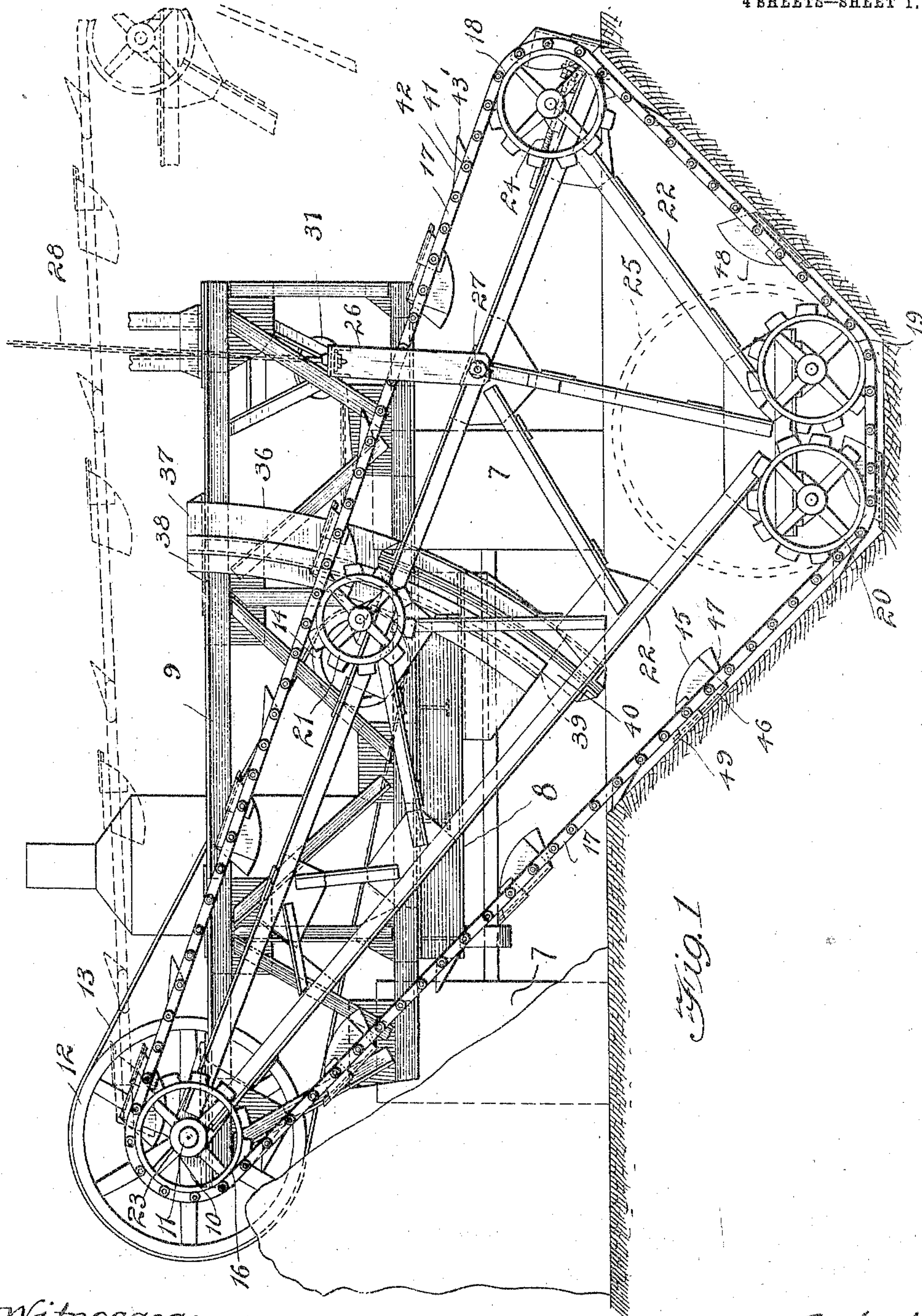


N. RONNEBERG.
EXCAVATING MACHINE.
APPLICATION FILED MAY 24, 1909.

967,440.

Patented Aug. 16, 1910.

4 SHEETS—SHEET 1.



Witnesses:—

Alv. Fernstromaker
Louis H. Green

by

Inventor:

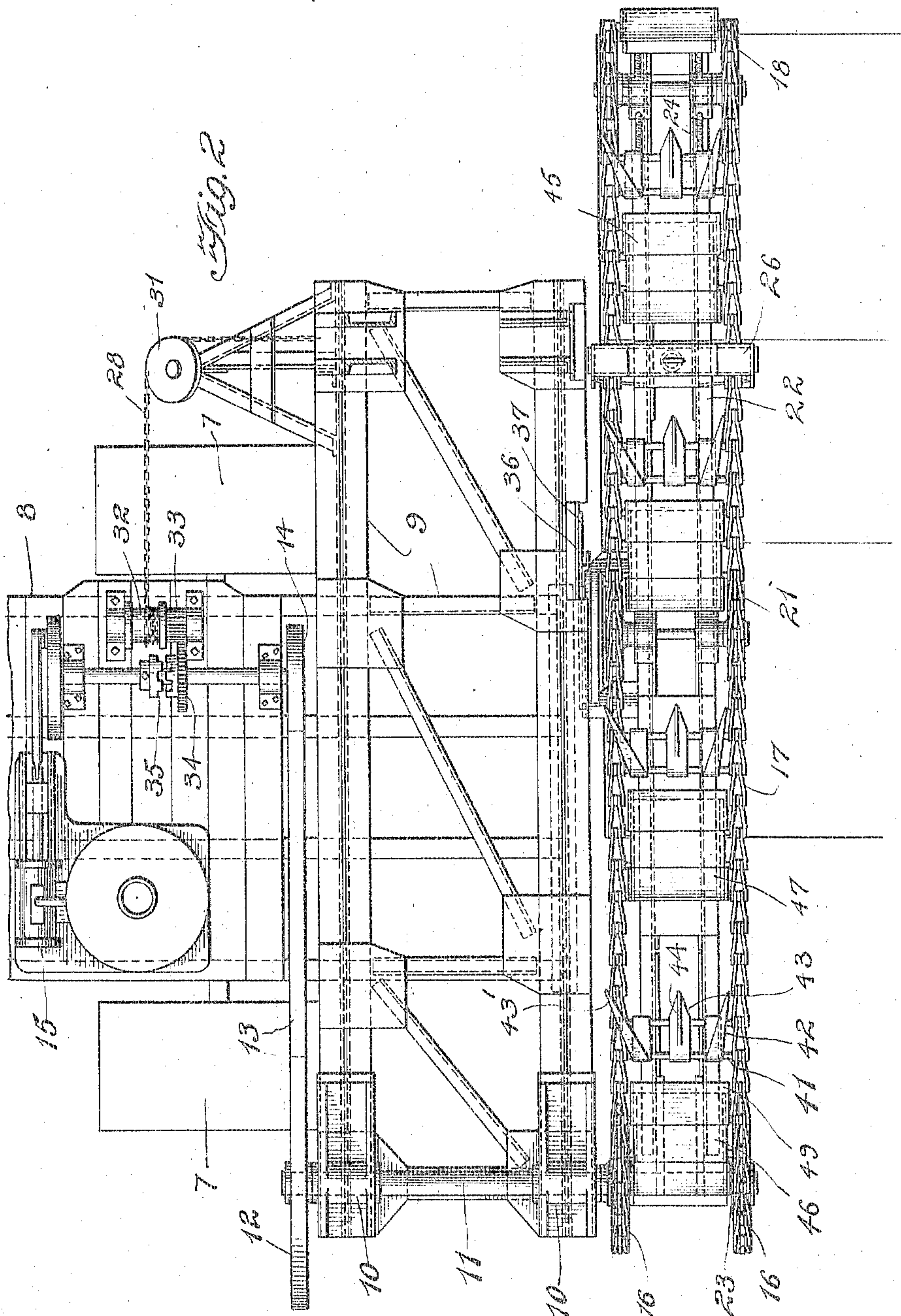
Nathal Ronneberg,
Glenn S. Noble
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4 SHEETS—SHEET 2.



Witnesses:-
Wm. H. Yagle
Chas. H. Henshaw

by

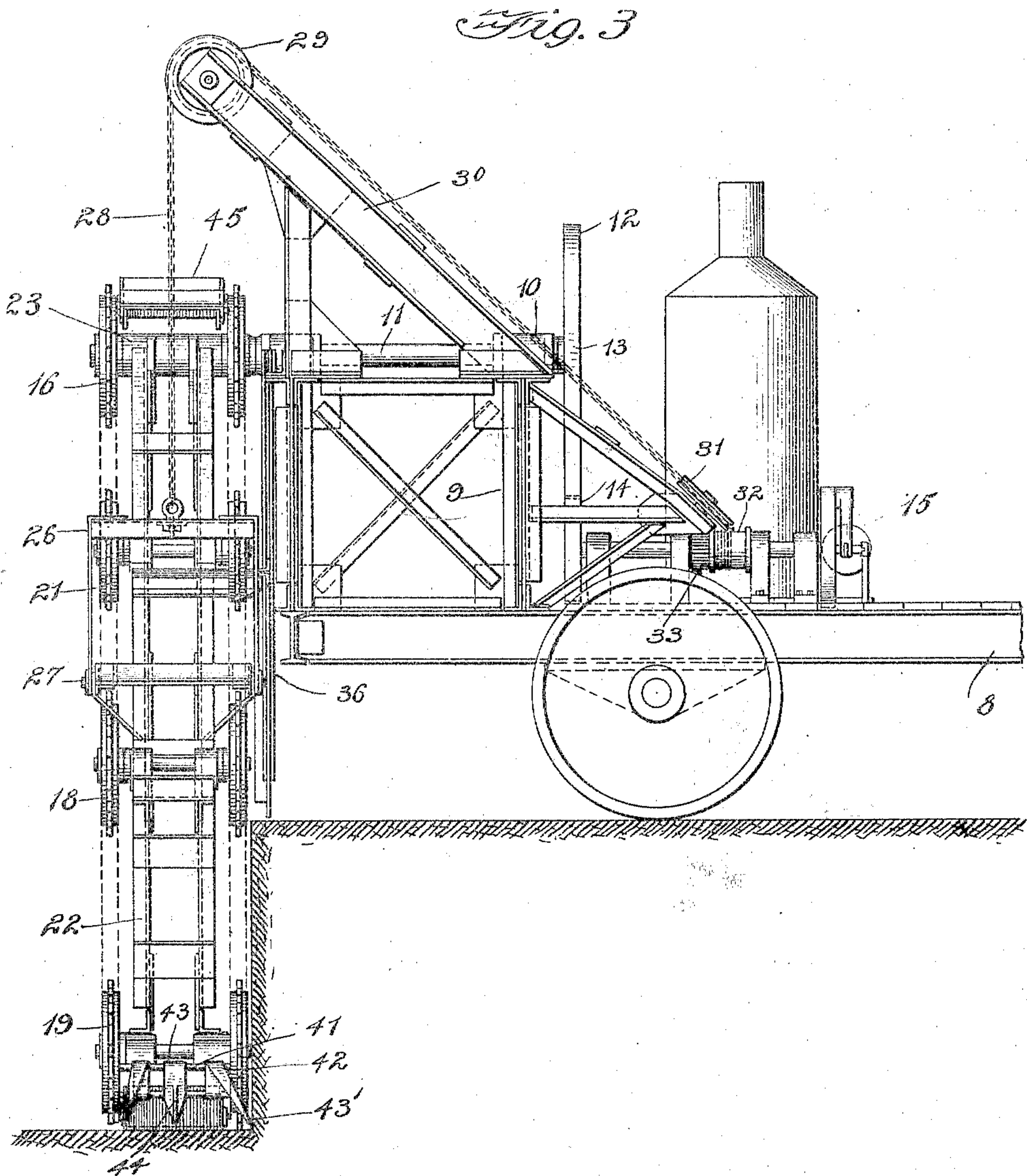
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4 SHEETS—SHEET 3.



Witnesses:-

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4 SHEETS—SHEET 4.

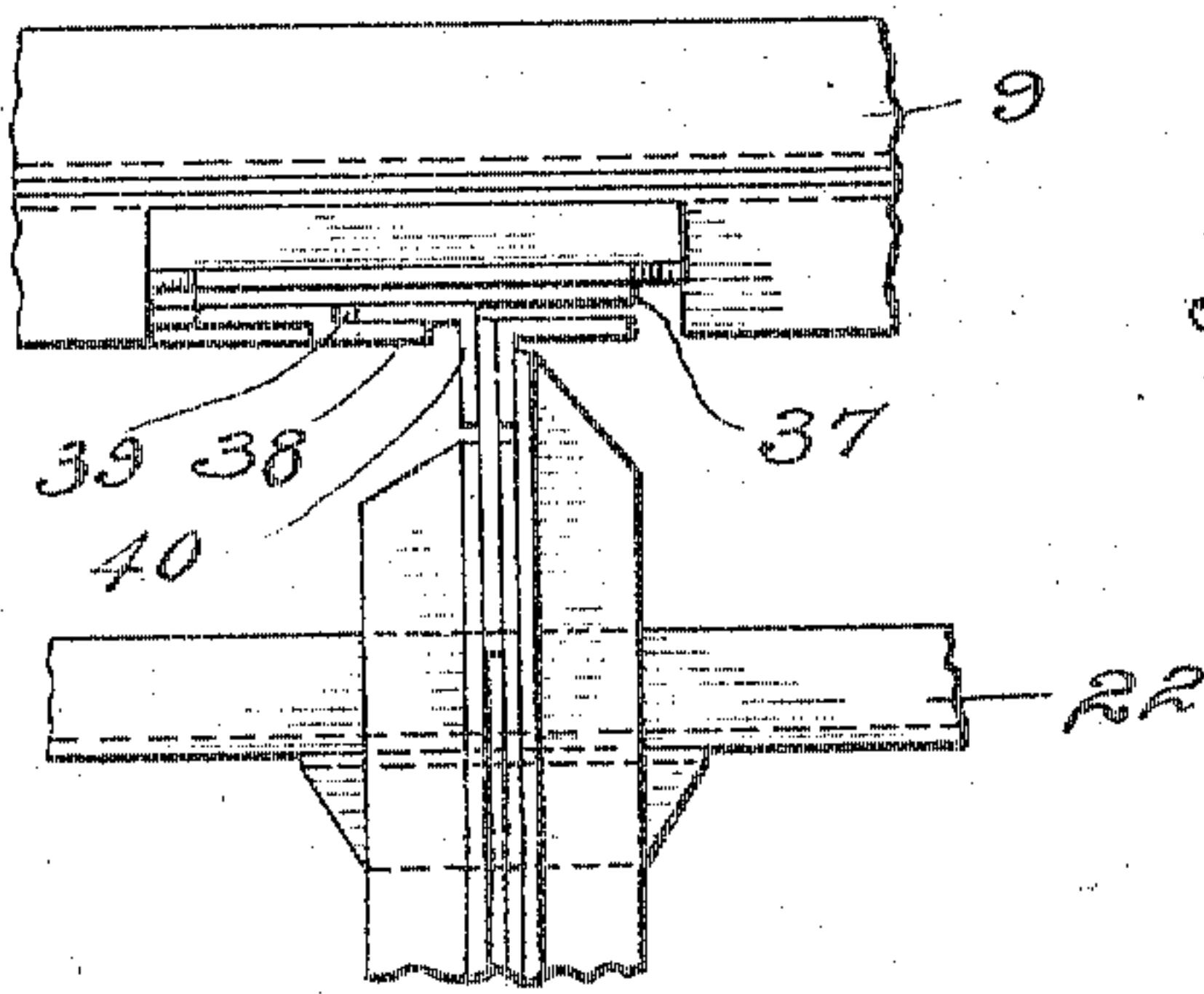


Fig. 4

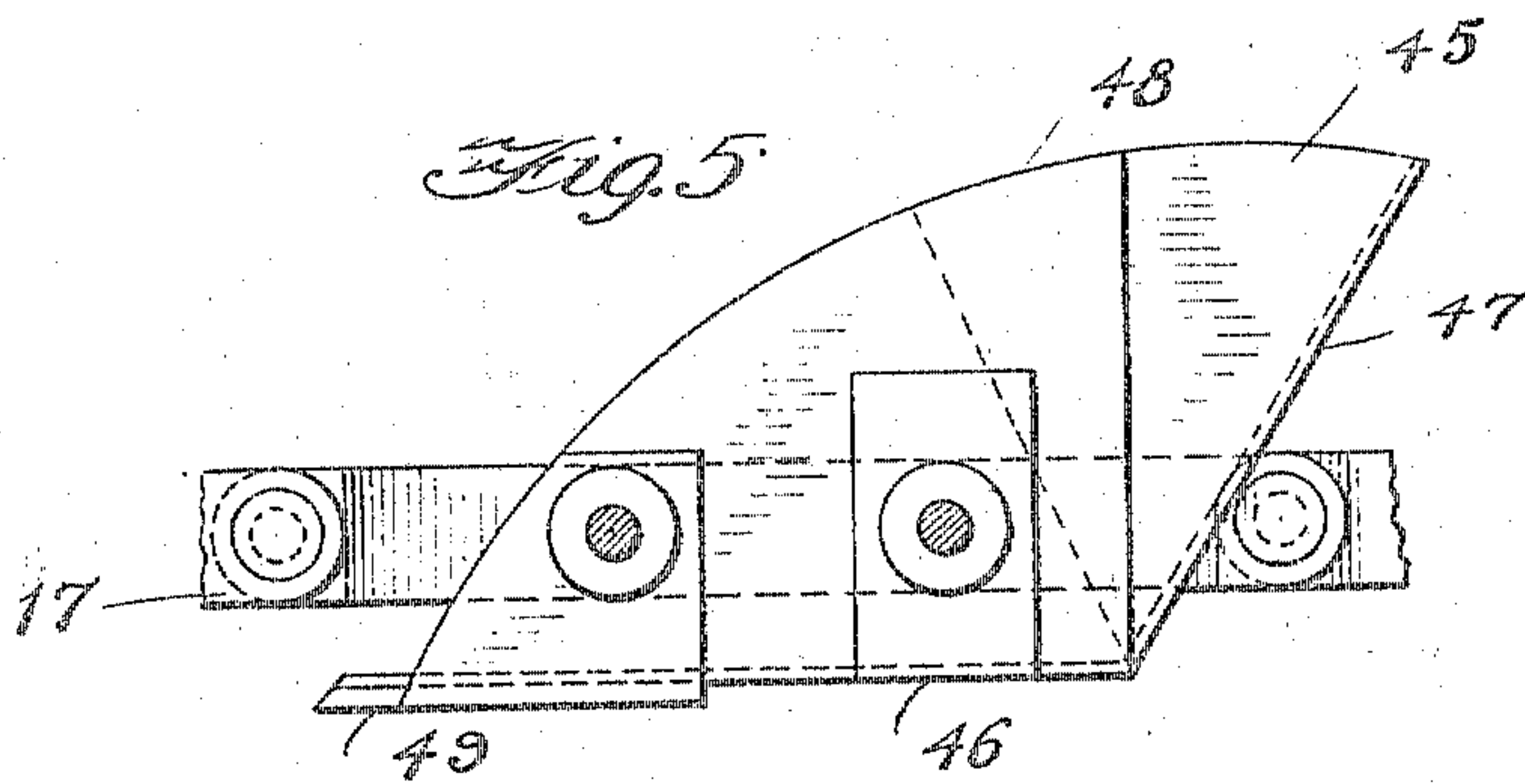


Fig. 5

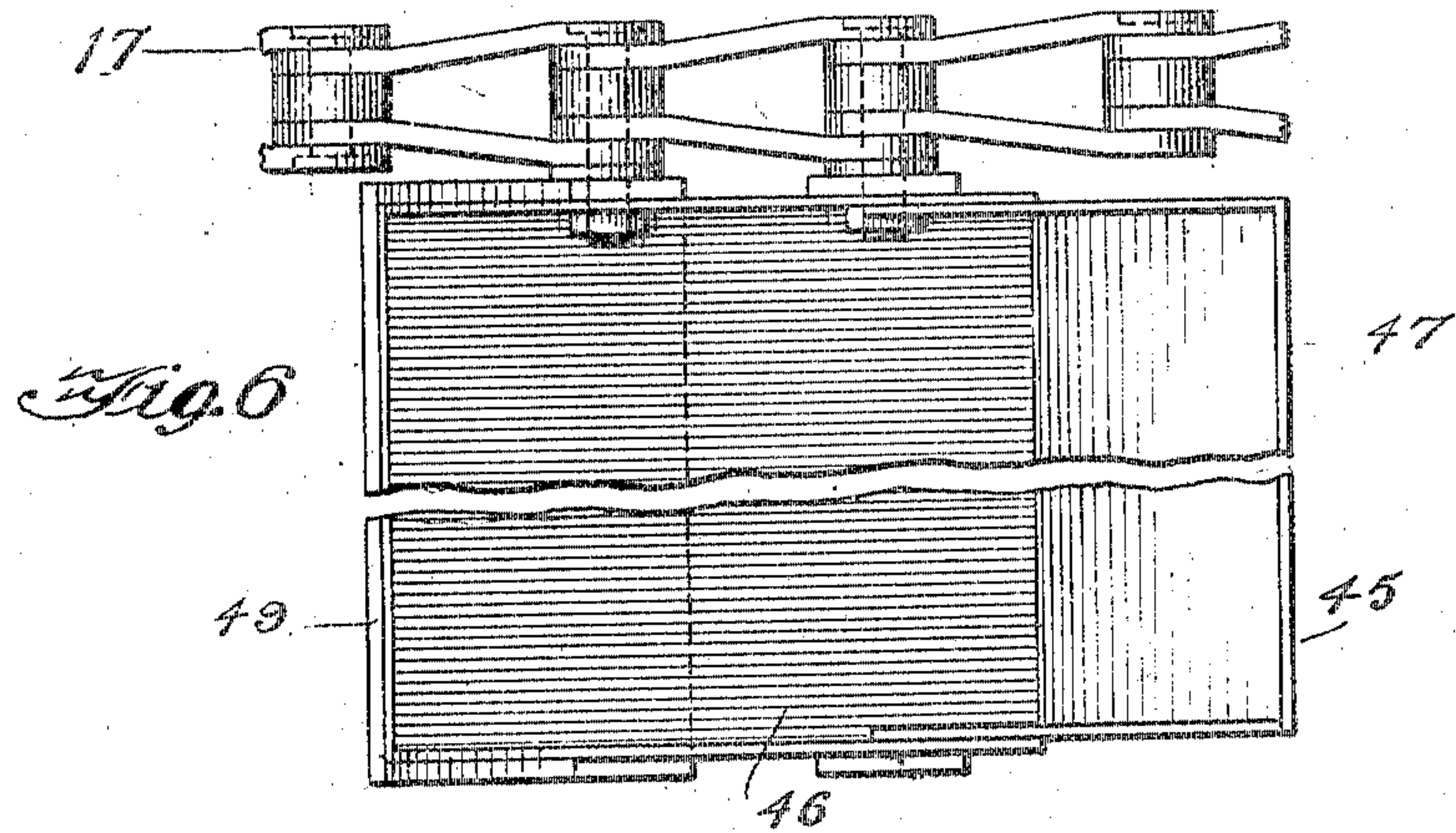


Fig. 6

Witnesses.
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UNITED STATES PATENT OFFICE

NATHAL RONNEBERG, OF CHICAGO, ILLINOIS.

EXCAVATING-MACHINE.

967,440.

Specification of Letters Patent. Patented Aug. 16, 1910.

Application filed May 24, 1909. Serial No. 497,936.

To all whom it may concern:

Be it known that I, NATHAL RONNEBERG, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Excavating-Machines, of which the following is a specification.

It is frequently desirable to make drainage, irrigating, and other ditches, with a substantially uniform cross-section and with even properly beveled side slopes, so that when water is admitted, there will be little likelihood of the banks being washed or the bottom of the ditch becoming filled with material, which would otherwise occur if the sides were left rough or uneven. It has heretofore been proposed to make such ditches by means of machines wherein a single digging scoop, for instance, is attempted to be forced along lines corresponding with the side slopes and bottom of the ditch, but such machines have been found defective in many particulars and occasion heavy strains on the operating parts on account of the varying load caused by the bucket's being first forced through the material and then being relieved as it finishes the cut.

My improved excavating machine is designed to overcome these objections and such other objections as I have noted in machines heretofore constructed; and its further objects are to provide a simple and effective mechanism for digging ditches, canals, or the like, which will require a minimum amount of driving power which is substantially uniform at all times, and which will effectively cut or excavate the ditch, with smooth sides and bottom and with uniform cross-section. I attain these objects and such other advantages as will appear hereinafter, by means of the apparatus shown in the accompanying drawings, in which—

Figure 1 is a rear elevation of a machine embodying my invention, the excavating apparatus being shown in full lines in digging position and partially indicated by dotted lines in raised position; Fig. 2 is a top plan view of the same, parts being broken away or shown in diagram for convenience in illustration; Fig. 3 is a side view of the same; Fig. 4 is a detail of the guide for the excavator frame; and Figs. 5 and 6 are details of the scoops or buckets, showing the method of attaching them to the chains.

As shown in these drawings, 8 indicates a truck preferably provided with large traction wheels 7 so that it will sustain the weight of the excavating apparatus, without the use of special tracks, and having at its rear end a transverse truss or frame-work 9 preferably extending, for large sized machines, for some distance on either side of the truck. At one end of the truss or frame 9 are bearings 10 which carry a large supporting and driving shaft 11. This shaft is driven from its forward end by means of a suitable wheel or pulley 12 which is in turn driven by means of a belt or chain 13 from a wheel or pulley 14 which is in turn driven through suitable connections from a motor or engine indicated at 15.

On the rear or projecting end of the shaft 11 are mounted a pair of sprocket wheels 16 which drive chains 17 carrying the digging and elevating devices. The chains 17 pass over guide wheels or sprockets 18, 19 and 20, and if desired, other idler sprockets, such as indicated at 21 may be used for supporting the chain along its upper reach. The wheels 18 to 21, inclusive, are mounted on a substantially triangular frame 22 which is pivoted at 23 to the shaft 11, the arrangement being such that this frame may be freely swung from such shaft as a center. Some of the guide wheels, for instance those indicated at 18, are preferably provided with adjusting screws 24 for regulating the tension on the chains 17. The frame 22 is so shaped and the sprocket wheels 18, 19 and 20 so mounted thereon that the lower reaches of the chain will substantially conform to the shape of the bottom of the completed ditch. While I have shown two pairs of wheels 19 and 20 at the bottom portion of the frame so as to give a short horizontal bottom to the ditch, one set of wheels, such as indicated by dotted lines at 25, might be used, in which case the bottom of the ditch would have a circular outline corresponding to the position of the buckets and diggers as they pass around the single set of wheels. The frame 22 is provided with a yoke 26 pivoted thereto at 27 at a distance from the outer end thereof to which is attached a chain or cable 28 which passes up over a guide sheave 29 mounted on a supporting beam 30 on the truss or frame 9 and then down over another guide sheave 31 to a winding drum 32. The winding drum is driven in any desired manner, as for in-

stance by means of a gear 33 which meshes with a gear 34 on the driving shaft of the engine 15, the gear 34 being provided with a clutch 35, so that the drum may be operated when desired. By means of this arrangement the frame 22 may be swung up and down on the shaft 11, thereby controlling its vertical movement. The position of the yoke 26, with reference to the frame, is such that it will support a large portion of the weight of the frame and its connected parts, thereby taking the strain off from the shaft 11. In order to further insure the proper swinging movement of the frame, I prefer to provide an additional guide and for this purpose have arranged a segmental guide member 36 on the truss 9, which consists of plates 37 and 38 which are arranged so as to leave a groove 39 therebetween into which groove fits an angular movable guide member 40 which is secured to the side of the frame 22, the arrangement being such that, as the frame 22 is raised or lowered, the guide assists in preventing lateral movement of the frame.

Among the important features of this invention are the special plows or digging devices and the carrying buckets together with the particular arrangement of the same in connection with the chains. At desired intervals, along the chains 17, I provide cross-bars 41 upon which are mounted scrapers or digging devices 42 and 43. The digging devices 42 are provided with sharp laterally and outwardly projecting cutting blades 43', the ones on the front side of the frame being extended so that they will cut beyond the plane of the chain 16 in order to give a sufficient clearance for this chain; the ones on the opposite side may be arranged in a similar manner, but this is not as essential, as ordinarily the chain at the rear will pass down through the space already excavated. The central plows or diggers 43 are preferably provided with downwardly projecting blades or ribs 44, which will tend to hold the cutting apparatus against lateral movement. These diggers or cutting devices preferably project a sufficient distance beyond the chains so that they will do substantially all of the cutting, whereby the buckets will only need to carry up the material and perhaps trim off any projections left by the main diggers. The buckets 45 are preferably arranged with their bottoms 46 substantially parallel with and projecting slightly beyond the outer edges of the chains 17, the arrangement being such that the point of connection will be as near as possible to the digging side in order to avoid lateral strains on said connections and on the chains. The backs 47 of the buckets are preferably arranged at an angle of greater than ninety degrees to the bottoms 46, so that the material will be readily discharged

when the buckets pass up over the sprocket wheels 16. The body of the bucket is preferably formed of a single piece of metal, for instance sheet steel, with the tops of the sides curved as indicated in Fig. 5, the sides being overlapped as shown at 48 in order to allow for the bending up of the back portion 47. The front lower edge of the bucket is preferably reinforced with a cutting edge 49 of suitable material to stiffen the edge and also to withstand the wear at this point.

The operation of my improved digging apparatus will be readily understood by one skilled in the art, from the above description and the accompanying drawings. When the ditch is to be started, the frame 22 is gradually lowered from its elevated position until the lower reaches of the chains bring the digging devices into contact with the ground. The dirt will then be loosened by the digging devices 42 and 43 and will be gathered into the buckets 45 and carried up until the buckets pass over the sprocket wheels 16 when the buckets will be inverted and the material discharged, making the spoil pile at a distance from the sides of the ditch. When the frame has been lowered a sufficient distance until the desired depth has been reached, it will again be raised by means of the chain or cable 28 until the digging devices clear the ground, when the truck 8 is moved forward substantially the width of the excavating devices, when the frame 22 is again lowered and the operation repeated, this being continued until the ditch is completed.

It is obvious that various changes in the details of construction or arrangement of parts of my improved apparatus may be made without departing from the spirit of this invention, and therefore I do not wish to be limited to the exact arrangement shown and described, but

What I claim and desire to secure by Letters Patent is:

1. In a machine for digging ditches, the combination of a truck, a shaft supported at the rear end of said truck, means for turning said shaft, a substantially triangular frame pivotally mounted at one of its apexes on said shaft, driving sprockets secured to said shaft, guide sprockets arranged at the other apexes of said frame, chains around said driving and guide sprockets, excavating and elevating devices carried by said chains, said frame being arranged transversely of the line of progression of said truck and one of the apexes of said frame being directed downwardly so that the lower reaches of the chains will conform substantially to the shape of the ditch to be excavated, means for raising and lowering the free end of said frame, and a guide for guiding said frame in its up and down movements.

2. In an excavating apparatus, the combi-

nation of a movable truck, a truss mounted transversely to said truck at the rear end thereof, a shaft mounted at one end of said truss, means for turning said shaft, sprocket wheels on said shaft, chains carrying excavating and elevating devices, passing over said sprocket wheels, a frame pivotally mounted on said shaft and having the lower part of its opposite end, corresponding in shape with the bottom of the ditch to be excavated, guide wheels on said frame to guide the chains around the same, a guideway mounted on said truss, a guide on said pivoted

frame engaging with said guideway, a yoke connected with said frame, and means connected with said yoke for raising and lowering the free end of said frame, the arrangement being such that the material excavated from the ditch will be carried by said chains and elevating devices and discharged at a point at some distance from the side of said ditch.

NATHAL RONNEBERG.

Witnesses:

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A. W. FENSTEMAKER.