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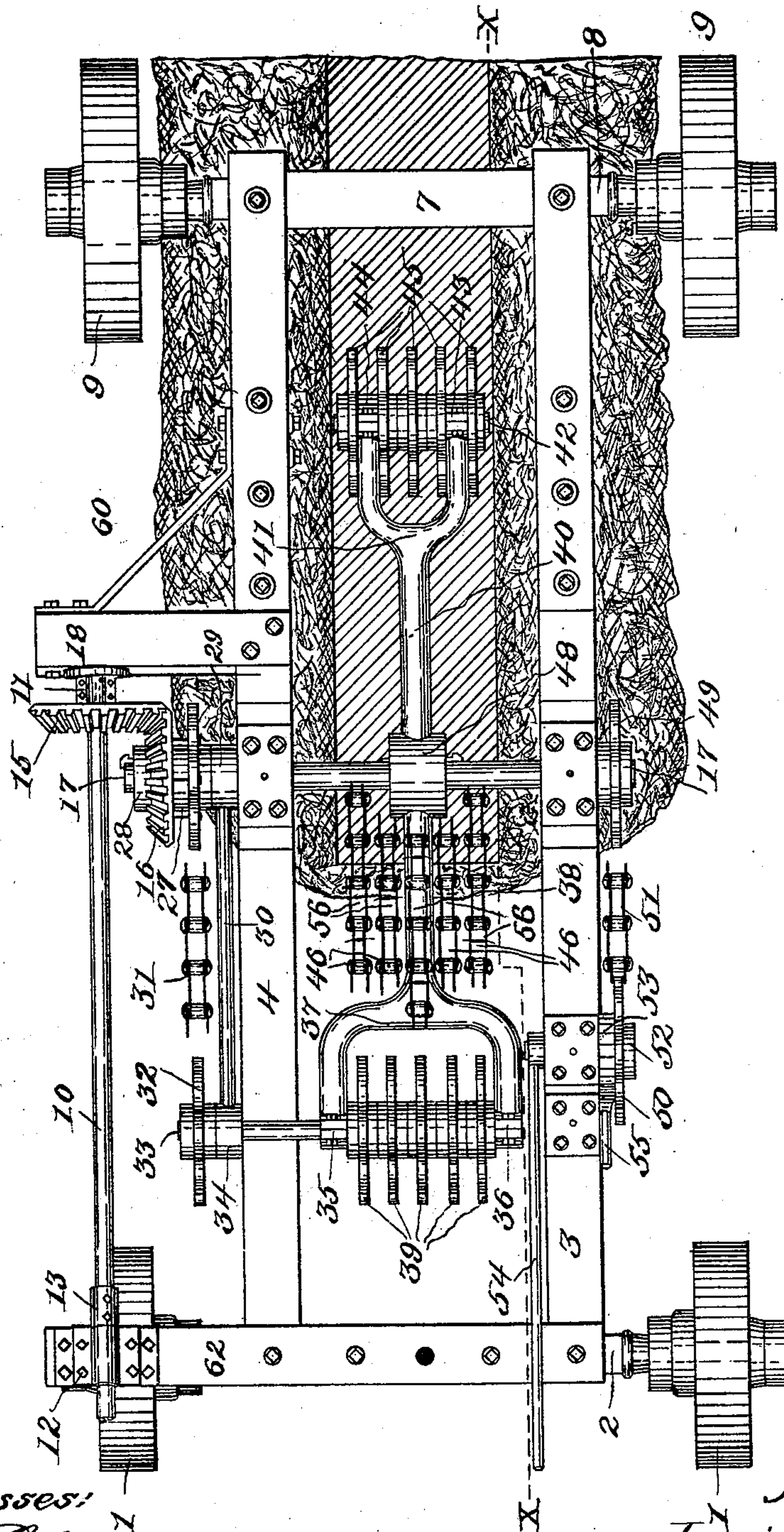
5 Sheets—Sheet 1.

L. A. STANFORD.  
DITCHING MACHINE.

No. 517,774.

Patented Apr. 3, 1894.

Fig. 1



Witnesses:  
Geo. C. Crane.  
Walter E. Allen.

Inventor:  
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Atty.



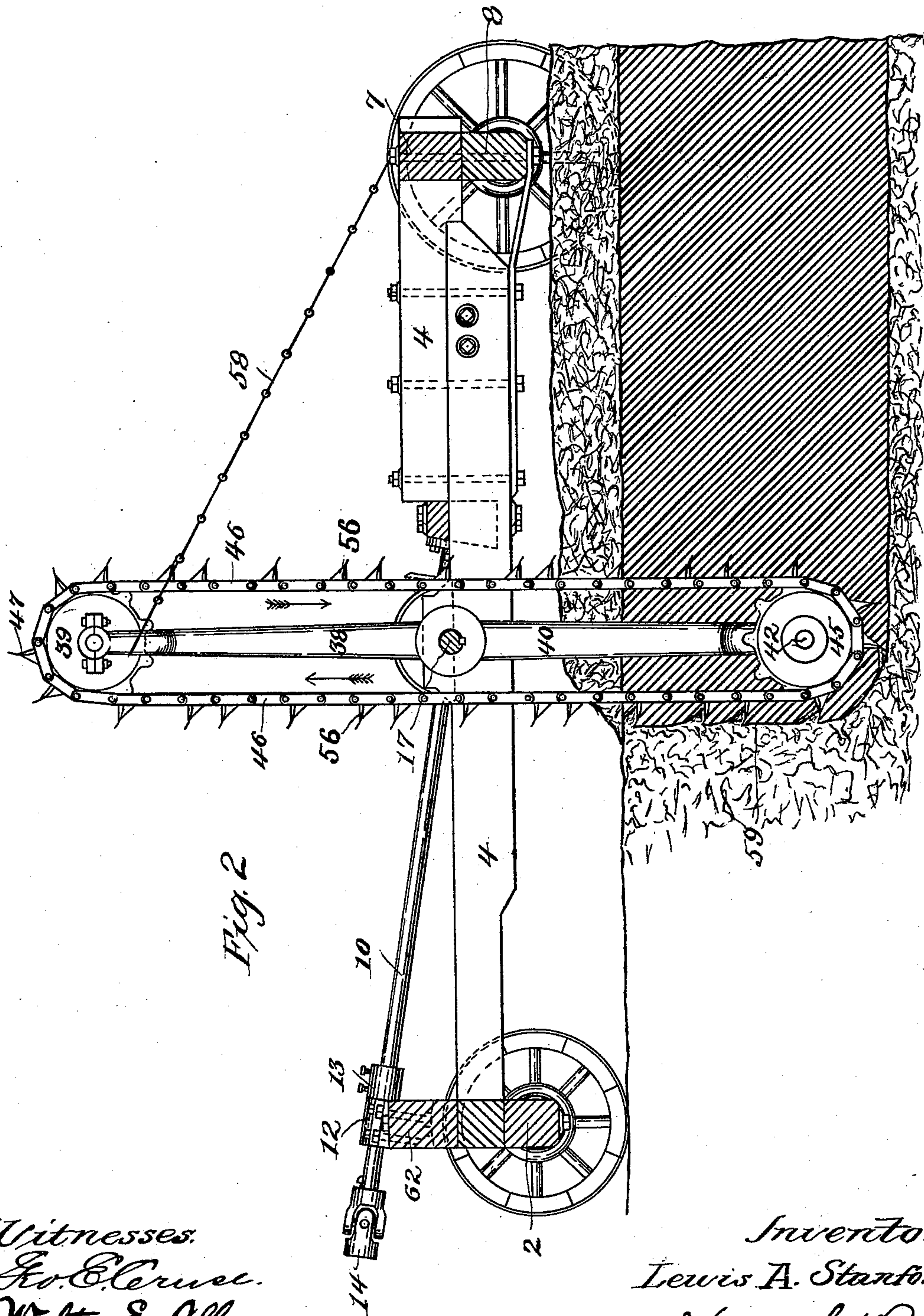
(No Model.)

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L. A. STANFORD.  
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Witnesses:  
Geo. E. Cruise.  
Walter E. Allen

Inventor:  
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Attys.

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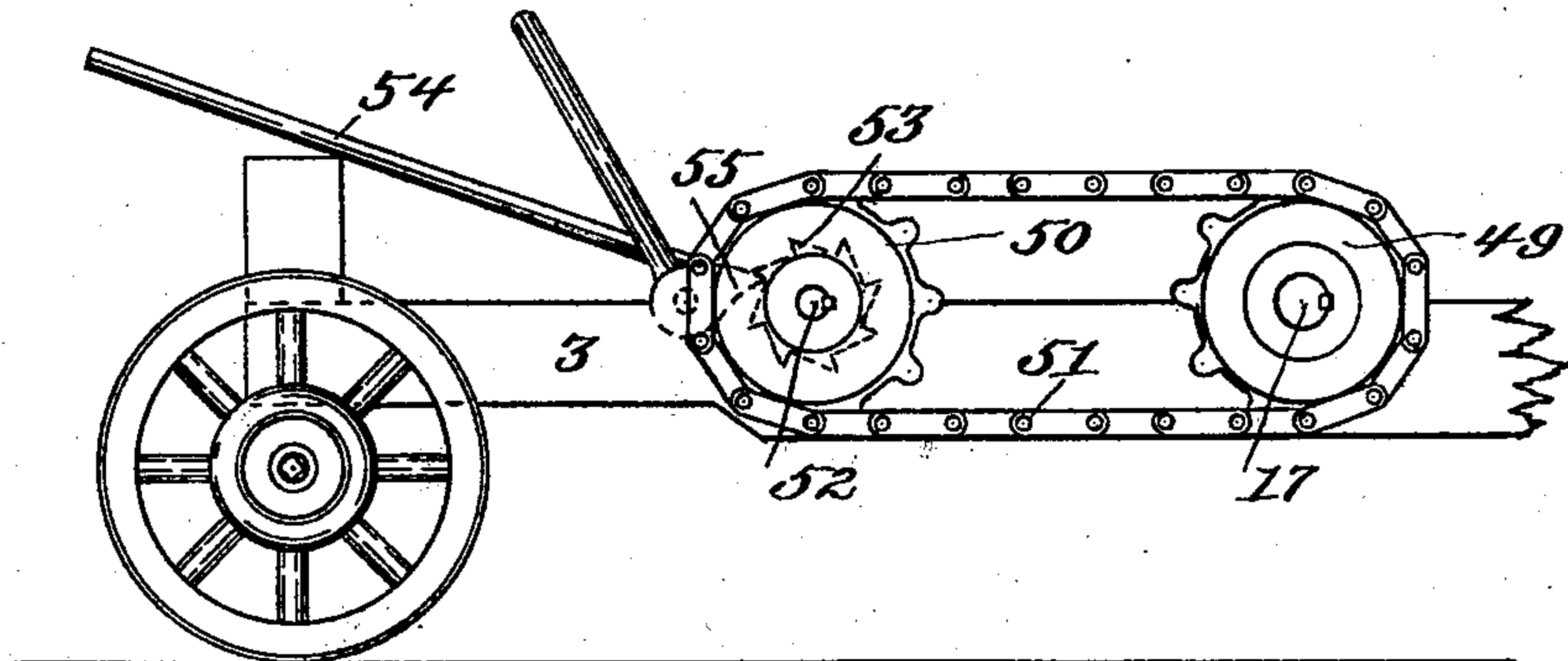
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L. A. STANFORD.  
DITCHING MACHINE.

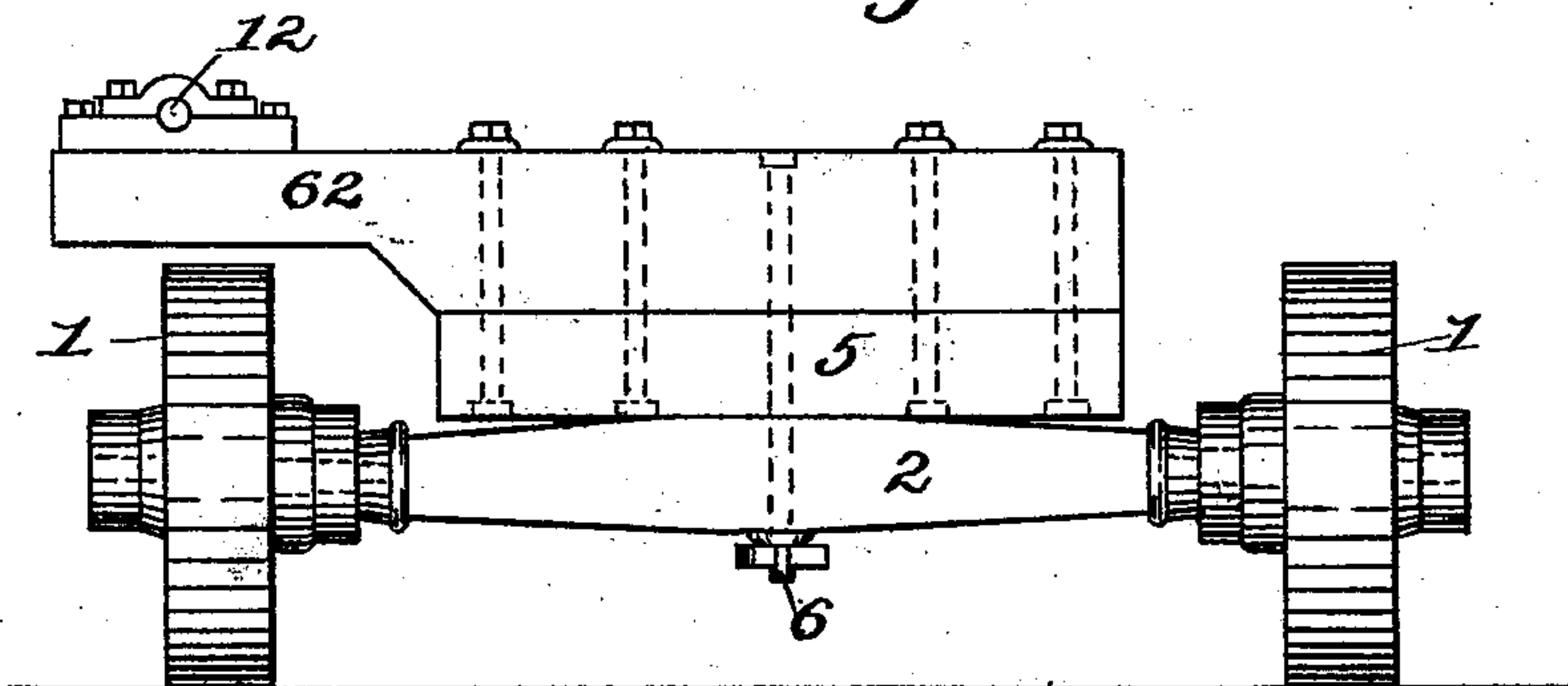
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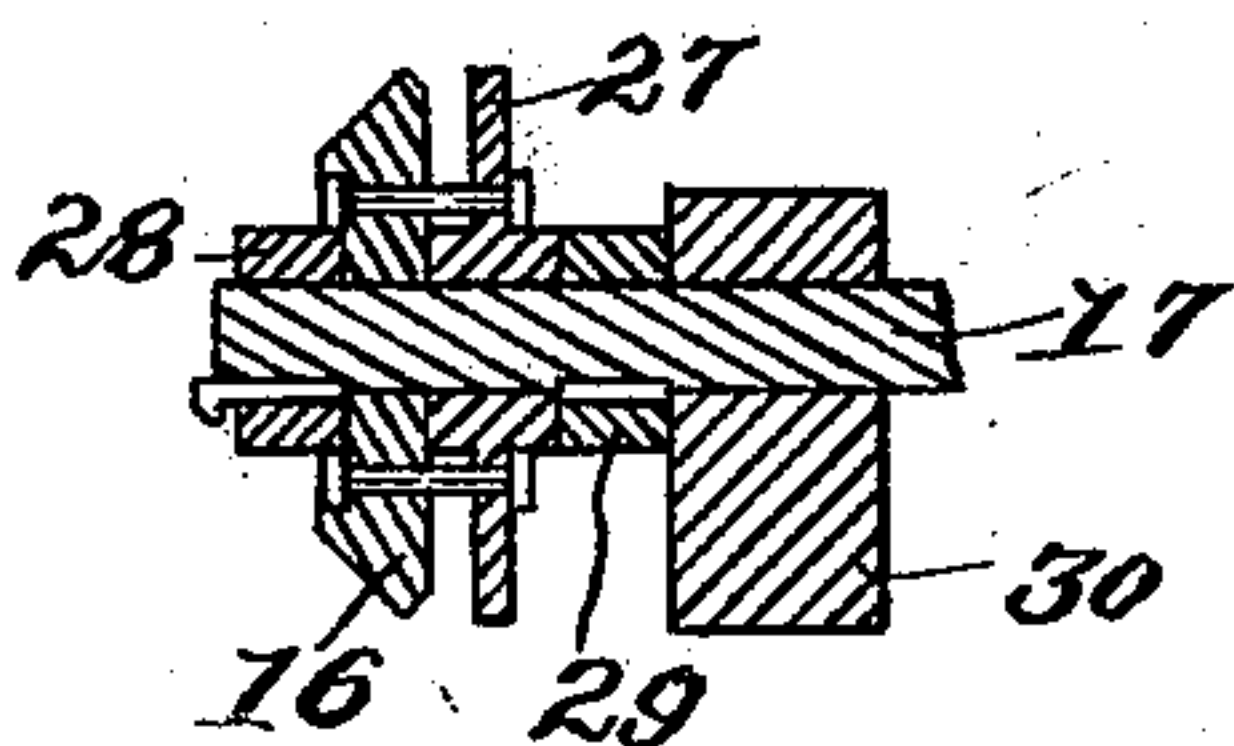
*Fig. 3.*



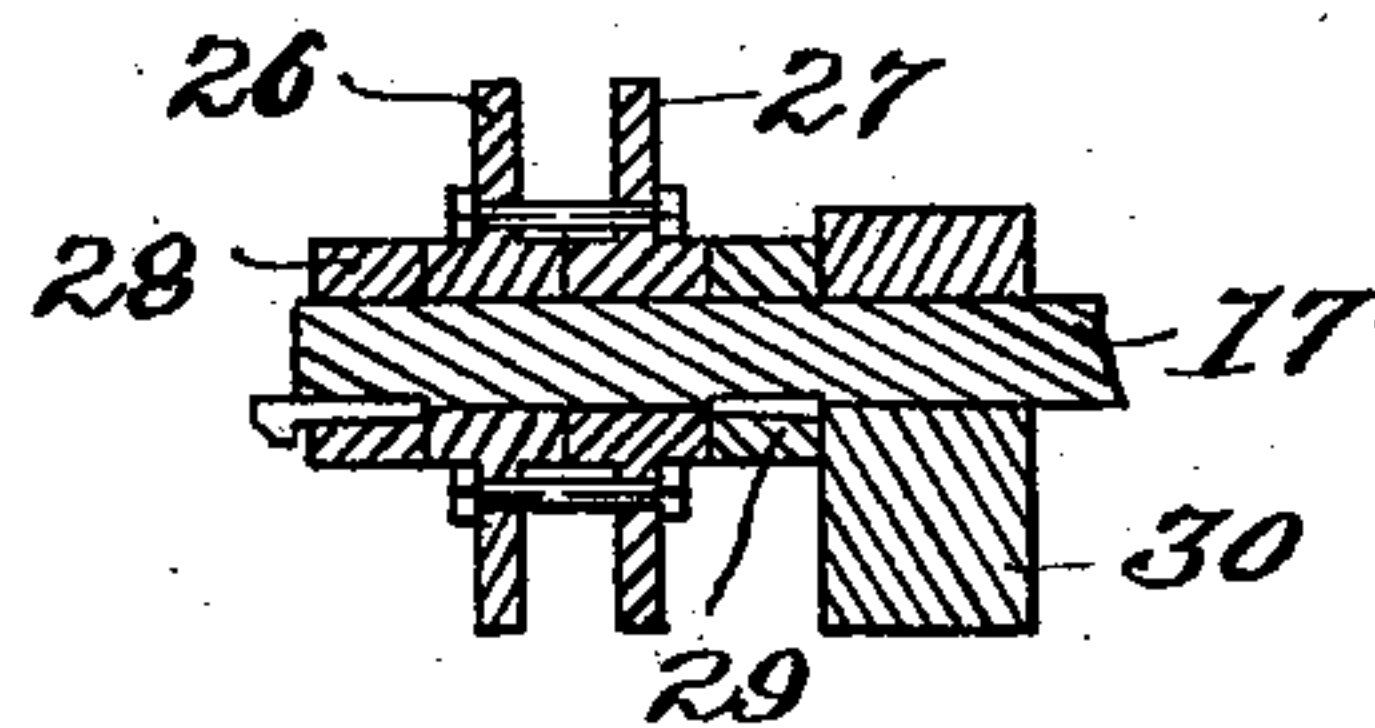
*Fig. 4.*



*Fig. 5.*



*Fig. 8.*



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(No Model.)

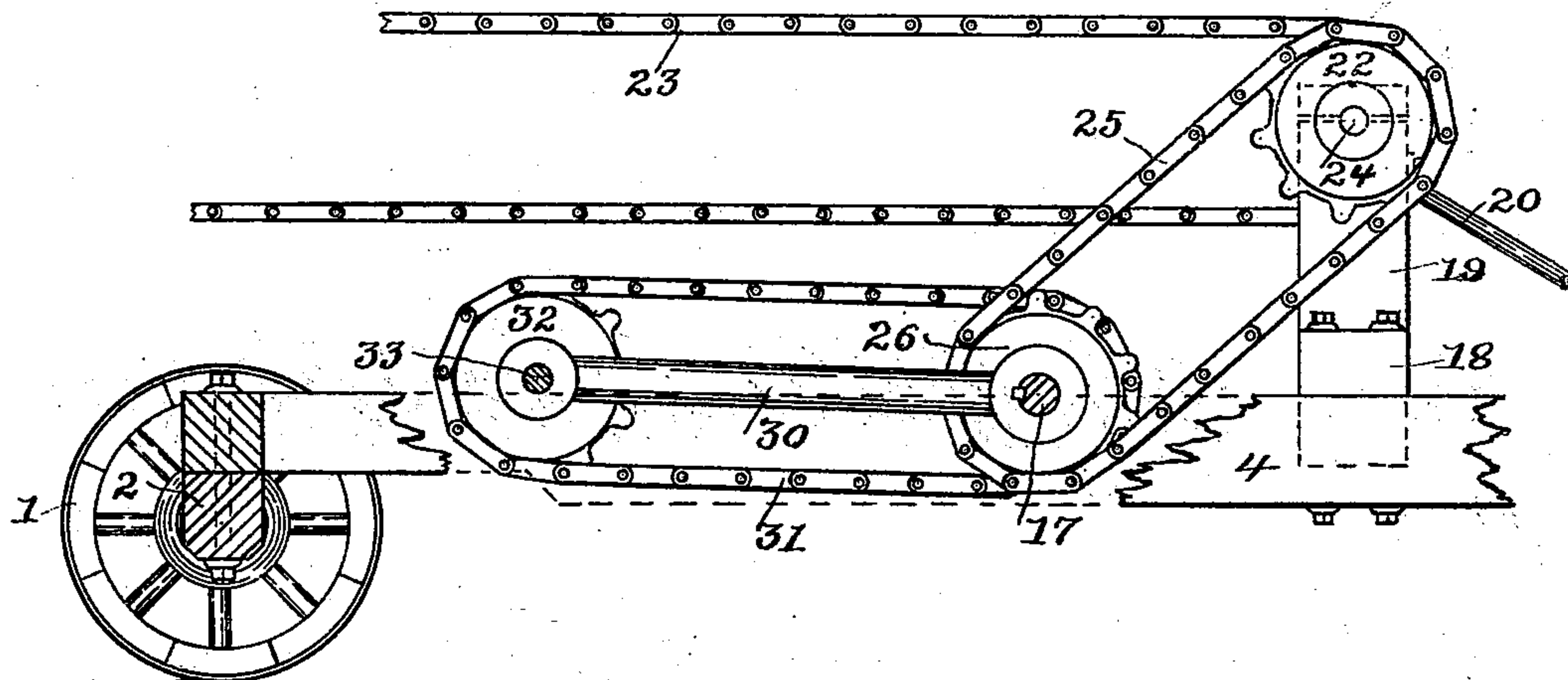
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L. A. STANFORD.  
DITCHING MACHINE.

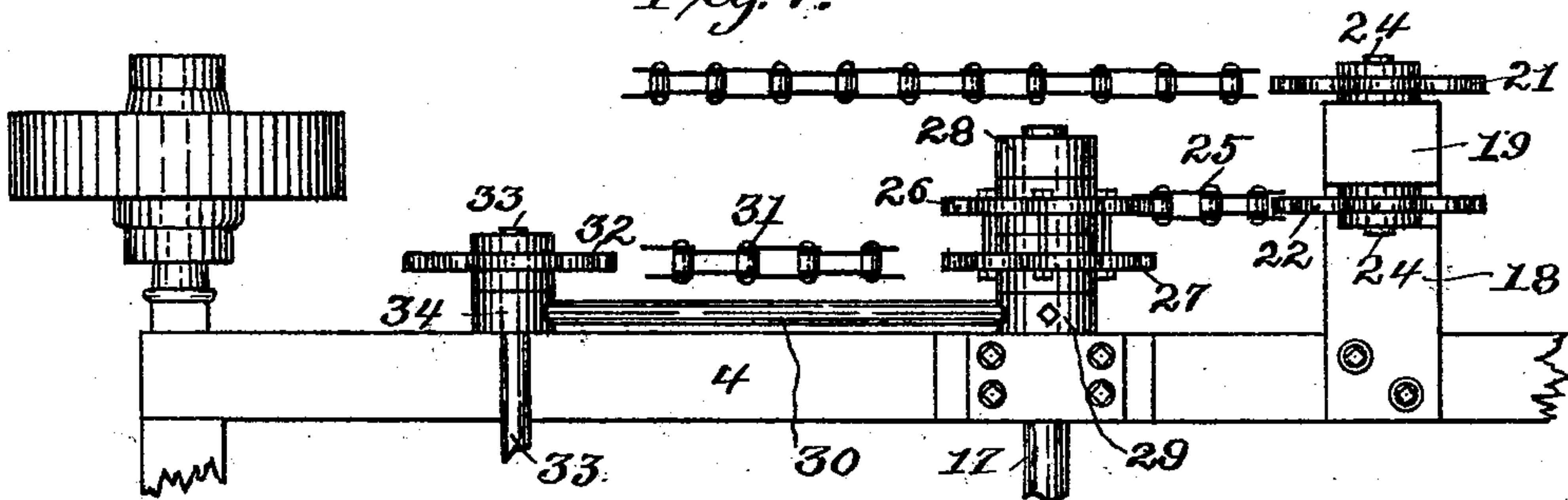
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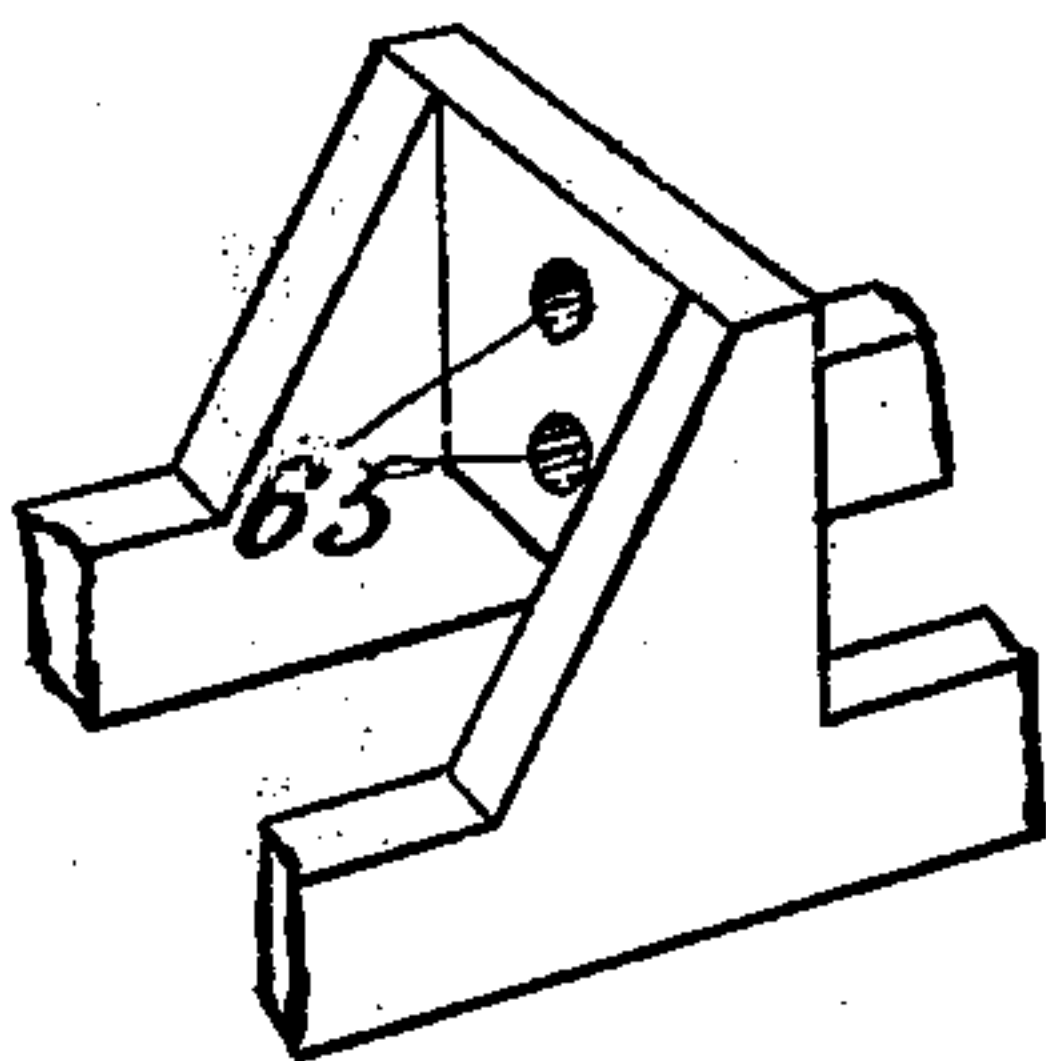
*Fig. 6.*



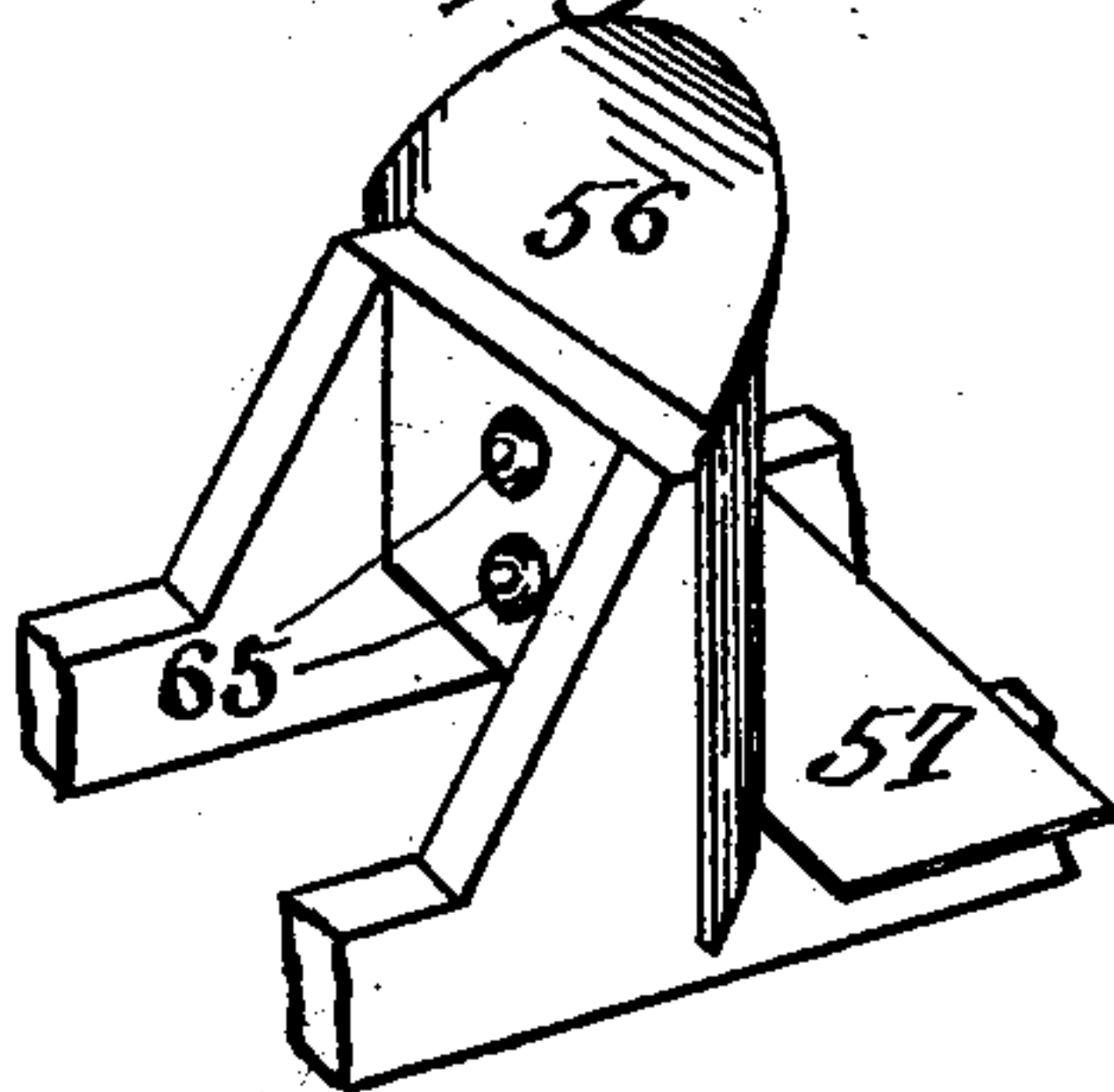
*Fig. 7.*



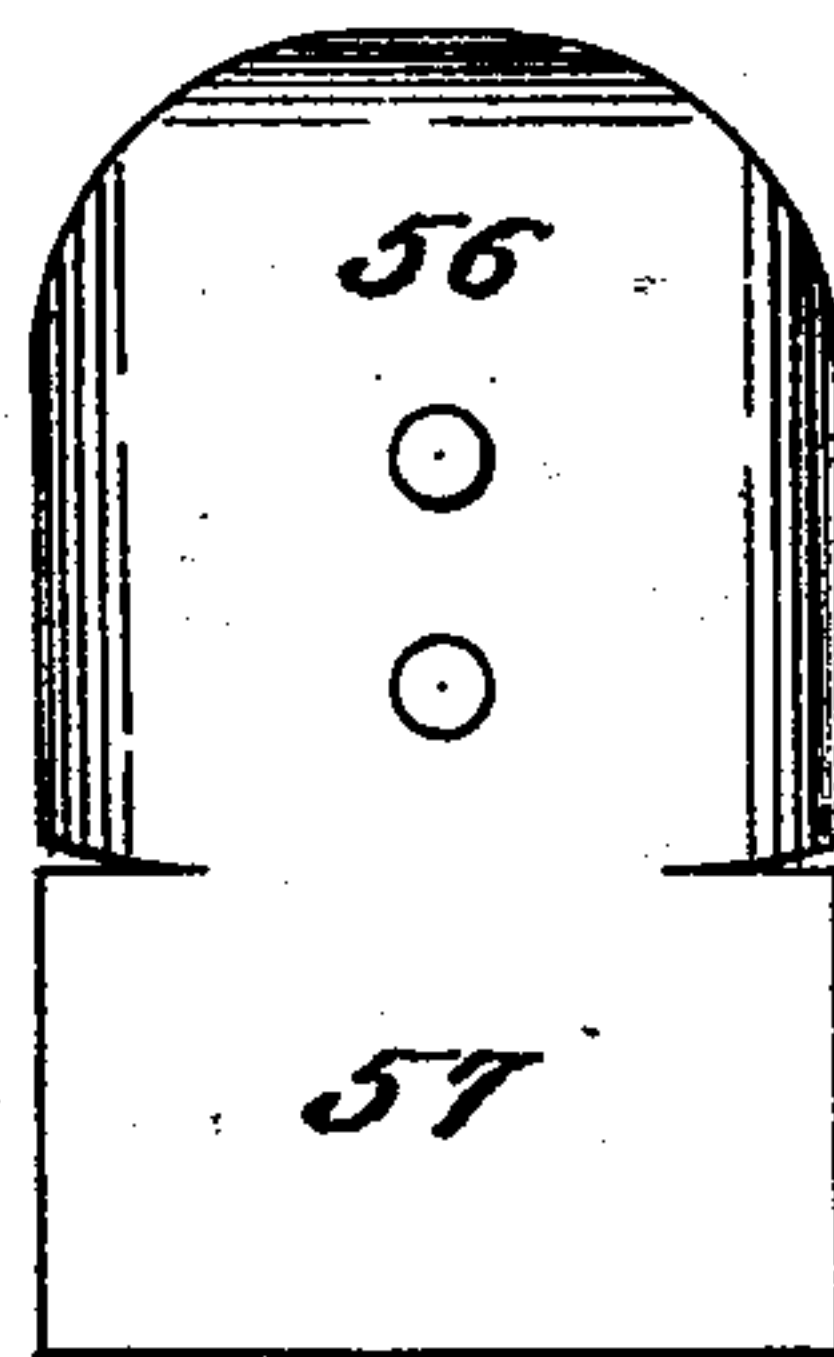
*Fig. 9.*



*Fig. 10.*



*Fig. 11.*



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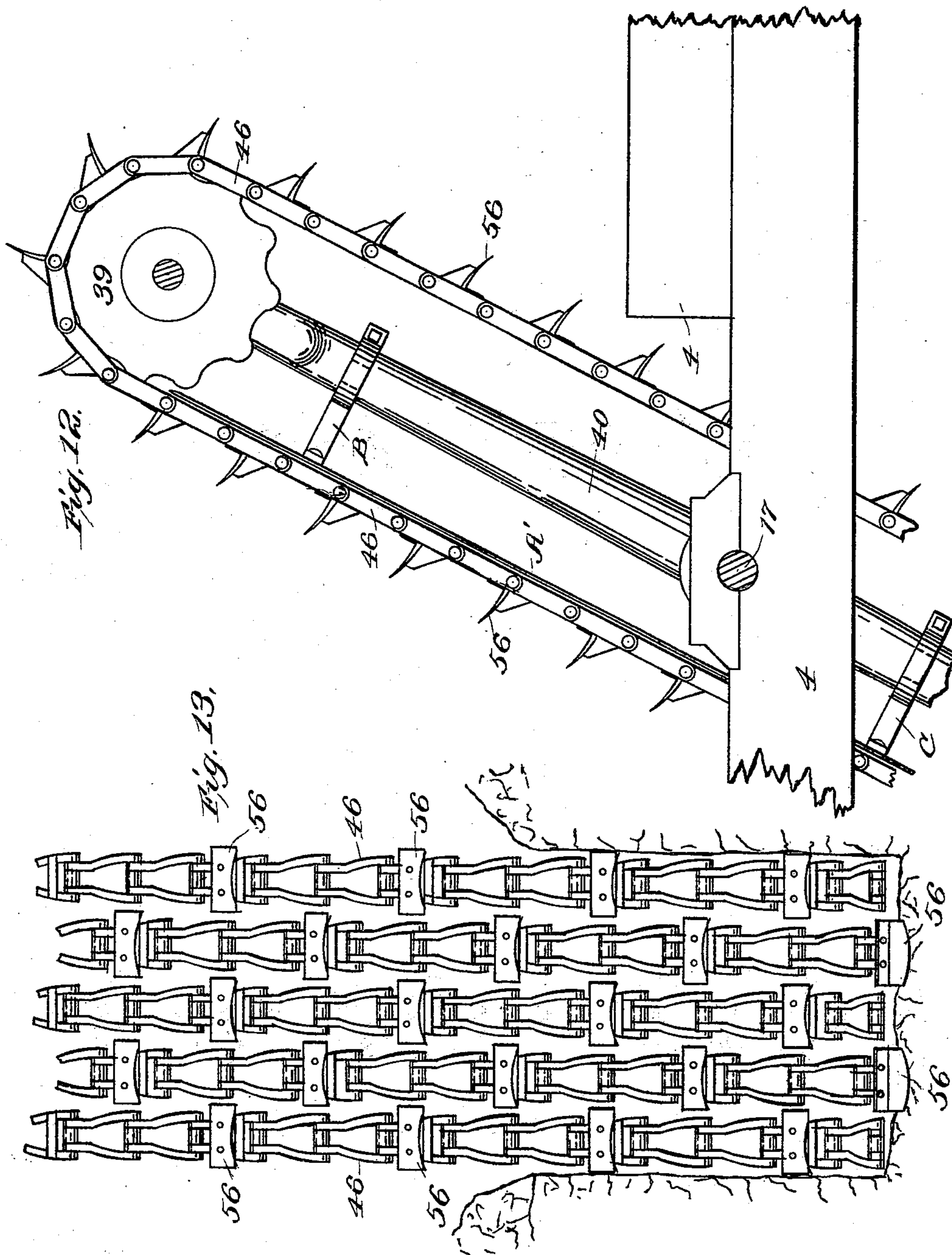
(No Model.)

5 Sheets—Sheet 5.

L. A. STANFORD.  
DITCHING MACHINE.

No. 517,774.

Patented Apr. 3, 1894.



WITNESSES:

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# UNITED STATES PATENT OFFICE

LEWIS A. STANFORD, OF BRADFORD, PENNSYLVANIA.

## DITCHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 517,774, dated April 3, 1894.

Application filed March 25, 1893. Serial No. 467,642. (No model.)

*To all whom it may concern:*

Be it known that I, LEWIS A. STANFORD, a citizen of the United States, residing at Bradford, in the county of McKean and State of Pennsylvania, have invented a new and useful Improvement in Ditching-Machines, of which the following is a specification.

My invention relates to that class of machines used for digging trenches for laying pipe, tile, &c., and also for land irrigation, and the object of my improvement is to provide a simple yet durable and effective trench or ditch-digger which can be readily attached to a traction or an ordinary mounted boiler and engine and be driven by the steam power thereof. I attain these objects by the mechanism illustrated in the accompanying drawings in which—

Figure 1 represents a top view of my ditching machine as it appears when not at work and ready for transportation, with the dirt-elevating device in its inoperative position. Fig. 2 represents the ditching machine with the dirt-elevating device in operative position cutting a ditch or trench, and shows as does also Fig. 1 the mechanism for transmitting power to the device. Fig. 3 represents a portion of the left-hand plate (looking toward the motive power), showing the means for elevating or lowering the dirt-elevating device. Fig. 4 represents an elevation of the front of the ditching machine showing the extended cross-piece that supports the shaft journal box. Fig. 5 represents a cross-section view of the driven miter wheel, bolted to the driving sprocket-wheel, and the means for supporting the same on the end of the main shaft. Fig. 6 represents a side elevation, and Fig. 7 represents a top view of another method of transmitting power to the ditching machine. Fig. 8 represents a cross-section of, and the method of connecting the driven and driving sprocket-wheels that are on the main shaft shown in Figs. 6 and 7. Fig. 9 is a perspective view of a section of the chain link that carries the spade blade. Fig. 10 is a perspective view of the same as Fig. 9 with the spade blade secured thereto. Fig. 11 is a front elevation of the spade blade before the lower portion is bent to form the back of the spade. Fig. 12 is an enlarged view of one of the carrier arms showing a plate placed in

the rear of the spade-blades to prevent the dirt falling back into the ditch. Fig. 13 is an enlarged view showing the arrangement of the spade-blades on the conveyer-chains.

Similar numerals and letters refer to similar parts.

A is the main frame of the device composed of the side plates 3, 4, and cross-pieces 5, 7. The side plates 3, 4, may be formed of a single piece or of a jointed piece as shown in Fig. 2. Secured to the forward cross-piece 5 by means of the king bolt 6, is the axle 2 on which are mounted the wheels 1, and secured to the cross-piece 7 is the rear axle 8 on which are mounted the wheels 9.

The power-transmitting device shown in Figs. 1 and 2, is composed of the driving shaft 10, which is journaled in the foot box 11, at one end and at the other end in the journal-box 12, on the extended cross-piece 62, and it is provided with the collar 13 to prevent any forward movement of the said shaft 10. It is further provided with the universal joint 14, to connect it with the driving shaft of the engine (not shown) and the miter-wheel 15, which meshes with the miter-wheel 16, on the main shaft 17. The miter-wheel 16, is fixedly secured by means of bolts to, or formed integral with, the sprocket-wheel 27. They are loosely mounted on the main shaft 17 and are prevented from any lateral movement by the collar 28, on the one side, and the hub 29, on the supporting arm 30, on the other side. The foot journal-box 11, is bolted to the projecting horizontal post 18, whose inner end is secured to plate 4 by bolts or otherwise, and whose outer end is braced by the rod 60.

In Figs. 6 and 7, which illustrate another device for transmitting power, the horizontal post 18, supports an upright post 19, which is bolted to plate 4, by the brace 20 (not fully shown). This post 19, is used when the power is transmitted from the engine by means of chain or other belt-gearing. On post 19 is journaled the sprocket-wheels 21 and 22. Sprocket-wheel 21 receives the power from the main driving chain 23, transferring it by means of the journal 24 to the sprocket-wheel 22, which in turn transmits it to the sprocket-wheel 26 by means of the chain belt 25. The sprocket-wheels 26 and 27, are either fixedly



secured to each other by means of bolts or are formed integral, and they are loosely mounted on the main shaft 17, and are held from lateral movement by the collar 28 on the one side, and by the hub 29 of the supporting arm 30 on the other side. Around the sprocket-wheel 27, the chain belt 31 passes driving the sprocket-wheel 32 which is keyed to the shaft 33. Thus in either case, of the use of shafting or belting the power is conveyed to the driving sprocket-wheel 27. The shaft 33 is supported by the hub 34 of the supporting arm 30 (which hub may be a journal box), and the journal boxes 35, and 36 of the yoke 37, which is integral with the carrying arm 38. Between the prongs of the yoke 37, and fixedly secured to the shaft 33, are the several sprocket-wheels 39. These may be integral, in the form of a drum or otherwise. The other carrying-arm 40, is provided with a yoke 41 in which is journaled the shaft 42 by means of the journal boxes 44 and 44. On the shaft 42 are the sprocket-wheels 45. Two of the sprocket-wheels 45 are on the outside of the yoke 41, and on the extreme ends of the shaft 42. The object of being so constructed is to have the spades on the outside elevating chain belts cut a trench or ditch wide enough for the carrying arm 40 with its sprocket-wheels 45 to move along in it without cramping or binding on the sides thereof. The main shaft 17, is further provided with the sprocket-wheel 49, which is connected to the sprocket-wheel 50 by means of the chain belt 51. The sprocket-wheel 50 is secured to the short shaft 52 on which shaft is also secured the ratchet-wheel 53, and the lever 54. Journaled on the plate 3, is the dog 55, which works in the ratchet-wheel 53. The above-described device is for controlling the movement of the dirt-elevating device. The elevating chain belts 46, have links constructed as shown in Figs. 9 and 10, with a vertical plate extending across and connecting the sides and provided with rivet holes 65, for fastening on the spade blades 56. The spade blades have a back 57 which prevents the earth that is lifted up on the spades from passing through the elevating chain belts 46 and falling back into the ditch. In some soils it may be necessary to place a plate A', (see Fig. 12) secured to the carrier arm 40 by means of the clamps B, C, the width of which is the same as the several elevating chain belts 46, back of them where the spades are cutting and against which they will bear, fastening said plate to the carrying-arm 40. This will still further prevent the loosened earth from falling back into the ditch. The spade blades 56, as shown in Figs. 10 and 11 represent more especially those used on the center elevating-belt of series 46, inclining both ways from their center line, while those used on each side of the central elevating-belt will be made slightly curved on their outer side or set at such an incline as to most readily deliver the earth raised, away from

the ditch. This construction is clearly shown in Fig. 13 of the drawings.

The operation of my ditching machine is as follows: The machine is fastened from the front axle 2, to the portable boiler and engine by any of the known means, and the shaft 10 or the belt 23 as the case may be, is connected to the motive-power. The lever 54 is raised, by which means the carrying-arm 40 is lowered and assumes the position shown in Fig. 2, and it is locked in that position by means of the ratchet-wheel 53 and dog 55. To prevent vibration to the carrying-arms 38 and 40 and to add to their rigidity, the guy-rods or wires 58 of which there are two, are connected to the yoke 37, at their one end, and secured to the rear end of the frame at their other. On starting the engine, power and speed are conveyed to the sprocket-wheels 39, as heretofore described, the elevating chain belts 46, being driven thereby and the spade blades attached are forced into the earth at the end 59, of the ditch. At the same time they are raised and the earth carried up to the surface and discharged on each side of the ditch as shown in Fig. 1.

My method of moving the ditching machine forward as it cuts and removes the dirt from the ditch or trench is as follows: One end of a wire cable is anchored at some distance ahead of the motive-power, the other being fastened to a drum or reel in front of the engine and connected thereto by a belt or any other suitable gearing and so adjusted that the engine will wind up the cable and then draw forward both the motive-power and the ditching machine at whatever rate of speed is required.

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

1. In a ditching machine, the combination of a suitable frame, a shaft mounted in said frame, and a dirt-elevating device carried by said shaft consisting of the oppositely projecting carrier arms forked at their outer ends, a series of sprocket-wheels journaled in said forked ends, and conveyer chains passing around said sprocket-wheels, and suitable means for operating said elevating device, substantially as shown and described.

2. In a ditching machine, the combination of a frame, a shaft mounted therein, a dirt-elevating device mounted on said shaft, and consisting of the forked carrier arms having sprocket-wheels journaled therein, and elevating chains passing around said sprocket-wheels, suitable means for imparting motion to said elevating device, and suitable means for controlling the position of the elevating device consisting of a sprocket-wheel mounted on the central shaft, a sprocket and ratchet-wheel mounted in the frame, a pawl engaging said ratchet-wheel, and an operating lever, all substantially as shown and described.

3. In a ditching machine the combination of a suitable frame, a shaft mounted in said



frame and a dirt-elevating device carried by  
said shaft, consisting of the oppositely pro-  
jecting carrier arms forked at their outer ends,  
a series of sprocket-wheels fixedly secured to  
5 shafts journaled in said forked ends and con-  
veyer chains passing around said sprocket-  
wheels, suitable means for imparting motion  
to said elevating device consisting of the  
sprocket-wheels mounted respectively on the  
10 shafts of the carrier arms and elevating sprock-  
ets, a chain connecting said sprocket-wheels,  
a bevel wheel mounted loosely on the carrier  
shaft and fixedly secured to the sprocket-  
wheel on said shaft, and a second bevel wheel  
15 mounted upon the power shaft journaled in  
the main frame engaging with the bevel wheel  
on the carrier shaft, substantially as shown  
and described.

4. In a ditching machine, the combination  
20 of a suitable frame, a shaft mounted in said  
frame, and a dirt-elevating device carried by  
said shaft and consisting of the oppositely  
projecting carrier arms 38 and 40 forked at

their outer ends, and having journaled there-  
in a series of sprocket-wheels, two of said 25  
wheels on the arm 40 being mounted outside of  
the fork and elevating chains passing around  
said sprocket-wheels with suitable means for  
operating the elevating device, substantially  
as shown and described.

5. In a ditching machine, the combination  
of a suitable frame, a shaft mounted in said  
frame, a dirt-elevating device carried by said  
frame consisting of the forked carrier arms  
having sprocket-wheels journaled therein, 35  
and chains passing around said wheels, the  
links of which are formed with integral brack-  
ets and having secured thereto the elevating  
spade blades formed with a back 57 and in-  
clined edges, and suitable means for impart- 40  
ing motion to the elevating device substan-  
tially as shown.

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