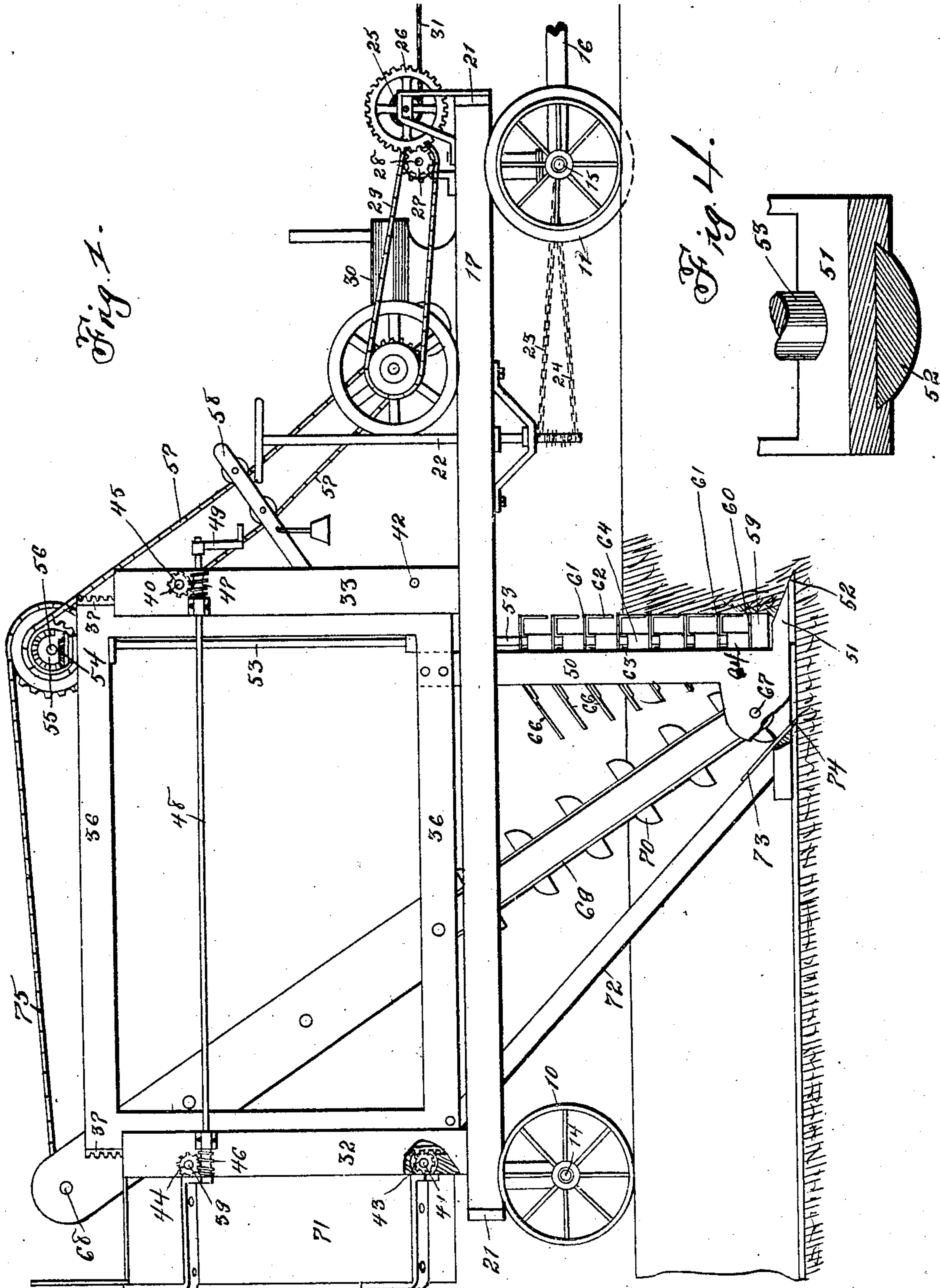


No. 831,976.

PATENTED SEPT. 25, 1906.

G. M. McCLEARY.
DITCHING MACHINE FOR TILE, &c.
APPLICATION FILED JAN. 5, 1906.

2 SHEETS—SHEET 1.



Witnesses: }
H. A. Fairbank }
R. H. Orwig }

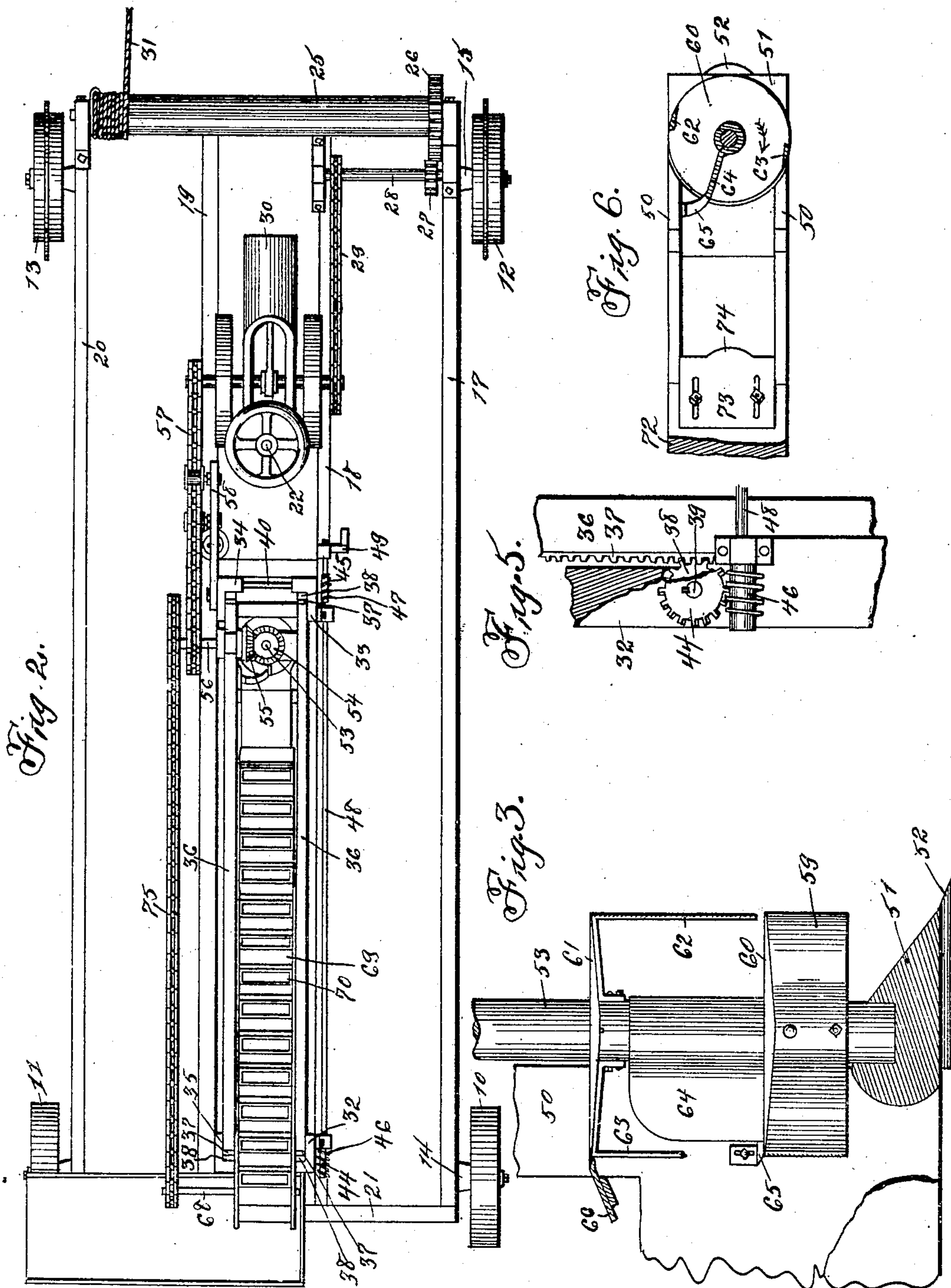
Inventor: George M. McCleary,
By Thomas G. Orwig & Co.,
Attorneys.

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2 SHEETS—SHEET 2.



Witnesses:
L. K. Kibrock
R. H. Orwig.

Inventor: George M. McCleary.
By Thomas G. Orwig & Co. Attys.

UNITED STATES PATENT OFFICE.

GEORGE M. McCLEARY, OF PITZER, IOWA.

DITCHING-MACHINE FOR TILE, &c.

No. 831,976.

Specification of Letters Patent.

Patented Sept. 25, 1906.

Application filed January 5, 1906. Serial No. 295,163.

To all whom it may concern:

Be it known that I, GEORGE M. McCLEARY, a citizen of the United States, residing at Pitzer, in the county of Madison and State of Iowa, have invented a new and useful Ditching-Machine for Laying Tile, Sewers, &c., of which the following is a specification.

The object of this invention is to provide improved mechanism for cutting ditches.

10 A further object of this invention is to provide improved mechanism for cutting and elevating earth.

15 A further object of this invention is to provide improved means for governing the depth of a ditch.

A further object of this invention is to provide improved means for shaping the bottom of a ditch to receive tile or pipe.

20 A further object of this invention is to provide improved means for cutting earth and delivering the same to an elevator.

25 A further object of this invention is to provide improved means for connecting, raising, and lowering a cutting mechanism and elevating mechanism conjunctively.

30 A further object of this invention is to provide means for interchangeably using various bits, plows, or shoes for shaping the bottom of a ditch to receive tile or pipe of various diameters.

A further object of this invention is to provide a cutting mechanism in which disks and reamers are employed and to provide clearers for the disks.

35 A further object of this invention is to provide a supplemental clearer following and spaced apart from the shaping bit, plow, or shoe for the purpose of clearing the loose earth from the shaped bottom of the ditch.

40 A further object of this invention is to be found in the provision of a double reamer adapted to cut earth above and move the same to the rear of a plow, bit, or shoe.

45 My invention consists in the construction, arrangement, and combination of elements hereinafter set forth, pointed out in my claims, and illustrated by the accompanying drawings, in which—

50 Figure 1 is a side elevation illustrating the complete machine in position for practical use. Fig. 2 is a plan of the complete machine. Figs. 3, 4, 5, and 6 are detail views of parts of my machine.

In the construction of the machine as

shown the numerals 10 11 designate support- 55
ing-wheels, and 12 13 supporting and steering wheels, said wheels carrying axles 14 15. A tongue or pole 16 is fixed to the axle 15 and may be employed for attachment of motive power to transport the machine when not in 60
use. A truck-frame composed of parallel longitudinal bars 17, 18, 19, and 20 and end bars 21 is mounted on the axles 14 15, the steering-axle having a king-bolt connection or fifth-wheel of conventional form. A steering-shaft 22 is mounted for manual rotation 65
in the forward portion of the truck-frame and is connected by chains 23 24, oppositely wound on the lower end portion thereof, to the steering-axle 15. A drum 25 is mounted 70
for rotation in a horizontal position transversely of the forward end portion of the truck-frame, and a pinion 26 on one end of said drum is in mesh with a pinion 27 on a counter-shaft 28, also carried by said frame. 75
The counter-shaft 28 is driven by sprocket-and-chain connections 29 to a prime mover, in this instance an engine 30 on the truck-frame. A cable 31 is fixed at one end to and is adapted to be wound on the drum 25. 80
The opposite end portion of the cable 31 is adapted to be anchored in any desired manner, whereby the operation of winding the cable on the drum will effect a forward movement of the trucks of the machine. 85

Posts or standards 32, 33, 34, and 35 are mounted on, fixed to, and rise from the truck-frame in parallel vertical planes. The posts 32 and 35 are arranged as a pair near the rear end of the truck-frame, and the posts 33 and 34 are arranged as a pair approximately mid- 90
way of the length of the frame. A machine-frame 36, composed of pairs of top bars and pairs of bottom bars connected by pairs of vertical end bars and again connected by pairs of horizontal end bars, is mounted in the space partially inclosed by the posts 32, 33, 34, and 35. Racks 37, in this instance four in number, are mounted or formed on the vertical end bars of the machine-frame 36 and mesh with pin- 95
ions 38, also four in number, fixed to and driven by shafts 39 40, mounted for rotation in the posts 32, 33, 34, and 35. Idler-shafts 41 and 42 are mounted for rotation in the posts below the shafts 39 and 40, and idler- 100
pinions 43 are mounted thereon and mesh with the racks 37 for the purpose of maintaining a vertical alinement of the machine- 105

frame 36. Worm-gears 44 and 45 are mounted rigidly on projecting end portions of the shafts 39 and 40 and are engaged by worms 46 and 47 on an actuating-shaft 48, and said shaft 48 is provided with a hand-crank 49 at one end, whereby manual force may be applied to raise or lower the machine-frame 36. Hangers 50 are arranged in a pair and are fixed to and depend from the forward end portion of the machine-frame 36, and the lower end portions of said hangers are connected to and carry a plow 51. The plow 51 preferably is solid and is formed with a longitudinally-plane lower face, an upper face inclining upward and rearward from its forward end, and a rounded or convex rear end face. A slide-seat having dovetailed side margins is formed in the bottom of the plow 51 and extends from the front end thereof rearward, but not to the rear end. A bit 52, formed with dovetailed side margins and a convex forward end portion and convex bottom face, is mounted by rearward-sliding movement in the slide-seat of the plow 51. It is the function of the bit 52 to form a trough or concaved groove longitudinally and centrally of the ditch to receive pipe or tile and hold the same in alinement preparatory to filling the ditch, and since tile or pipe of various diameters is laid it is desirable to form such grooves of various widths. Therefore I may remove a bit 52 having a given radius of curvature at its forward end and bottom and replace it by another bit having a greater or less curvature to conform to larger or smaller tile or pipe. A cutter-shaft 53 is stepped for rotation on the plow 51, and the upper end portion of said shaft is journaled in a bearing in the forward end portion of the machine-frame 36. A miter-gear 54 is fixed to the upper end portion of the cutter-shaft 53 and meshes with a miter-gear 55 on one end of a counter-shaft 56, journaled on the machine-frame 36. Sprocket-and-chain gearing 57 connects the counter-shaft 56 to the power-shaft of the prime mover or engine 30, and a gravity-operated belt-tightener 58 acts on the chain thereof to maintain the desired tension thereon. A double reamer 59, approximately S-shaped in cross-section, embraces and is fixed at its center to the cutter-shaft 53 immediately above the plow 51, there being sufficient clearance between the reamer and plow for the earth raised by the plow to pass rearward over it. Disks 60 and 61 are keyed to the cutter-shaft 53 and are formed with cutting edges. The disk 60 is arranged immediately above the double reamer 59, and the disks 61, of which there may be any desired number, are arranged at desired distances of separation above the disk 60. Reamers 62 63, formed of bar metal and each sharpened on one edge or margin, are fixed to the cutter-shaft 53 immediately beneath the disks 61 and extend radially to the

margins of the disks and thence downward nearly to the next lower disk. The orbit of the cutting edges of the reamers 62 63 is coincident with the cutting edges of the disks. Clearers 64, each formed of a single sheet of metal, are pivotally mounted on or hinged to the cutter-shaft 53 between the disks. The lower margin of each clearer 64 is plane and is in close proximity to or rests on the upper surface of a disk. The length of each clearer 64 approximates closely to the radius of a disk. An arm 65 is formed on and extends laterally from the lower outer corner of each clearer and is bolted to one of the hangers 50. The thickness of the arms 65 is such that the reamers 62 63 may just pass over them in the rotation of the cutter-shaft 53, and for this reason the reamers are stopped short of the upper surface of each disk.

Each of the clearers 64 is held stationary by the connection with the hanger 50 through the medium of the arms 65, and hence in the rotation of the disks in the direction of the arrow in Fig. 6 each clearer scrapes the earth from a disk and discharges the same rearward. Shelves 66 are fixed to and incline rearward from the hangers 50 adjacent each disk, and it is the function of the shelves to receive earth from the disks and deliver the same to the elevator about to be described. A shaft 67 is journaled in the lower end portion of the hangers 50, and a shaft 68 is journaled parallel therewith in the upper portion of the machine-frame 36. An elevator 69 of belt-and-bucket form is mounted on and for travel around the shafts 67 68, and the buckets 70 of such elevator have cutting edges that engage the bottom of the ditch as formed by the plow 51 and bit 52. The upper portion of the elevator 69 delivers to a laterally-inclined spout or chute 71, whereby the earth raised by the elevator is delivered laterally away from the ditch and at the rear of the machine. A bracket 72 is fixed to the rear portion of the machine-frame 36 and inclines forward therefrom to a point below and at the rear of the lower end of the elevator 69. The lower end of the bracket or brace 72 is fixed to rearwardly-extending portions or wings of the hangers 50, and a bit 73 is removably and replaceably mounted on and extends downward and forward therefrom between said wings. The bit 73 is formed with a lip 74, convex at its outer margin on the same radius as the forward end of the bit 52. It is the function of the bit 73 and its lip to clean the loose earth from the bottom of the ditch and maintain the shape of such bottom as formed by the bit 52. The bit 73 and its lip lift and push forward the loose earth in the lower portion of the ditch in such manner that the buckets 70 can engage and remove it. Hence it is desirable to provide bits 73 having lips of various sizes to conform to the bits 52. Sprocket-and-chain gearing 75 is

provided to connect the shaft 68 to the shaft 56, whereby the elevator 69 may be driven.

In the practical operation of the machine the trucks are advanced as described and the cutter-shaft 53 is driven at such speed in relation to the advance of the machine that the disks and reamers cut thin slices at various elevations and independent of each other from the forward end or wall of the ditch. Each disk carries its slice rearward and delivers it, through the engagement of a clearer 64, to a shelf 66, by which it is diverted to the elevator 69. The plow 51 and bit 52 lift and cut a portion of earth below the reamers and disks and shape the bottom of the ditch. The earth lifted by the bit and plow is moved over and to the rear of the plow by the reamer 59 and is received on the bottom of the ditch behind the plow. From the point behind the plow the loose earth is engaged and lifted by the elevator-buckets 70, and such earth as first escapes the buckets is lifted and advanced by the bit 73 until sufficient accumulates to be gathered by the elevator-buckets. The point of the plow 51 is in the vertical plane of the foremost points of the disks and reamers and cuts coincident therewith, thus relieving strain on the machine and permitting the trucks to be steered in curves and at angles to the line of normal advance indicated by the draft from the anchor.

I claim as my invention—

1. The combination of a wheeled truck, means for advancing said truck, a machine-frame on said truck, a vertical cutter-shaft on said frame, an elevator on said frame, and manually-operated mechanism for raising and lowering said frame, cutter-shaft and elevator relative to said truck.

2. The combination of a wheeled truck, means for advancing said truck, a machine-frame arranged for vertical adjustment on said truck, a vertical cutter-shaft on said frame, an elevator on said frame, means for raising and lowering said frame, cutter-shaft and elevator conjunctively, and means for driving said cutter-shaft and elevator conjunctively.

3. The combination of a wheeled truck, means for advancing said truck, a machine-frame arranged for vertical adjustment on said truck, a vertical cutter-shaft on said frame, an elevator on said frame, and mechanism for driving said elevator and cutter-shaft conjunctively.

4. The combination of a wheeled truck, means for advancing said truck, a machine-frame arranged for vertical adjustment on said truck, a vertical shaft on said frame, disks on said shaft, reamers on said shaft in working relation with said disks, and an elevator on said frame.

5. In a machine of the class described, a cutting mechanism comprising a shaft, disks on said shaft, reamers on said shaft adjacent

to said disks, clearers on said shaft adjacent said disks and an elevator at the rear of said shaft.

6. In a machine of the class described, a cutter mechanism comprising a shaft, disks on said shaft, reamers on said shaft adjacent said disks, the ends of the reamers being spaced apart from adjacent disks, clearers on said shaft adjacent said disks, arms on the clearers extending beneath the extremities of the reamers, stop means engaging said arms, and an elevator in the rear of said cutter mechanism.

7. In a machine of the class described, a shaft mounted for rotation, a double reamer fixed to said shaft, a disk fixed to said shaft above said reamer, other disks fixed to said shaft above the first disk and spaced apart, and other reamers fixed to said shaft adjacent the latter disks.

8. In a machine of the class described, a shaft mounted for rotation, a plurality of disks fixed to said shaft, a plurality of reamers fixed to said shaft, the arms of the reamers extending parallel with the shaft at the margin of the disks, and an elevator adjacent said shaft.

9. In a machine of the class described, a shaft mounted for rotation, a plurality of disks fixed to said shaft, a plurality of reamers fixed to said shaft, the arms of the reamers extending parallel with the shaft at the margins of the disks, the extremities of said arms spaced apart from the next lower disk, clearers on said shaft, arms on the clearers extending laterally beyond the margins of the disks, stop devices engaging said arms, and an elevator adjacent said shaft.

10. In a machine of the class described, a shaft mounted for rotation, a plurality of disks fixed to said shaft, a plurality of reamers on said shaft, the arms of the reamers extending parallel with the shaft at the margin of the disks, clearers on said shaft between the disks, shelves adjacent said disks, and an elevator adjacent said shelves, whereby the earth is directed from the disks to the elevator.

11. In a machine of the class described, a plow and a bit removably and replaceably mounted in said plow, said bit formed with a convex forward end and convex bottom.

12. In a machine of the class described, the plow formed with a longitudinally-plane lower face and an inclined upper face, and a bit removably and replaceably mounted in said plow, said bit formed with a convex forward end portion and a convex bottom.

13. In a machine of the class described, a plow, cutter mechanism above said plow, an elevator working to the bottom of a ditch at the rear of said plow, and a clearing-bit at the rear of said elevator.

14. In a machine of the class described, a plow, a bit removably and replaceably

mounted on said plow and formed with a convex cutting edge adapted to form a concaved groove, a cutter mechanism mounted above the plow, an elevator in the rear of and adapted to receive earth direct from said cutter mechanism and also adapted to engage and lift earth passing over the plow from the bottom of a ditch, and a clearing-bit following the elevator and adapted to accumulate loose earth passed by said elevator.

15. In a machine of the class described, a plow, a bit removably and replaceably mounted on said plow and formed with a convex cutting edge, an elevator adapted to collect earth passing over said plow and from the bottom of a ditch, and a clearing-bit, conforming to the plow-bit, following said eleva-

tor and adapted to accumulate loose earth passed by the elevator and feed it to said elevator.

16. In a machine of the class described, the combination of a truck-frame, a machine-frame mounted loosely in the truck-frame, racks on said machine-frame, shafts on the truck-frame, pinions on said shafts meshing with said racks, and worm-gears acting on said shafts.

Signed by me at Des Moines, Iowa, this 17th day of March, 1905.

GEORGE M. McCLEARY.

Witnesses:

SILAS C. SWEET,
L. L. LEIBROCK.