a dipper adapted to be interchangeably connected with either dipper arm.

In testimony whereof, I hereunto affix my signature in the presence of two witnesses.

HOLLIS H. HARRIS.

Witnesses:

C. A. WEBER,
H. B. NEWTON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."