M. L. POULTER.

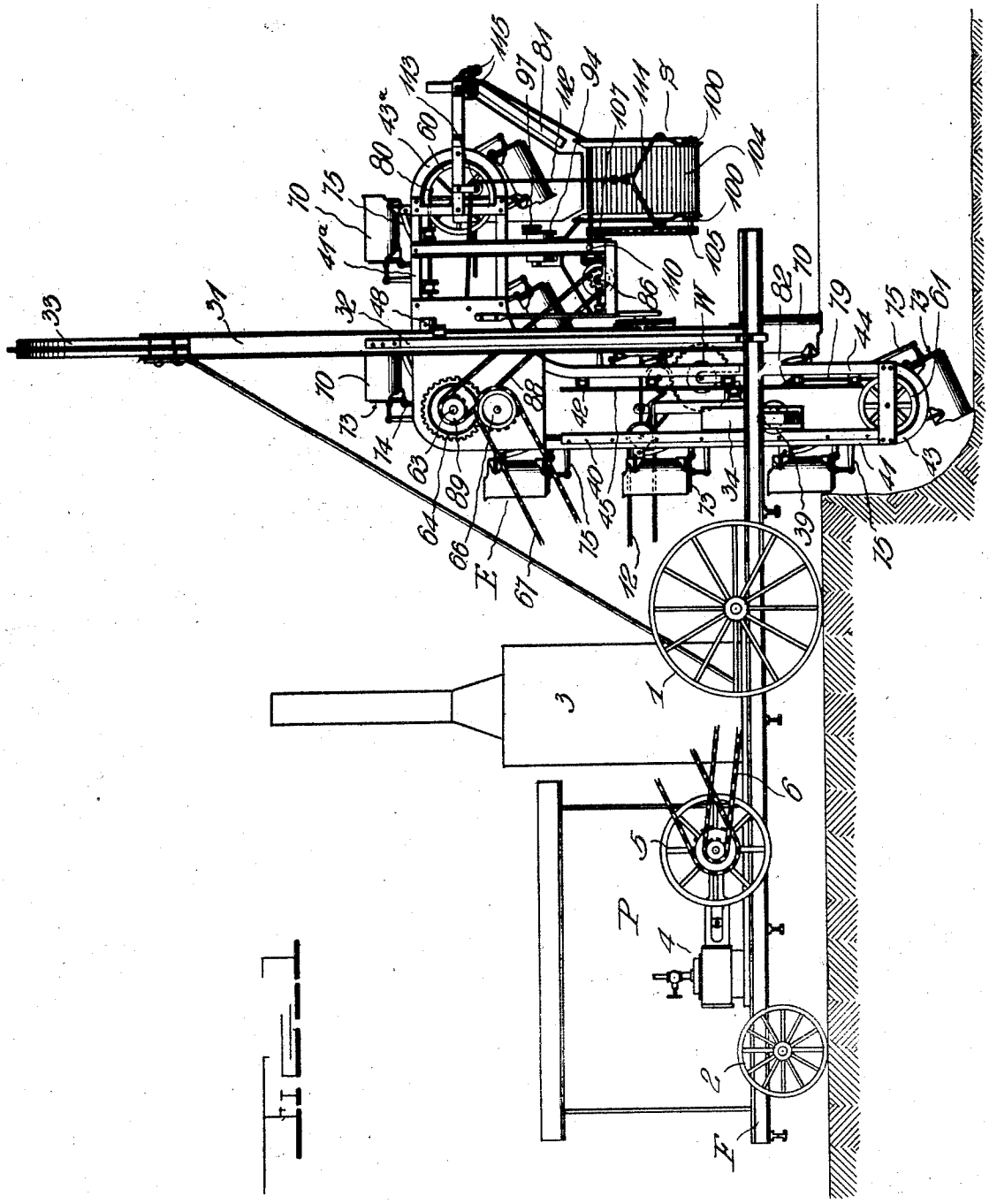
DITCHING MACHINE.

APPLICATION FILED SEPT. 27, 1912.

1,071,085.

Patented Aug. 26, 1913.

8 SHEETS—SHEET 1.



Witnesses

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8 SHEETS—SHEET 2.

FIG. 1

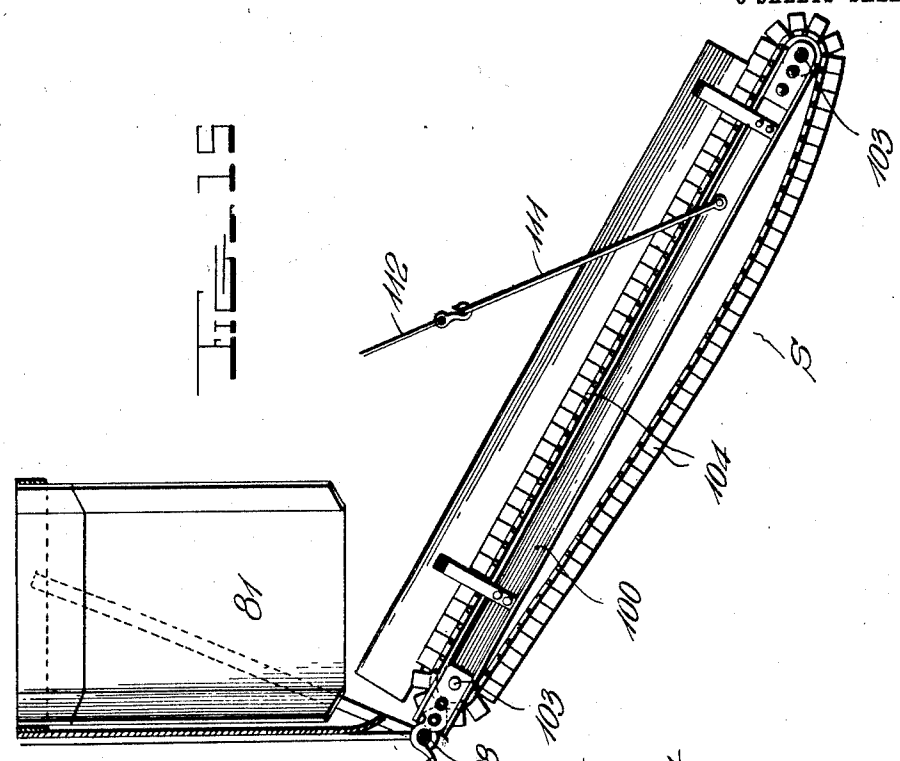
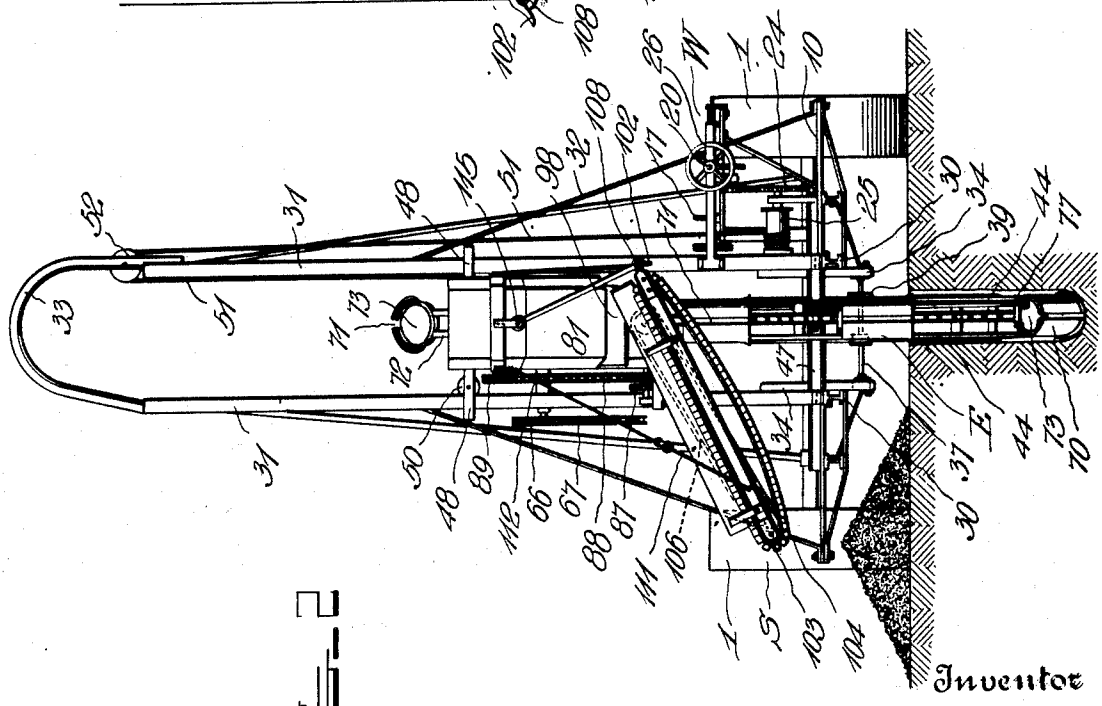


FIG. 2



Witnesses

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8 SHEETS—SHEET 3.

FIG. 3

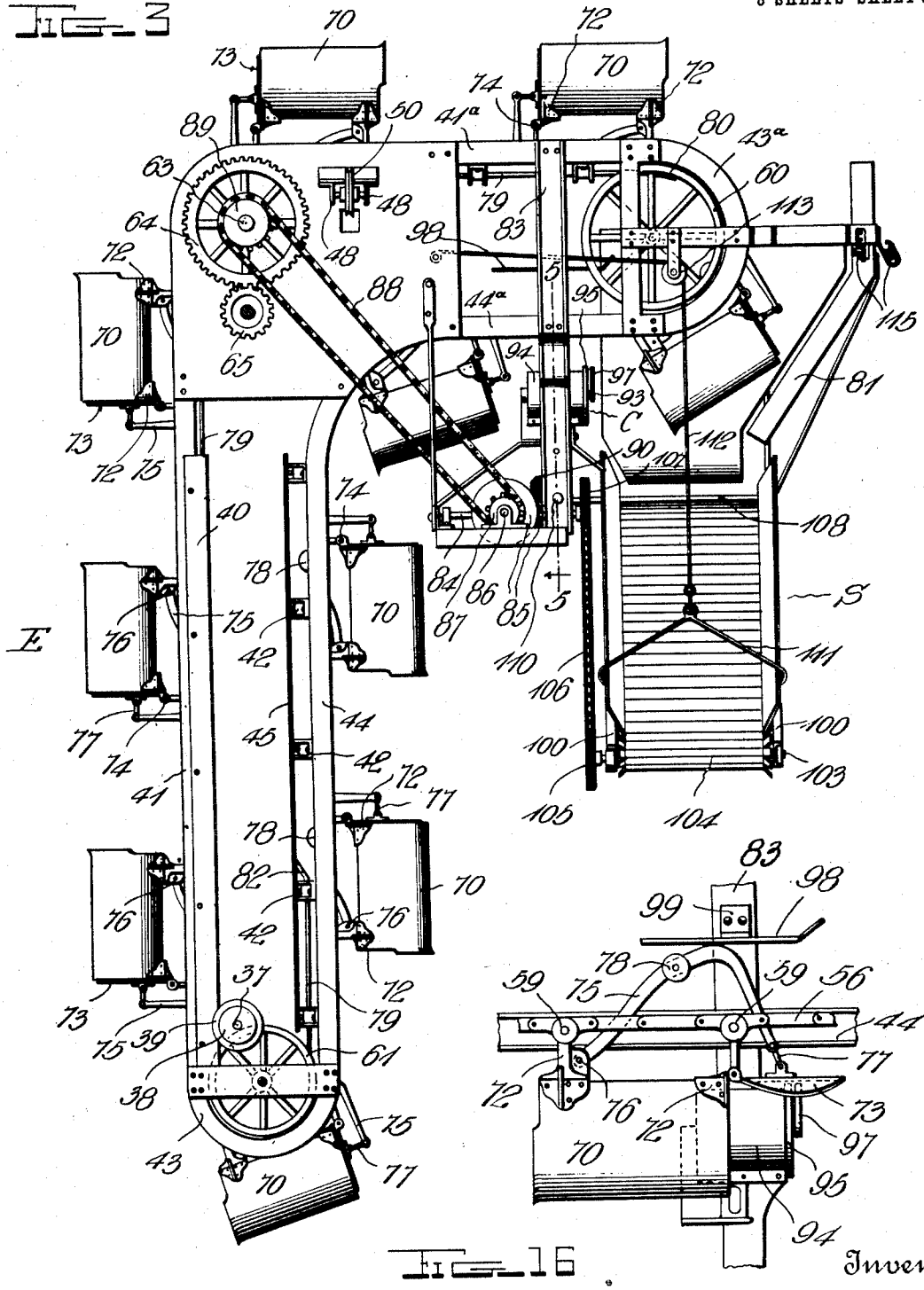


FIG. 16

Witnesses

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8 SHEETS—SHEET 4.

FIG. 4

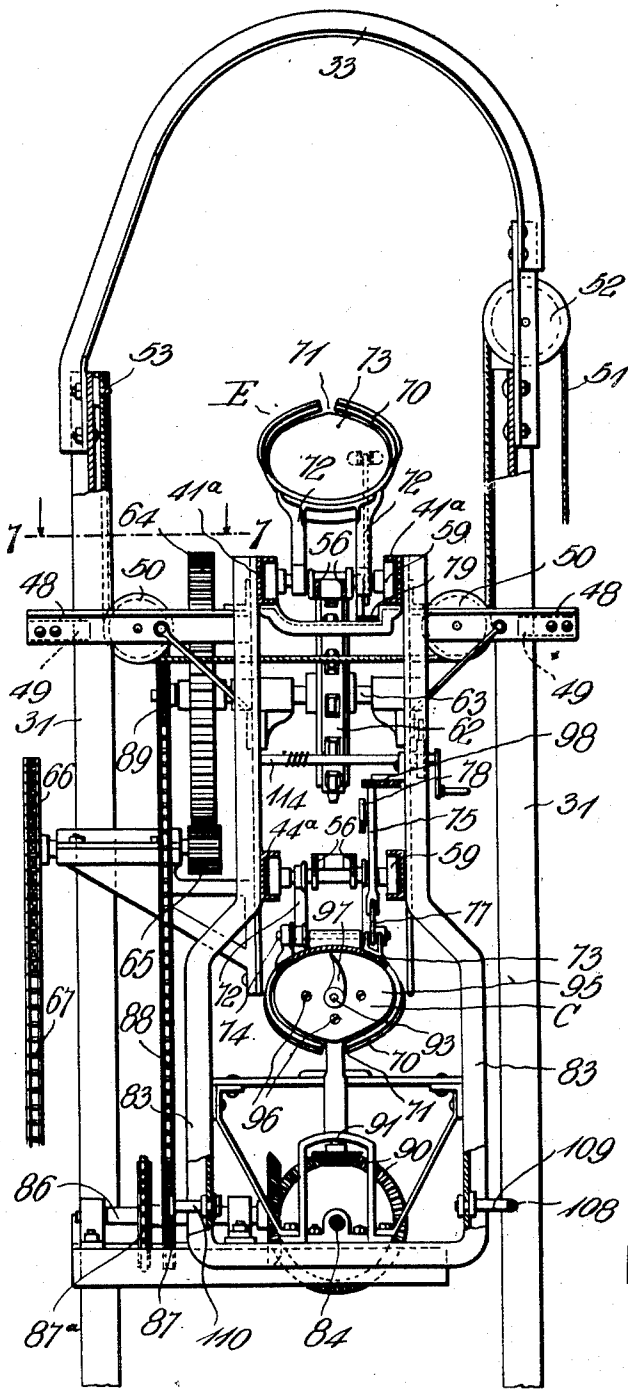


FIG. 7

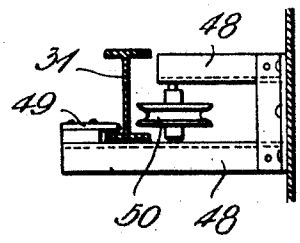


FIG. 6

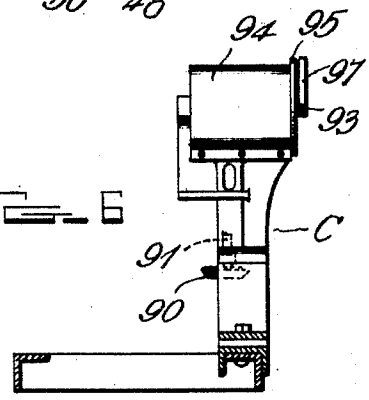
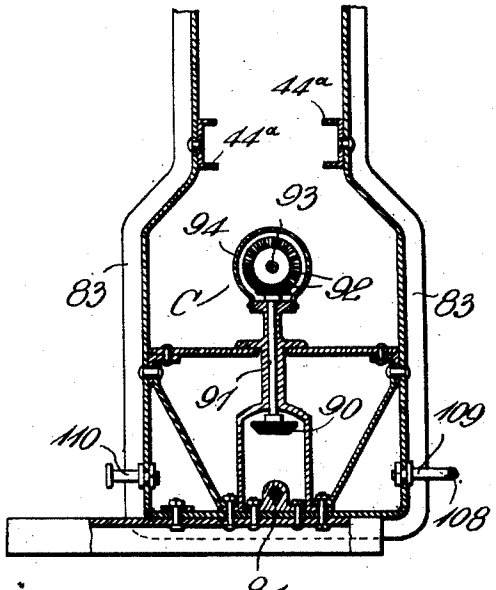


FIG. 5



Witnesses

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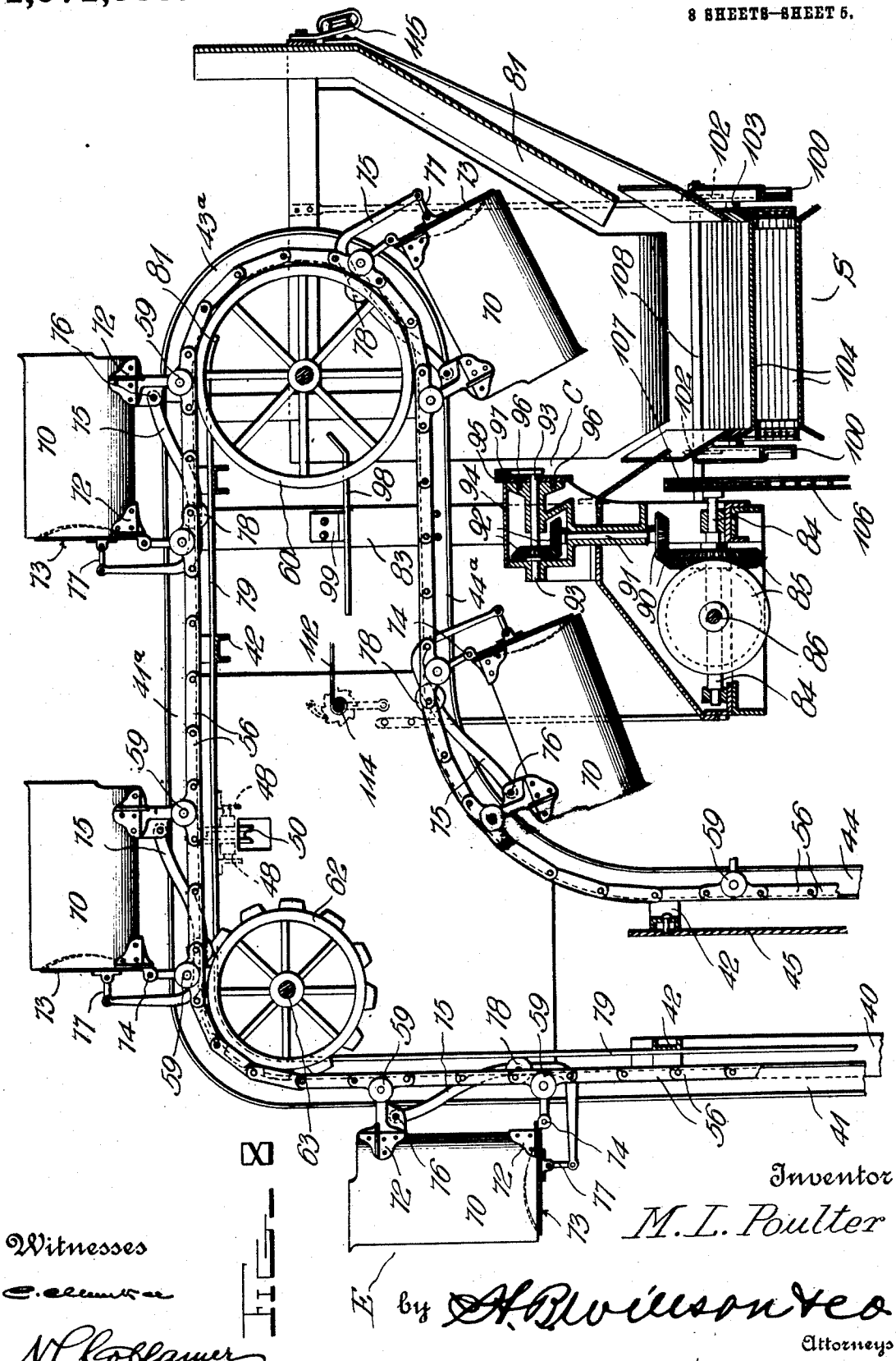
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8 SHEETS—SHEET 5.



Witnesses

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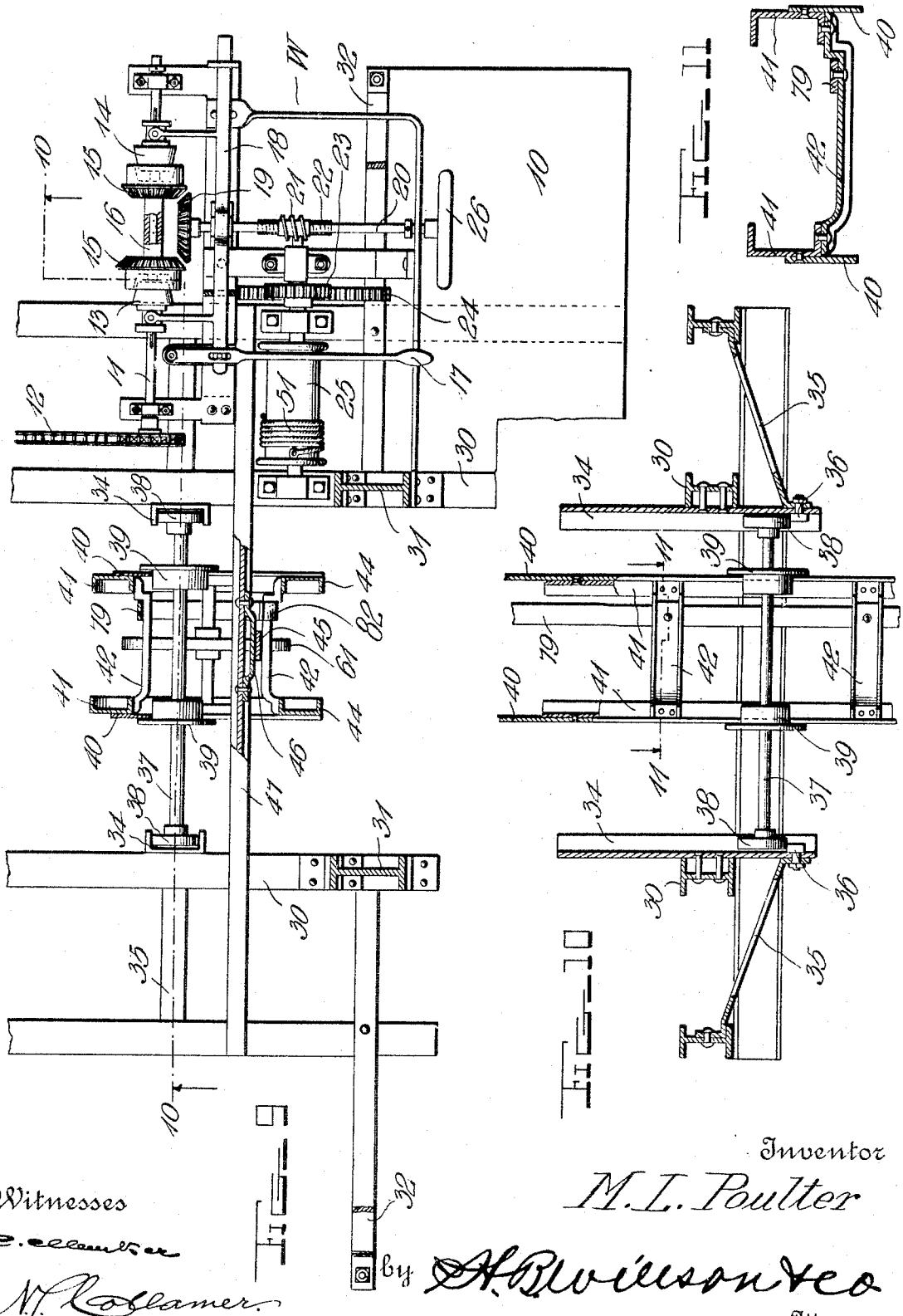
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8 SHEETS—SHEET 6.



Witnesses

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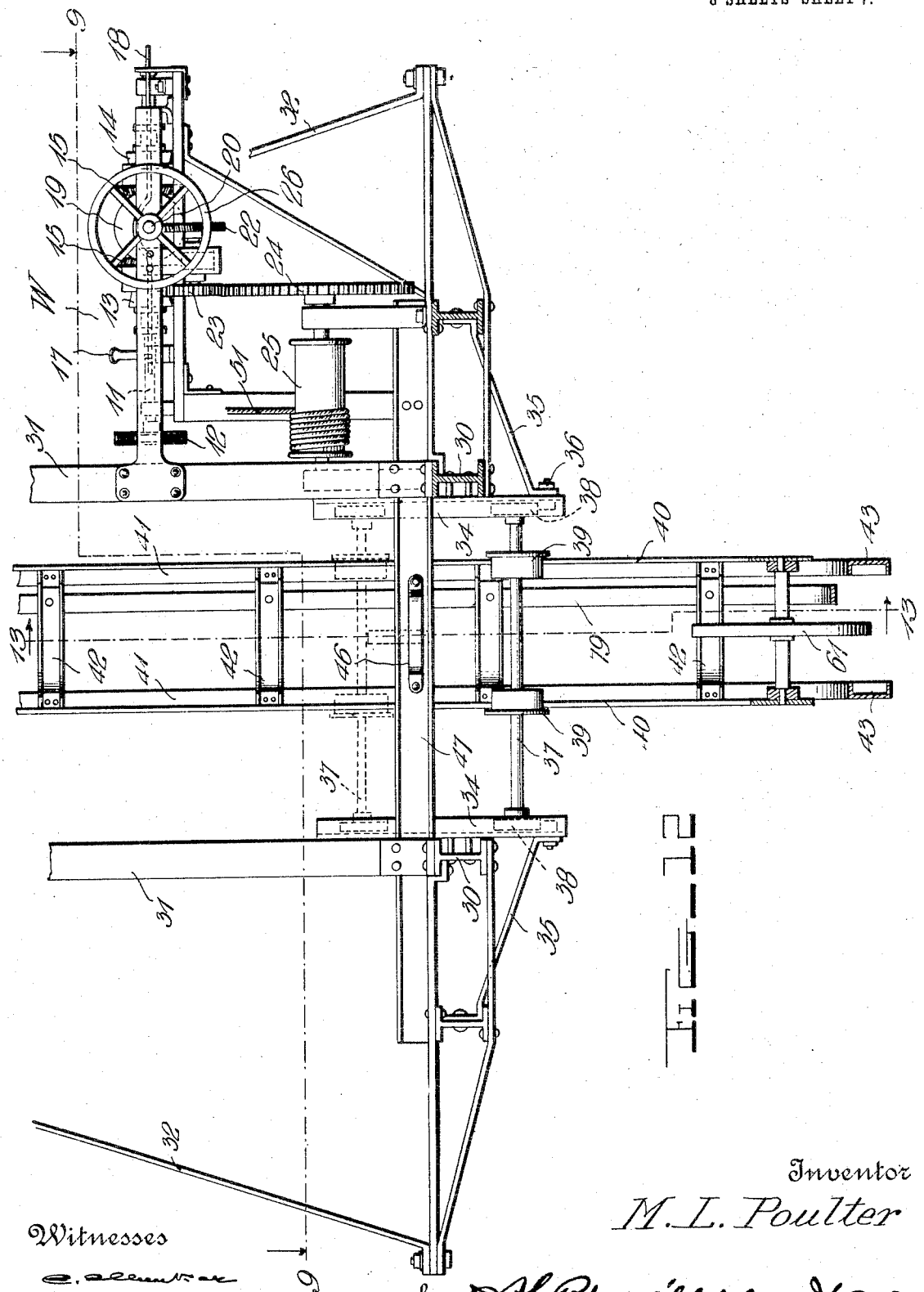
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1,071,085.

Patented Aug. 26, 1913.

6 SHEETS—SHEET 7.



Witnesses

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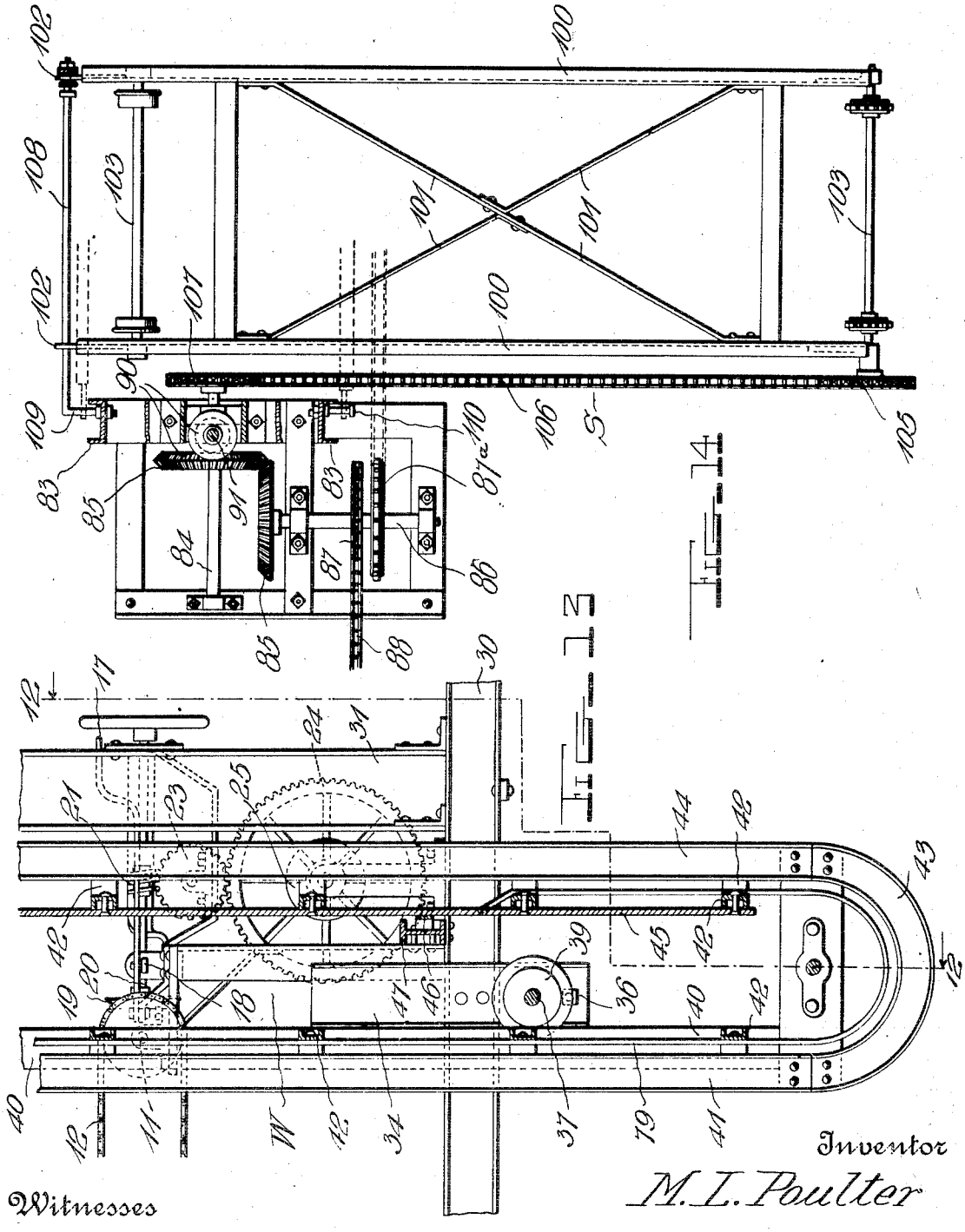
DITCHING MACHINE.

APPLICATION FILED SEPT. 27, 1912.

1,071,085.

Patented Aug. 26, 1913.

8 SHEETS—SHEET 8.



Witnesses

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UNITED STATES PATENT OFFICE.

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DITCHING-MACHINE.

1,071,085. Specification of Letters Patent. Patented Aug. 26, 1913.

Application filed September 27, 1912. Serial No. 722,673.

To all whom it may concern:

Be it known that I, MICAJAH L. POULTER, a citizen of the United States, residing at Mount Pleasant, in the county of Henry and State of Iowa, have invented certain new and useful Improvements in Ditching-Machines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to excavators of the chain and bucket type, and more especially it is a machine for digging a trench or ditch and delivering the excavated soil either to one side thereof or back into the ditch.

One object of the invention is to produce an improved form of excavating mechanism, and means for raising and lowering it so that it may be held above the ground when the machine is moving from point to point or may be depressed to such an extent that it will dig a ditch of the desired depth.

Another object is to produce an improved form of bucket for use in connection with the excavator.

Another object is to produce an improved form of bucket cleaning or scraping mechanism whereby the various buckets are cleaned or scraped just after they dump their loads each time they move upward out of the ditch.

The following specification describes in detail one embodiment of my invention as set forth in the appended claims, and as shown in the drawings wherein—

Figure 1 is a general side elevation of this machine taken from the left side, showing the excavating mechanism as lowered into the ground and as digging a ditch; Fig. 2 is a rear elevation of the same; Fig. 3 is an enlarged left side elevation of the excavating mechanism disassociated from the other parts, excepting the spout which is here shown in what might be called front elevation; Fig. 4 is an enlarged elevation of the upper end of the excavating mechanism as viewed from the rear, some parts of the framework and the bucket bottom being shown in section; Fig. 5 is a section on the line 5—5 of Fig. 3; Fig. 6 is a side elevation of the scraper; Fig. 7 is a sectional detail on the line 7—7 of Fig. 4; Fig. 8 is an enlarged central vertical section of the upper end of the excavator, this section being also taken through the center of the scraping mechanism; Fig. 9 is a section on the line 9—9 of Fig. 12, Fig. 10 a section on the line 10—10 of Fig. 9, and Fig. 11 is a section on the line 11—11 of Fig. 10; Fig. 12 is a section on the line 12—12 of Fig. 13, and Fig. 13 a section on the line 13—13 of Fig. 12; Fig. 14 is a plan view of the spout frame and its driving mechanism on an enlarged scale, the dotted lines indicating how its position might be changed so as to deliver to the rear instead of to the side of the machine; Fig. 15 is a side elevation of this spout, taken from the front end of the entire machine, and on an enlarged scale, showing said spout in conjunction with the chute; Fig. 16 is a detail showing a bucket in the act of passing the cleaner.

It is the purpose of the present invention to produce a unitary machine traveling on wheels and carrying its own source of power connected with said wheels so that it may be caused to move slowly along the ground, which machine will dig a trench of the desired depth, raise the soil up the upright arm and then move it along the horizontal arm of the excavator to the rear, and finally deliver the soil either to one side of the trench or back into the same again, meanwhile scraping the interior and the inside of the bottom of each bucket in the course of its travel. As above suggested, this machine may also embrace tile-laying mechanism, not shown or described herein, so that while the ditch is open the tiles can be inserted therein, although of course this might be done by hand. In that event the spout would be so disposed that the excavated soil would be dumped back into the ditch upon the tiles just laid, but otherwise this soil would be delivered to one side of the ditch for subsequent treatment. I may say here that the sizes, proportions, materials and detailed construction of parts are not essential to the successful operation of this machine as a whole, and therefore the invention must not be limited in its scope to the following specification which sets forth only one em-

bodiment of the idea which I have found to operate successfully. Not only could the tile-laying mechanism be added without departing from the principle of my invention, but many other changes in and elaborations of the idea might be made to suit the wishes of the manufacturer or the requirements of the user. While the power will preferably be connected with the traction wheels so that the machine as a whole will travel over the ground itself, the power might be used simply to do the excavating and the machine drawn by horses or otherwise.

Broadly speaking this machine embraces a framework carrying the power plant; an excavator whose frame is adjustable in the main framework and which disassociated therefrom is perhaps best seen in Figs. 3, 4 and 8; a windlass and the clutch mechanism for throwing the same into connection with the power so that the excavator frame may be raised and lowered, as perhaps best seen in Figs. 9 and 12; a bucket cleaner best seen in Figs. 5, 6 and 8, and in action in Fig. 4; and a spout best seen in detail in Figs. 8 and 14 and in conjunction with other elements in Figs. 2, 3 and 15. I have given these mechanisms reference letters so that they may be broadly referred to hereinafter thereby, and will describe them separately as far as possible although it is to be understood that they coact with each other in making up a unitary machine for the purposes set forth.

The framework F includes a body of angle-iron construction whose details need not be elaborated except where special reference to parts thereof is needed hereinafter, the body being mounted on large main traction wheels 1 which stand between the power plant and all other mechanism so that the latter is overbalanced by the weight of the engine and no rear wheels are necessary. In other words, the traction wheels 1 stand at about the midlength of the frame F, and the front end of the latter is supported by smaller wheels 2 by which the machine may well be steered, although the details of the steering mechanism are not shown.

The power plant P is shown in the present case as a steam engine including a boiler 3, the engine proper 4, and the driving wheel 5 from which latter connection may be made as by a chain 6 with the traction wheels 1 so as to cause the machine to travel slowly over the ground when it is doing work and perhaps at a higher speed when it is being transported from point to point. It is obvious that any other suitable form of portable engine might be employed, and of course the power plant need not be connected with the driving mechanism as the machine might be drawn by horses.

The windlass operating mechanism W (Figs. 9 and 12) is by preference disposed at the right side of the machine just forward of a platform 10 on which stands the operator who controls the ditching mechanism, although the construction might easily be such that he could also attend to the engine. This mechanism W includes a shaft 11 driven from the power plant P as by a chain 12 and carrying two clutches 13 and 14, oppositely facing separated bevel gears 15 mounted rigidly on a sleeve 16 which loosely surrounds said shaft and themselves having the other members of said clutches, a hand lever 17 and slide 18 for moving the clutches alternately into and out of engagement with the gears or to a neutral position as shown in Fig. 9, and a driven bevel gear 19 standing between said gears 15 and mounted on a shaft 20. The latter carries a worm 21 meshing with a worm gear 22, whose shaft in turn carries a gear pinion 23 meshing with a large gear 24 which is fast on the shaft of a windlass 25; and the worm shaft 20 carries a hand wheel 26 as shown. It is obvious that when the gears 15 stand at an intermediate position as shown in Fig. 9 and the driven gear 19 is not engaged by either of them, the hand wheel 26 can be rotated to turn the worm 21 so as to set the windlass 25 in either direction as desired; but when the necessities of the case require that the windlass shall be rotated to wind up or to unwind the rope upon it, the hand lever 17 is manipulated to throw the proper gear 15 into mesh with the driven gear 19 so that the windlass 25 is rotated. It will be seen that by this mechanism W I provide means for turning the windlass by power taken from the engine, or by hand, the former when the windlass is to be given several rotations and the latter when it is to be turned but a little, and in either case the direction of its rotation may be controlled at will by the operator.

The excavator E is of the chain and bucket type moving over a track having an upright arm and a horizontal arm, the whole carried within its own frame which is adjustably mounted within the main framework F of the machine. The main parallel sills 30 in rear of the traction wheels 1 carry a tower consisting of a pair of uprights 31 suitably braced as at 32 and connected at their upper ends by an arch 33 which is preferably employed so that L-iron or angle-iron may be used throughout, and between the lower ends of said uprights are parallel guides 34 of U-shaped metal which preferably extend downward between the sills 30 as best seen in Fig. 12 and are braced by rods 35 bolted as at 36 to the lower ends of the guides, the latter of course standing at points high enough to clear the surface of the earth as seen in Fig. 2. Mounted in said

guides is what might well be called a cross head, herein shown as a shaft 37 having anti-friction wheels 38 at its extremities which rest upon said bolts 36 when the cross head is in its lowest position, and the shaft also having mounted upon its body other anti-friction wheels 39 (preferably flanged as shown) and against which rest tracks 40 carried at one side of the skeleton frame of the excavator E itself. This frame as seen in Figs. 9 and 10 is made up of angle irons 41 held in parallelism by cross straps 42, and by preference the front pair carries the tracks 40 and is connected at its lower end by, or continued as at 43, into, the rear pair of angle irons 44 which are of like construction. The four bars making up this skeleton frame extend thence upward to form the upright arm thereof, and as seen in Fig. 8 they are deflected to the rear at the top of the upright arm into a horizontal arm as at 41^a and 44^a and are again connected at the rear upper end as at 43^a, the cross straps 42 being continued along this horizontal arm to give the frame structure suitable strength. The rear set of cross straps 42 carry on their inner faces an upright strap iron 45 forming a third track which moves against a fixed wear plate 46 mounted on some suitable part of the frame F, as for instance the cross beam 47 shown in Figs. 9 and 13 as resting on the main sills 30, and this track 45 slides against said wear plate as the front tracks 40 move over the anti-friction wheels 39 so that the entire frame of the excavator E is guided in its rise and fall and is permitted to have a considerable vertical movement through the main framework F. Its upper portion is steadied and guided between the uprights 31 in any suitable manner, but preferably by constructing the pulley-brackets as seen in Fig. 7 and attaching them to the excavator frame as seen in Fig. 4. Each of said brackets may have two arms 48 whereof at least one is made long enough to extend outward past the upright and is provided with a spur or hook 49 slidably engaging the same. The pulleys 50 which are journaled in these brackets coact with the windlass 25 and rope above mentioned, the latter (numbered 51) passing upward from the windlass as seen in Fig. 4 and over a pulley 52 carried by one upright at its upper end, thence downward under one of the pulleys 50 and across and under the other, and thence upward and secured at the point 53 to the opposite upright; and it will be obvious that when the windlass 25 is rotated in the proper direction to draw upon this rope, the entire excavator will be raised within the uprights of the main framework. I do not, however, limit myself to this precise form of guide for the upper end of the excavator frame, and of course the elevating mechanism and windlass therefor may be modified to a considerable extent.

The chain of the excavator is made up of links 56 pivotally connected with each other and having rollers 59 at intervals which are of a size to move within the U-shaped bars of the excavator frame, and obviously there are two sides to the chain, one ascending and the other descending between the respective pairs of side bars, the rollers holding either side midway between said bars as best seen in Fig. 4. At the rear upper end of the endless carrier thus formed the chain moves over an idle wheel 60 within the curved upper and rear ends 43^a of said side bars, and at the lower front end 43 of the latter the chain moves over another idle wheel 61, both these wheels being mounted in suitable bearings in the frame. In the angle of the latter, the chain moves over a sprocket wheel 62, whose shaft 63 carries a gear 64 meshing with a gear pinion 65 whose shaft in turn carries a sprocket wheel 66 connected with the power plant P as by a chain belt 67, and by this means rotary motion imparted to the sprocket wheel 62 drives said chain and the excavator. It will be noticed from Figs. 9 and 12 that the lowermost idle wheel 61 which is journaled as low as possible in the excavator frame stands beneath the shaft 37 of the cross head, and this construction causes the latter to be supported by the stops which consist of the bolts 36 in the lower ends of the guides 34 when the excavator frame is lowered as seen in Fig. 12. But when the excavator is raised, as for transporting the machine over the ground, the lower idle wheel 61 rises with it and if raised high enough it will strike the shaft of the cross head as seen in Fig. 3 and will eventually raise the entire cross head perhaps as high as the dotted position shown in Fig. 12—the extent thereof depending upon the position of the lowermost bucket or buckets when the chain comes to rest. That is to say, if a bucket stopped below the lower idler as seen in Fig. 3, the excavator frame would have to be lifted somewhat higher than if the two lowermost buckets stopped at opposite sides of the idler, the idea being of course that the excavator frame must be raised high enough to entirely clear the ground.

The buckets of the excavator are by preference made of stout sheet metal with their bodies 70 slightly oval in end elevation as best seen in Fig. 4, split or slotted along their outer sides as at 71, and having brackets 72 along their inner sides which are connected with the main pivots that carry the rollers 59. The front end of each bucket is open, but its rear end is closed by a bottom plate 73 which is preferably curved slightly in cross section as shown in

section in Figs. 4 and 16 and which is pivoted at 74 to the heel of the rearmost bracket as shown in Fig. 8.

The numeral 75 designates a lever pivoted at its front end at 76 to the foremost bracket 72 and standing at one side of the chain, its rear end being turned inward behind the bucket and connected with the bottom 73 thereof by a link 77, and said lever carries a roller 78 which travels outside a flat track 79 that extends around the same path as that followed by the chain but to one side thereof as seen in Fig. 9. Following the course of the bucket with the chain as driven by the sprocket wheel 62, this lever and link mechanism coacting with the roller 78 and the track 79 causes the bottom 73 of each bucket to remain closed while it moves upward in Figs. 13 and 8, and then while the bucket moves to the rear in the last-named view; but at the point 80 the track 79 terminates because the bucket is then about to pass around the rear idle wheel 60 and there is no longer any necessity for keeping its bottom closed. Here the bucket dumps or drops its contents into a chute 81 as will be described below and commences its return movement, and it is obvious that the weight of the bottom 73 will hold it closed and therefore the track 79 is no longer needed. Moving onward and thence downward until it passes between the sills 30 and again into the ditch as seen in Fig. 3, the track 79 is resumed at the point 82 and the roller 78 reëngages the track there and holds the bottom forcibly closed while the bucket is doing its work as it passes around the lower idle wheel 61. Hence the absence of the track between the points 80 and 82 leaves the bucket bottoms closed only by their own weight and this construction is purposely employed for a reason which will appear below.

The cleaner C is a valuable if not indispensable adjunct to machines of this type which are constantly operating in various kinds of soil, and which, because of the fact that they force their buckets through the soil, rapidly choke with mud and clay to such an extent that the efficiency of the machine is impaired if its buckets are not constantly cleaned. If the bottom of the bucket were left open the bucket would be easy to clean but the contents would fall out, and if the bucket were closed by a rigid bottom the contents would be retained but the cleaning mechanism would have to be quite complicated or the movement of the chain would have to be interrupted. I have therefore devised a cleaner which coacts well with the type of bucket described above, and whose details I will now explain, reference being made more particularly to Figs. 4, 5, 6 and 8. Supported principally by a loop-shaped hanger 83 depending from the horizontal arm of the excavator frame are bearings in which is journaled a longitudinal shaft 84 connected by gears 85 with a counter shaft 86 which carries two sprocket wheels 87 and 87ª, the former connected by a chain 88 with a sprocket 89 on the shaft 63 which drives the chain. The longitudinal shaft 84 is in turn connected by gears 90 with an upright shaft 91, and the latter by gears 92 with the scraper shaft 93, all this mechanism being protected from the dirt by a housing 94 as best seen in Fig. 8. The scraper shaft 93 passes through the center of a blade or plate 95 which is secured by screws 96 to the rear end of the housing as seen in Fig. 4, and its upper edge is shaped to conform with the inner side of the bottom 73 of the bucket as well as with the internal contour of the body thereof; and on the rear end of said shaft 93 is a finger 97 which is caused to rotate over the rear face of said plate by means of the train of gearing above described. As the buckets pass around over the rear idle wheel 60 as seen in Fig. 8, and the track 79 releases the rollers on their levers which hold their bottoms closed, their bodies and bottoms pass over said plate 95 and are scraped clean. A guard rail 98, secured as at 99 to the framework, stands in position to be engaged by the levers 75 at this time to hold said bottoms down upon the edge of the plate 95 as seen in Fig. 16. The plate naturally accumulates considerable soil, and the rotation of the finger scrapes the soil therefrom and keeps the cleaner itself clean, everything scraped off the bucket bottom or out of its body dropping over the shield into the spout S next to be described.

The spout S employed in connection with this ditching machine is of special construction and attachment in order that it will coact therewith to deliver the soil either to the side of the ditch being dug or back into the same, and here again because of the nature of the ground being treated I preferably employ a spout having a moving conveyer within it so that the material dumped by the buckets will be positively delivered to the point where it is desired. The framework of the spout (see Fig. 14) is made up of side bars 100 suitably braced and connected as at 101 and having hooks 102 at their upper ends; and through said bars are mounted shafts 103 over which moves an endless belt 104 constituting the conveyer and whose detailed construction need not be described. The outermost shaft carries a sprocket wheel 105 connected by a chain 106 with a driving sprocket 107 on the rear end of the longitudinal shaft 84 described above—this being the means for driving the conveyer when the spout stands in the position seen in Figs. 2 and 15 and in full lines in Fig. 14; but when said spout is disposed

at the rear of the machine so as to fill the trench just dug, the sprocket chain 106 is connected with the sprocket 87ª as indicated in dotted lines in the last-named view. Ordinarily the spout will deliver the soil excavated to one side of the ditch as seen in Figs. 1 and 3, in which event the hooks 102 will be engaged over an L-iron 108 whose foot 109 is bolted to the hanger 83; but when the spout is to deliver to the rear the hooks 102 are removed from this L-iron and one of them engages with said foot 109 as seen in dotted lines in Fig. 14 while the other engages a bolt or pin 110 at the other side of the hanger 83, the upper or inner end of the spout in either case being thereby pivotally supported and standing beneath the chute 81 and the shield 98 as seen in Fig. 8. A bail 111 is connected with the frame of the spout and from it leads a chain or rope 112 which passes over a guide pulley 113 to a windlass 114 which is suitably journaled in the excavator frame within reach of the operator. When the spout is moved from the position shown in Fig. 3 around to the rear of the machine, the rope 112 is led from the pulley 113 over an additional pulley 115, so that in either position the operator by manipulating the windlass 114 can raise and lower the outer or lower end of the spout and cause the delivery of the excavated soil as seen in Fig. 2. The parts may be properly braced by additional means not necessary to amplify.

The operation of this machine if constructed substantially as above described, is as follows: When the frame of the excavator is raised all parts of this entire machine excepting the wheels stand above the ground, and it may be transported to the point of use either by horse power or under its own steam. There the windlass will be rotated in the proper direction by manipulating the clutch mechanism W shown in Fig. 9, and if the rope 51 is slackened the entire excavator E descends within the uprights 31 as its guides will permit. Finally the proper clutch (not shown) in the power plant is manipulated to impart motion to the sprocket chain 67, and the digging mechanism begins its work. The buckets travel downward and around the lower idler wheel and scoop up the earth being excavated, and then travel upward and to the rear until they dump their contents upon the chute 81, whence it falls into the spout S and is delivered wherever the operator desires. If he is simply digging a ditch, the soil is carried outward by the conveyer on the spout and delivered to one side of the same as seen in Fig. 2; whereas if something is to be laid in the ditch at once—either by machinery or by hand—and it is laid as fast as the ditch is dug, the spout can be deflected so as to deliver the soil at the rear of the machine, and the ditch will be filled as the machine progresses. It is well known to those familiar with the handling of ditching machines, that when the ditch is to be used for irrigating purposes or is to contain irrigating tiles, its bottom must be given a constant slope whether the surface of the land is flat or undulating, so that the pitch of the water either in the ditch or in the tiles will be substantially uniform from the highest to the lowest point. If therefore in the progress of the machine across a field it should pass over a slight rise in the ground, it will be obvious that the excavator must at that point be depressed so that while the ditch being dug is here a little deeper its bottom is in line with the grade being maintained. On the other hand if the machine should pass across a slight depression in the ground, the excavator will here be lifted temporarily. Either of these slight adjustments may be effected by turning the hand wheel 26 of the windlass controlling mechanism W; or if the operator has the clutches 13 and 14 under good control and the engine is moving slowly, it may be possible for him to adjust the excavator higher or lower by mechanical means, though these are merely for use when the excavator is to be raised or lowered bodily to some considerable extent. Power communicated through the chain 67 to the shaft 63, drives the bucket chain, the cleaner, and the conveyer if one be employed within the spout S; so that so long as the excavator is moving these adjuncts thereof are also at work. As each bucket passes around the rear upper end of the excavator frame and the roller 78 on its lever 75 passes off the rear end 80 of the track 79, the bucket bottom 73 is free to open; and hence as the bucket passes over the cleaner, the plate 95 will clean both the interior of the bucket body 70 and the inner side of the bottom 73 which is curved to conform with the curvature of the interior of said body, the finger 97 meanwhile rotating constantly so as to clean the face of the plate 95 as above described. All material dumped by the bucket is guided by either the chute 81 or the shield 98 or both into the spout S, and all material scraped off by the cleaner C falls over the shield 98 into the same spout. The latter delivers the soil as desired, and in order that the machine need not be built at a too great height from the ground I prefer to employ the endless conveyer within said spout so that the material dug out of the trench or ditch can be delivered to a considerable distance to one side thereof as shown in Fig. 2. Attention is directed to the bracing effect produced by the peculiar construction of the cross head which is mounted in upright guides on the main framework and travels inside of tracks 40 carried on the excavator frame. The bracing

action of this cross head in one direction is opposed by the contact of the wear plate 46 with the strap iron 45 which is rigidly mounted in the rear part of the excavator frame. Although the forward progress of a machine of this kind may be extremely slow, great strain is thrown upon it when the buckets are carried down into the ditch and forced to scoop up the material as indicated in Fig. 1; and in order to bear this strain and carry it from the excavator frame to the main framework at as low a point as possible, I have devised the rolling support consisting of said cross head as described above. This takes the rearward thrust thrown upon the excavator as the latter is driven into the soil, and the strap iron 45 contacting with the wear plate 46 steadies the entire structure as will be clear, holding the parts so firmly that some such form of guide as that illustrated in Fig. 7 will be sufficient at the upper part of the excavator frame. It will not be necessary to elaborate details of construction or operation further than as above.

What is claimed as new is:

1. In a ditching machine, the combination with an excavator frame, and an excavator including a chain and buckets and means for moving them throughout the length of the frame; of bucket cleaning mechanism beneath the rear end of said excavator frame, each of said buckets having a hinged bottom, link-and-lever mechanism connecting the bucket with said bottom and carrying a roller, and a track in the excavator frame following the path traveled by said chain but omitted where the bucket passes said cleaning mechanism.

2. In a ditching machine, the combination with a pair of sills carrying guides, stops at the lower ends of said guides, and a cross head whose extremities move in said guides and rest normally on said stops; of an excavator whose frame is adjustable vertically between said sills and astride said cross head, anti-friction wheels on the latter against which said frame rests, the excavator including a chain and buckets, and an idle wheel at its lower end for said chain and adapted to raise said cross head when the excavator frame is elevated.

3. In a ditching machine, the combination with a pair of sills carrying guides, a cross head whose extremities move in said guides, anti-friction wheels on said cross head, a cross beam connecting said sills, and a wear plate carried by the beam; of an excavator whose frame is adjustable vertically between said sills and astride said cross head and beam, tracks on the frame bearing against said wheels, an upright strap iron in the frame bearing against said wear plate, the excavator including a chain and buckets, and an idle wheel at its lower end for said chain and adapted to raise said cross head when the excavator frame is elevated.

4. In a ditching machine, the combination with a pair of sills, upright guides of U-shaped cross section carried thereby with their lower ends extending below the sills, braces connecting the frame of the machine with the lower end of said guides, bolts through the braces and guides and forming stops in the latter, and a cross head having anti-friction rollers at its extremities moving in said guides and resting normally on said stops and flanged anti-friction rollers on its body; of an excavator whose frame is adjustable vertically between said sills and astride said cross head, tracks on this frame moving over said flanged wheels, means for holding them in engagement therewith, the excavator including a chain and buckets, and an idle wheel at its lower end for said chain and adapted to raise the cross head off said stops when the frame is elevated.

5. In a ditching machine, the combination with a support, an excavator frame thereon having an upright arm and a horizontal arm projecting from the upright arm, idle wheels at the outer extremities of both arms, and a power driven sprocket in the angle between said arms; of tracks around said frame, a chain and bucket carrier traveling on the tracks and the chain engaging said power-sprocket, the body of each bucket being slitted along its outer side and its bottom hinged, means for holding the bottom parallel with its line of travel while the bucket is passing along the lower side of the horizontal arm of the frame, and cleaning devices located at that point and mounted on a standard across which said slit moves.

6. In a ditching machine, the combination with an excavator of the chain-and-bucket type, a sprocket wheel for driving the same, a gear and a sprocket on the shaft of said sprocket wheel, and a power pinion meshing with said gear; of a bucket-cleaning plate, a movable finger for cleaning the plate, driving mechanism for said finger, and connections between this mechanism and the sprocket on the shaft of said chain-sprocket.

7. In a ditching machine, the combination with an excavator including a chain and substantially tubular buckets, a sprocket over which the chain moves, and means for rotating the shaft of this sprocket; of a cleaning finger rotating in a plane at right angles to the axis of said buckets, means for driving the finger, and connections between said means and the shaft of said sprocket wheel.

8. In a ditching machine, the combination with an excavator including a chain and a series of buckets secured thereto and each having a tubular body provided with a longitudinal slit along its outer side; of

cleaning mechanism comprising a scraping plate whose periphery conforms with the cross sectional internal contour of the bucket body, a standard supporting said plate and over which said slit passes, a shaft extending through the center of said plate, a finger mounted on the shaft and moving over the face of the plate for cleaning the latter, and driving mechanism for said shaft leading down through said standard.

9. In a ditching machine, the combination with an excavator including a chain and a series of buckets secured thereto and each having a tubular body provided with a longitudinal slit along its outer side, a bottom hinged to the lower end of the body and transversely curved to conform with the curvature of the inner wall of said body, and means for holding said bottom closed at times and releasing it at other times; of cleaning mechanism comprising a scraping plate whose periphery conforms with the cross sectional internal contour of the bucket body, and the inner side of said bottom, a standard supporting said plate and over which said slit passes, mechanism for scraping the face of said plate, and driving means therefor leading through said standard.

10. In a ditching machine, the combination with an excavator including a chain and a series of buckets secured thereto, a bottom hinged to the lower end of the body of each bucket and transversely shaped to conform with the shape of the inner side of said body, lever mechanism connecting said body and bottom, and means for directing the course of said buckets; of a cleaner including a plate whose edge is shaped to conform with the interior of the body and bottom, a guard rail located adjacent said cleaner and positioned to be struck by said lever mechanism when the bucket bottom is opened into alinement with the inner wall of the bucket body, and means engaging said mechanism for holding said bottom closed except when the bucket is passing said guard rail.

11. In a ditching machine, the combination with an excavator including a chain and a series of buckets secured thereto and each having a tubular body provided with a longitudinal slit along its outer side, a bottom hinged to the body and transversely curved to conform with its curvature, lever mechanism connecting said body and bottom, and parallel tracks for directing the course of said buckets; of a cleaner fixed on a standard in the path of said buckets, a roller on said lever mechanism, a track for this roller located between said parallel tracks, following their course, interrupted opposite said cleaner, and positioned to hold the bottom closed, and a guard rail located opposite the interruption in said track and positioned to be struck by said lever mechanism when the cleaner opens the bottom into alinement with the inner wall of the bucket body.

12. In a ditching machine, the combination with an excavator including a chain and a series of buckets secured thereto and each having a tubular body provided with a longitudinal slit along its outer side, a bottom hinged to the lower end of the body and transversely curved to conform with the curvature of the inner wall of said body, and means for holding said bottom closed at times and releasing it at other times; of cleaning mechanism comprising a scraping plate whose periphery conforms with the cross sectional internal contour of the bucket body and the inner side of said bottom, a standard supporting said plate and over which said slit moves, a shaft journaled through the center of said plate, a finger carried by the outer end of said shaft and moving over the face of the plate, a shaft journaled in said standard and connected with a source of power, and gears connecting said shafts for moving the finger.

13. In a ditching machine, the combination with the excavator including a frame, an endless chain movable throughout the length of said frame, buckets on said chain and each slitted along its outer side, and a power-driven sprocket for moving the chain; of a hanger depending from said frame, a tubular standard supported by said hanger and astride which the slits in the buckets pass, a housing carried by the upper end of the standard, bucket-cleaning devices carried by said housing, a movable finger for scraping said cleaning devices, a shaft extending upward through said standard, connections between this shaft and finger and located within said housing, and operative connections between the lower end of said shaft and the driving sprocket of said chain.

14. The herein described cleaner for excavator buckets and the like comprising a plate disposed in the path of movement of the buckets and across said line of movement, and a finger moving over the face of the plate.

15. The herein described cleaner for excavator buckets and the like comprising a plate disposed in the path of movement of the buckets and across said line of movement, a shaft journaled through the center of the plate, a finger secured to the front end of the shaft and moving over the face of the plate, and means for imparting rotary movement to the shaft.

16. The herein described cleaner for excavator buckets and the like comprising a plate disposed in the path of movement of the buckets and across said line of movement, a shaft journaled through the center of the plate, a finger secured to the front

end of the shaft and moving over the face of the plate, a tubular standard supporting the plate, means passing upward through said standard for imparting rotary movement to said shaft, and a shield standing below said plate.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

MICAJAH L. POULTER.

Witnesses:
D. B. FINCH,
J. W. BURNOP.