J. L. STEENROD.

TILE LAYING APPARATUS.

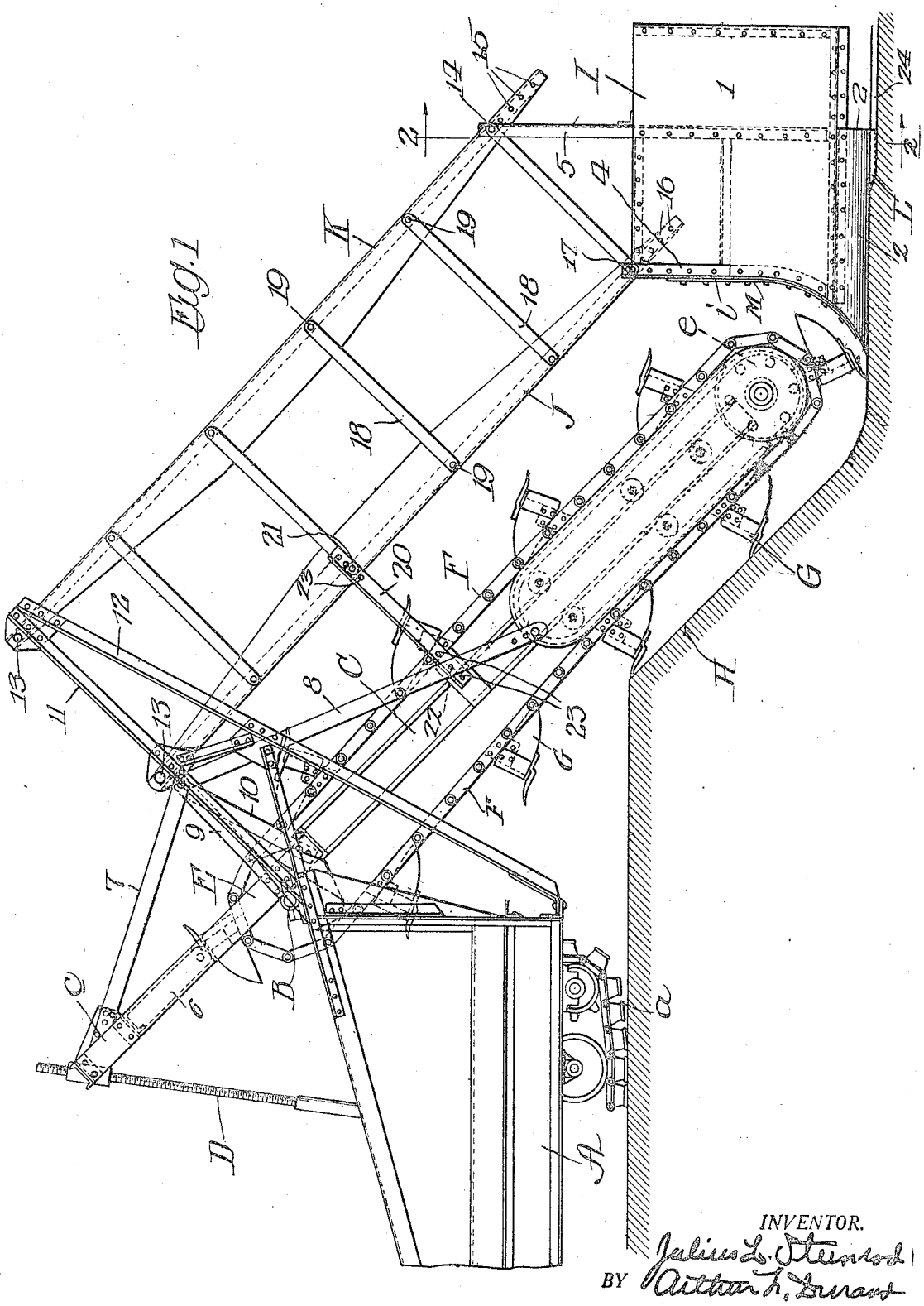
APPLICATION FILED FEB. 7, 1917.

1,287,781.

Patented Dec. 17, 1918.

3 SHEETS—SHEET 1.

Fig. 1



INVENTOR.

Julius L. Steenrod

BY Arthur L. Durand

ATTORNEY.

J. L. STEENROD.

TILE LAYING APPARATUS.

APPLICATION FILED FEB. 7, 1917.

1,287,781.

Patented Dec. 17, 1918.

3 SHEETS—SHEET 2.

Fig. 2

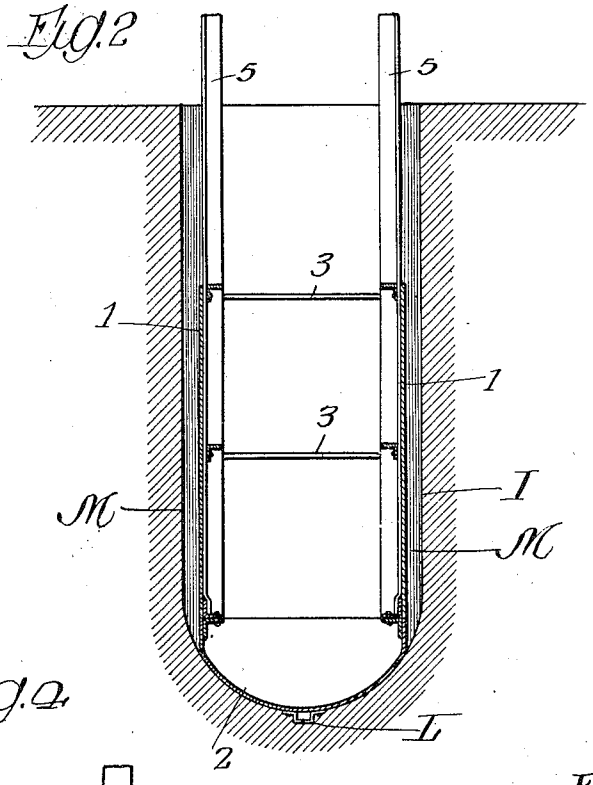


Fig. 4

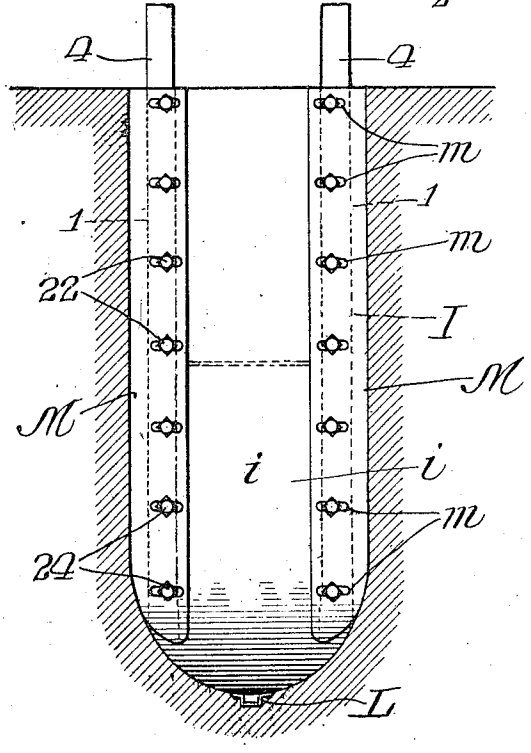
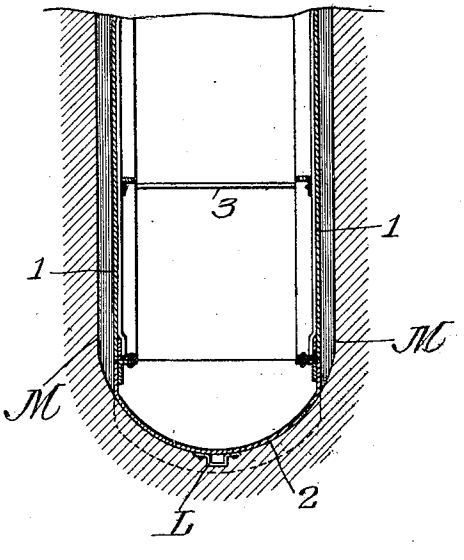


Fig. 3



INVENTOR.

Julius L. Steenrod

BY Arthur L. Benard

ATTORNEY.

J. L. STEENROD.

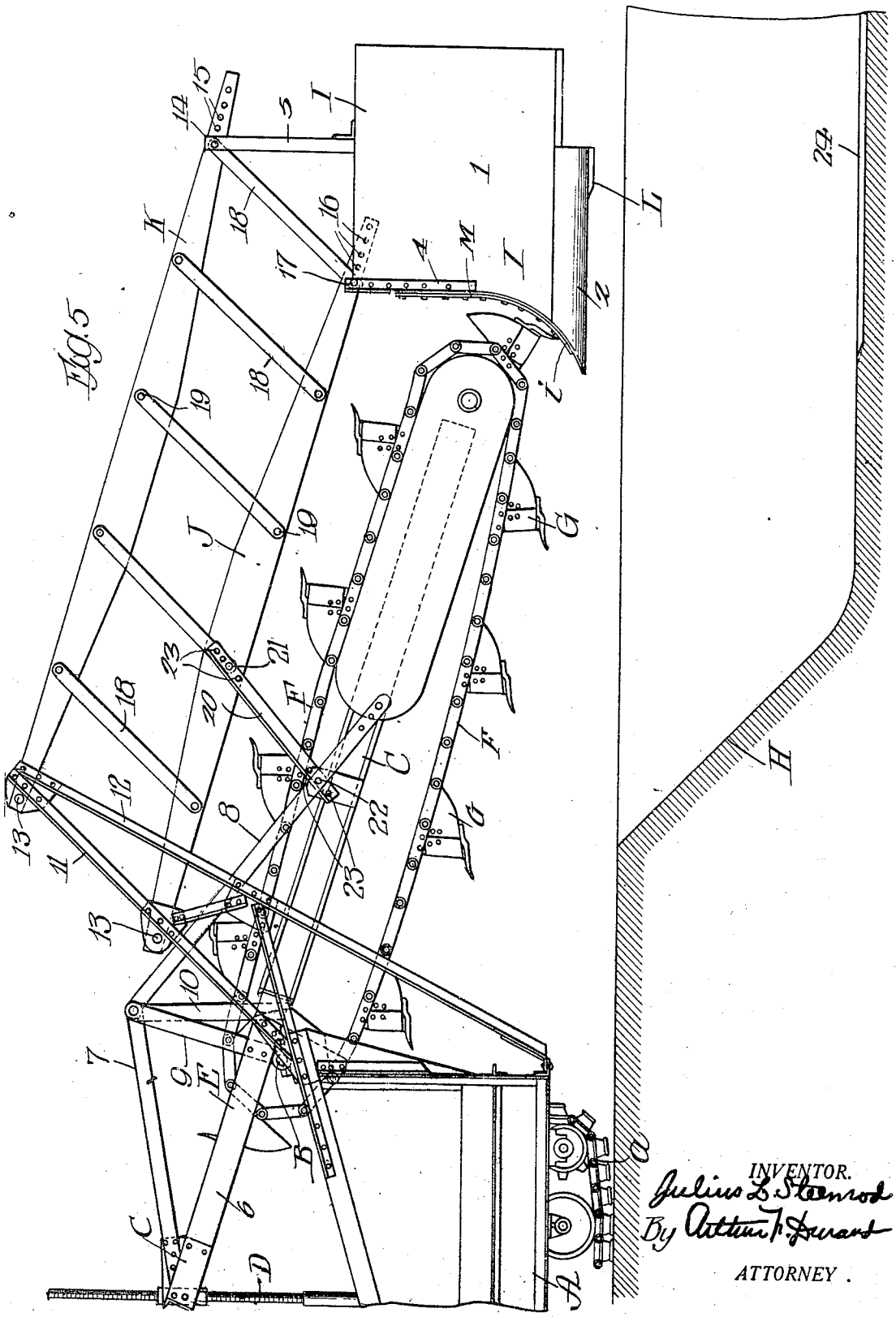
TILE LAYING APPARATUS.

APPLICATION FILED FEB. 7, 1917.

1,287,781.

Patented Dec. 17, 1918.

3 SHEETS—SHEET 3.



UNITED STATES PATENT OFFICE.

JULIUS L. STEENROD, OF KENOSHA, WISCONSIN, ASSIGNOR TO FREDERICK C. AUSTIN, OF CHICAGO, ILLINOIS.

TILE-LAYING APPARATUS.

1,287,781. Specification of Letters Patent. Patented Dec. 17, 1918.

Application filed February 7, 1917. Serial No. 147,076.

To all whom it may concern:

Be it known that I, JULIUS L. STEENROD, a citizen of the United States of America, and resident of Kenosha, Kenosha county, Wisconsin, have invented a certain new and useful Improvement in Tile-Laying Apparatus, of which the following is a specification.

My invention relates to trenching machines of that kind in which a digging beam is arranged at the rear end of the machine and provided with an endless series of buckets which cut a trench while the machine moves slowly forward. Excavators of this kind are used, for example, in making trenches for laying tile, the excavated dirt being returned to the trench behind the excavator after the tile is properly laid therein.

Generally stated, the object of my invention is to provide a novel and improved arrangement to facilitate the laying of the tile at the bottom of the trench immediately in rear of the forwardly moving digging beam and buckets.

A special object is to provide, as an attachment for a trenching machine, a tile-laying apparatus which will work in either hard or soft ground, and which will form a longitudinal groove along the bottom of the trench, in which groove the tile can be laid behind the excavator.

It is also an object to provide certain details and features of construction and combinations tending to increase the general efficiency and desirability of an excavator having a tile-laying apparatus or attachment of this particular character.

To the foregoing and other useful ends, my invention consists in matters hereinafter set forth and claimed.

In the accompanying drawings:—

Figure 1 is a side elevation of the rear portion of an excavator having a tile-laying attachment or apparatus in conjunction therewith, for facilitating the laying of the tile immediately in rear of the excavator, embodying the principles of my invention.

Fig. 2 is an enlarged vertical section on line 2—2 in Fig. 1.

Fig. 3 is a view similar to Fig. 2, showing the manner in which the groove-cutter is employed or operated when the ground is comparatively hard.

Fig. 4 is a front elevation of the box-like body which slides on the bottom of the trench behind the buckets.

Fig. 5 is a view similar to Fig. 1, showing the digging apparatus raised out of the ground.

As thus illustrated, my invention comprises an excavator-body A mounted upon suitable traction-devices *a*, the forward portions of said body and traction-devices being broken away for convenience of illustration. At the rear of the machine, the transverse shaft B is supported in suitable bearings on the frame of the body, and the digging beam C is supported by this shaft, so that said beam is adapted to swing up and down at its lower and rear end. A raising-and-lowering apparatus D, of any suitable character, is applied to the upper end portion *c* of said beam to raise and lower the same by tilting it about the horizontal axis provided by said shaft. Sprockets E are mounted upon said shaft, and rotary supporting members *e*, of any suitable character, are mounted to rotate about a horizontal axis at the lower end of the digging beam. Endless sprocket-chains F are carried by sprockets E and the members *e*, and digging buckets G are secured at intervals to said chains or link-belts, whereby the rotation of the shaft B, by any suitable means, will cause the operation of said buckets. It will be understood that the buckets are operated so that those behind the beam move downward and those in front of the beam move upward, the upwardly traveling buckets operating against the sloping forward end wall H or breast of the trench, in the usual and well-known manner. In this way, and by slowly operating the traction-devices while the buckets G are in operation, the machine will move slowly forward and cause the buckets to cut a trench having straight sides, the depth of the trench being regulated by adjusting the beam up and down in the well-known manner.

Trenches of this kind are used for the laying of tile, and the general method consists in laying the tile along the bottom of the trench and then using the excavated dirt as a filling to cover the tile. Ordinarily, the tile is laid immediately behind the excavator, and to facilitate this method various attachments have heretofore been used immediately behind the digging beam and buckets. For this purpose, the box-like

body or structure I is arranged immediately behind the beam and buckets, being provided with a front wall *i* which forms a shield immediately behind the buckets, and which is curved forward at its lower portion to conform to the curved path of the buckets, thereby to keep the loose excavated dirt in the trench crowded forward in position to be gradually taken up by the buckets. This body I is provided with sides 1 which bear against the sides of the trench, thus keeping the dirt from caving in at this point. Said body is also provided with a bottom 2 which is curved to conform to the trough-like curvature of the bottom of the trench, which curvature conforms to the curve of the edges of the buckets G, in the well-known manner. The sides 1 are spaced apart by braces 3 or any other suitable means. Relatively short standards 4 are provided at the front of the body I, one at each side thereof, and taller standards or uprights 5 are provided at a distance in rear thereof. The beam C is provided at its upper portion with a rigid frame 6 comprising the rigidly connected members 7, 8, 9 and 10, arranged as shown in Fig. 1, thus providing a stiffening frame for the beam. The body A has a rear frame 11 and 12 to support the body I behind the excavator. Preferably, this is done by means of parallel bars J, one at each side of the trench, which connect the front standards 4 with the frame-members 11 and 12, using the pivot-bolts 13 for this purpose. Similar bars K, one at each side of the machine, connect the upper ends of the frame-members 11 and 12 with the upper portions of the standards 5, the pivot-bolts 13 being employed for this purpose at the upper ends of said bars. At their lower ends, the bars K are connected by pivots 14 with the standards 5 and have a series of holes 15 to permit adjustment of the connection. The bars J have similar holes 16 to permit adjustment or variation of the bolts 17 by which these standards 4 are connected to the bars J. Bars 18 extend between the bars J and K, being pivoted thereon at 19, so that a parallel-motion-connection is provided. Links 20 connect the bars J with the beam C, having pivots 21 and 22, whereby the bars J remain substantially parallel with said beam, when the latter is raised and lowered. (See Fig. 5.) Holes 23 in the links 20 permit adjustment for the bolts 21 and 22 to insure the desired mode of operation.

The trench made by this machine is much wider than the tile, in order to enable the workman to conveniently do the work of laying the tile, and it becomes desirable to cut a longitudinal groove along the bottom of the trench in which to lay the tile. For this purpose, a groove-cutter L is provided and secured to the under side of the bottom 2 of the body I, so that a groove will be cut in the ground as the machine moves forward. The workman stands in the body I and drops the tile into the groove 24 cut in the bottom of the trench. If the machine is working in soft ground, the body I will sink to the bottom of the trench, and the cutter L will operate below the bottom surface of the trench, in the solid ground, so that the groove will be cut below the depth of operation of the buckets. (See Figs. 1, 2 and 5.) On the other hand, if the machine is working in very hard ground, the body I is then adjusted upward a distance by means of the holes 15 and 16 and the cutter L will then rest and slide upon the bottom of the trench, causing the bottom wall 2 to move along a distance above the bottom of the trench, so that a certain amount of the loose dirt left by the buckets in the trench will be allowed to pass under the body I, and this loose dirt will be compressed at each side of the cutter L to form the sides of the groove for the tile. (See Fig. 3.) In other words, in soft ground this groove is formed in the solid ground below the bottom of the trench, while in hard ground said groove is formed in the loose excavated dirt left by the buckets in the trench. With the construction shown, the body I is always vertical, so that its bottom is horizontal, regardless of the depth of the trench. This is because of the parallel-motion-connection by which the body I is supported.

As shown in Fig. 4, adjustable cutter-plates M are secured to the front of the body I, at opposite sides, and can be pushed out against the sides of the trench. For this purpose, each plate has horizontal slots *m* for the bolts 24, so that by loosening these bolts the plates can be moved toward and away from each other.

Thus, a groove is formed for the tile, so that the laying of the latter will be rendered more certain and accurate, the workman in the body I simply placing the tile one ahead of the other in said groove as the machine moves along. In this way, the tile is held in a straight line, and displacement thereof is prevented, so that when the excavated dirt is returned to the trench, the tile will be properly covered and will not be disarranged.

What I claim as my invention is:—

1. In an excavator, apparatus for cutting a trench, a body adapted and arranged to slide along on the bottom of the trench immediately in rear of said apparatus, means on the bottom of said body to form a longitudinal groove for tile along the bottom of the trench, said apparatus comprising a digging-beam mounted at its upper end to swing up and down at its lower end, and a

frame to support said body for movement up and down with said beam, said frame having a parallel-motion-connection to keep said body upright in all positions thereof.

2. In a trenching machine, the combination of a tilting digging beam disposed in rear of the machine, an endless chain of digging buckets carried by said digging beam, a hollow body adapted to slide on the bottom of the trench behind said buckets to facilitate the laying of tile in the trench, means for changing the angle of said digging beam to vary the working depth thereof in the ground, and mechanism to automatically maintain said hollow body in the same operative position thereof for all angles of said digging beam, and for all depths of said body in the ground, and for supporting said body to swing up and down with said beam.

3. In a trenching machine, a structure as specified in claim 2, said mechanism comprising a parallel motion connection controlled by said beam.

4. In a trenching machine, a structure as specified in claim 2, said mechanism comprising parallel members extending upward above said beam, substantially at the same angle with said beam, fixed pivots for the upper ends of said members, a pivoted link forming a connection between said beam and the lower member, pivoted links to connect said parallel members together, so that said members and links form a parallel motion support provided at its lower end with fixed pivotal points on said body.

5. In a trenching machine, a structure as specified in claim 2, said mechanism comprising a parallel motion support having fixed pivotal points of support at the upper end thereof, and having its lower end provided with pivotal points of support for said body, so that tilting motion of said body is prevented when it is moved up and down.

6. In a trenching machine, a tilting trench cutter disposed in position to cut a trench behind the machine, a device to slide on the bottom of the trench behind said trench cutter, and mechanism to support said device to swing up and down with said trench cutter, and having means to maintain the same operative position of said device for all angles of said trench cutter, and for all depths of said device in the ground.

7. A structure as specified in claim 6, and means for tilting said trench cutter and thereby raising and lowering said device through the medium of said mechanism.

8. In a trenching machine, a trench cutter, a hollow body to slide on the bottom of the trench behind said trench cutter, said body having a front wall and two side walls, so that a housing is provided to facilitate the laying of tile in the trench, cutter plates (M) on the front wall to smooth the sides of the trench and to provide a clearance at each side of the hollow body, and means to support said hollow body and by which to lift it out of the trench, said cutters having slots (*m*) extending transversely thereof, and bolts (22) engaging said slots to support the cutter plates, whereby said cutter plates are adjustable toward and away from the sides of the trench, substantially as shown and described.

9. A structure as specified in claim 6, said device comprising a groove cutter for making a groove in the bottom of the trench in which to place tile.

10. A structure as specified in claim 2, and a groove cutter mounted on the bottom of said device and maintained in horizontal position by said mechanism.

11. A structure as specified in claim 6, said device having a groove cutter, and means whereby said device is adjustable up and down on the lower end of said mechanism, for the purpose set forth.

Signed by me at Kenosha, Wis., this 25th day of Jan., 1917.

JULIUS L. STEENROD.