(No Model.)

3 Sheets—Sheet 1.

J. McMULLIN.

TILE LAYING MACHINE.

No. 361,309. Patented Apr. 19, 1887.

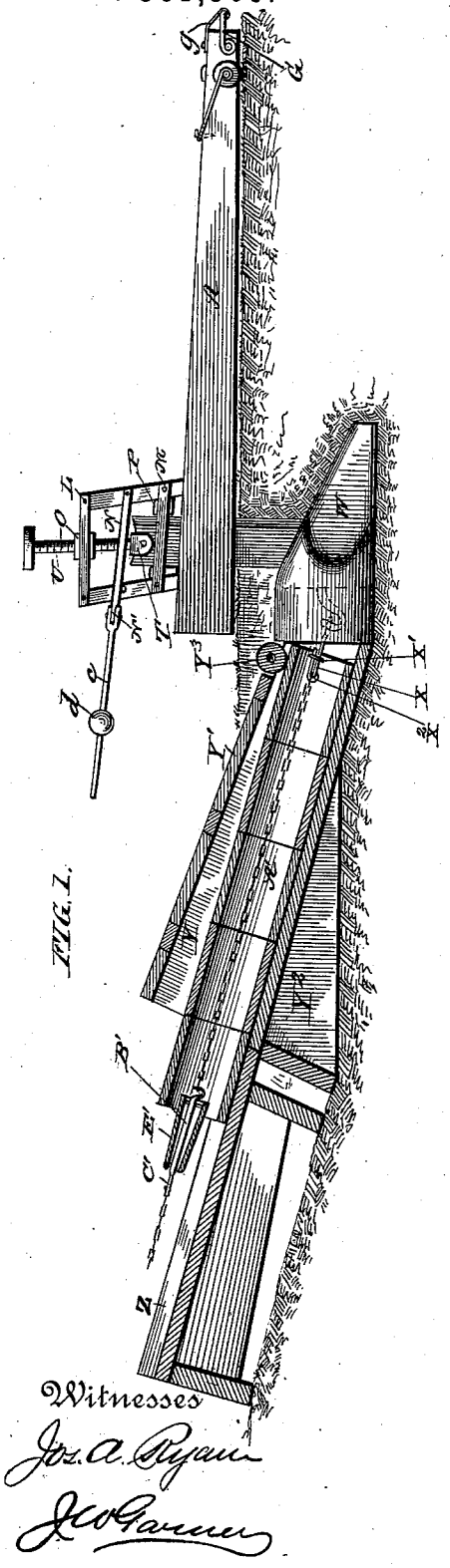


Fig. 1.

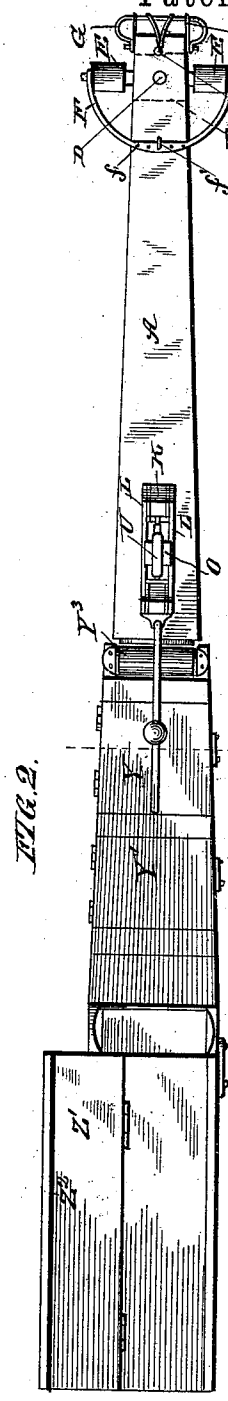


Fig. 2.

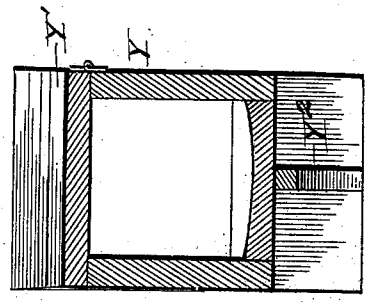


Fig. 4.

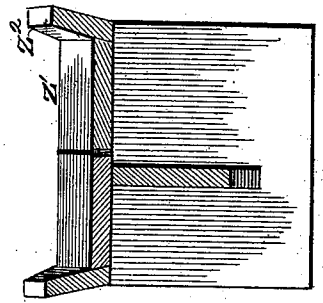


Fig. 5.

Witnesses

Jos. A. Ryan

J. McGarvey

Inventor

Joseph McMullin

By his Attorneys

C. A. Crowley

N. PETERS. Photo-Lithographer, Washington, D. C.

(No Model.) 3 Sheets—Sheet 2.

J. McMULLIN.

TILE LAYING MACHINE.

No. 361,309. Patented Apr. 19, 1887.

FIG. 3.

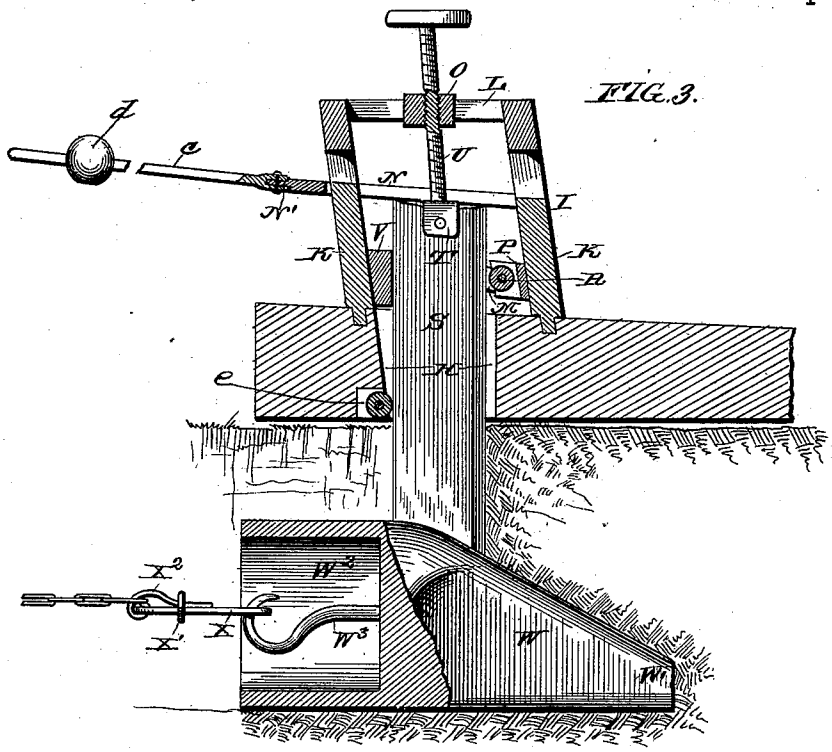


FIG. 6.

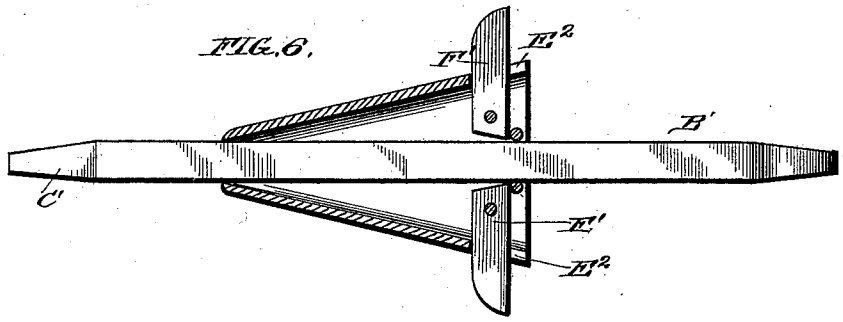
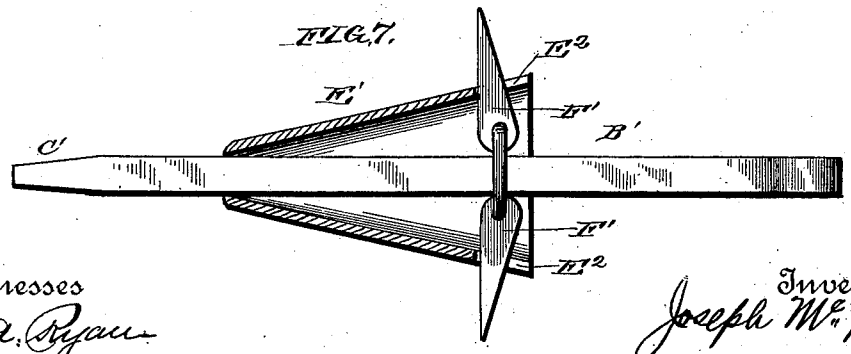


FIG. 7.



Witnesses
Jos. A. Ryan
J. W. Gannon

Inventor
Joseph McMullin

By his Attorneys
C. A. Snowden & Co

N. PETERS, Photo-Lanographer, Washington, D. C.

(No Model.) 3 Sheets—Sheet 3.

J. McMULLIN.

TILE LAYING MACHINE.

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FIG. 8.

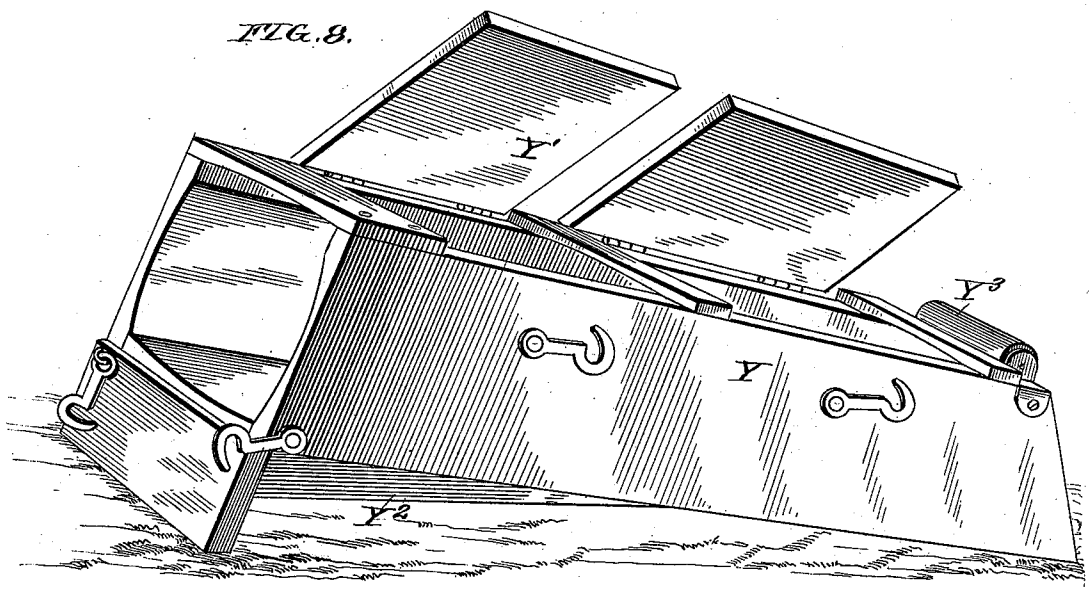
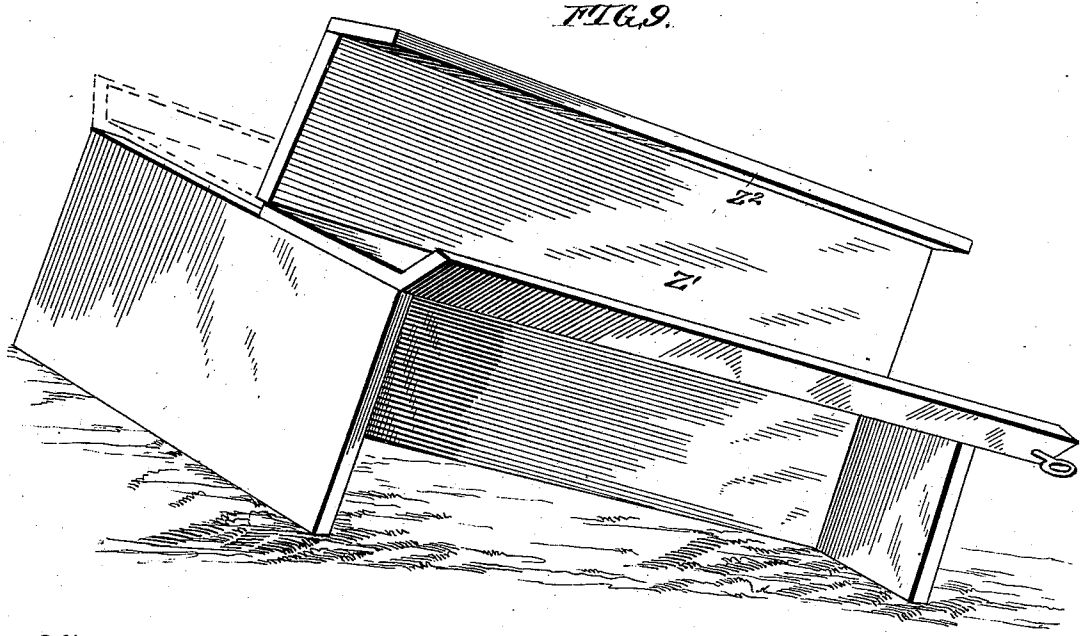


FIG. 9.



Witnesses
Jos. A. Ryan
E. G. Siggers

Inventor
Joseph McMullin

By his Attorneys
C. A. Snow & Co.

N. PETERS, Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

JOSEPH McMULLIN, OF CASEY, IOWA.

TILE-LAYING MACHINE.

SPECIFICATION forming part of Letters Patent No. 361,309, dated April 19, 1887.

Application filed January 19, 1887. Serial No. 224,792. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH McMULLIN, a citizen of the United States, residing at Casey, in the county of Guthrie and State of Iowa, have invented a new and useful Improvement in Tile-Laying Machines, of which the following is a specification.

My invention relates to an improvement in tile-laying machines; and it consists in the peculiar construction and combination of devices, that will be more fully set forth hereinafter, and particularly pointed out in the claims.

This invention is an improvement upon the tile-laying machine for which Letters Patent of the United States No. 354,429 were granted to me December 14, 1886.

In the accompanying drawings, Figure 1 is a side elevation, partly in longitudinal section, of a tile-laying machine embodying my improvements, arranged in position for laying tiles in the ground. Fig. 2 is a top plan view of the same. Fig. 3 is an enlarged elevation, partly in section, of the plow. Fig. 4 is a transverse sectional view of the evening-trough. Fig. 5 is a similar view of the tile-feeding trough. Figs. 6 and 7 represent a grasping device for the tiles. Fig. 8 is an enlarged detached perspective view of the evening-trough, and Fig. 9 is a corresponding view of the feed-trough.

A represents the plow-beam, which is provided near its front end with a horizontal transverse slotted opening, B, in which is located a transverse axle, C, which is pivoted at the center upon a king-bolt, D. On the ends of the axle are journaled bearing-rollers E, which support the front end of the plow-beam at a slight distance above the ground.

F represents a semicircular yoke-bar, which has its ends attached to the ends of the axle. The central portion of the said yoke-bar is provided with a series of openings, *f*. A pin, *f'*, is adapted to be passed through either of the said series of openings and to enter the upper side of the plow-beam, so as to support the axle at any suitable adjustment, and thus direct the plow either in a straight line or on a curve of any suitable radius.

G represents a clevis, which is attached horizontally to the front end of the plow-beam, the said clevis slightly exceeding the width of the plow-beam, and thereby projecting beyond the sides thereof. In the upper side of the plow-beam, near its front end, is secured a bolt, to which is attached the central portion of a rod, *g*, the ends of the said rod being attached to the central portion of the clevis. Similar rods, *g'*, are connected to the clevis near the ends thereof, and extend rearwardly, and are connected to the ends of the transverse bolt which extends through the plow-beam, and to which the ends of the clevis are attached. These rods *g* and *g'* serve to greatly strengthen the clevis, and thereby adapt the latter to withstand the strain to which it is subjected when the plow is used. The said rods also serve to divide the clevis, and form suitable openings, to which the cable is connected, for drawing the plow forward. Near the rear end of the plow-beam, and extending through the same, is a vertical longitudinal opening, H.

I represents a frame, which projects vertically from the upper side of the plow-beam near the rear end thereof, the said frame being mortised to the plow-beam and comprising the front and rear standards K, which are arranged at the front and rear sides of the opening H, and the bars L, connecting the upper ends of the said standards and attached to the outer sides thereof.

M represents horizontal bars, which are attached to the outer sides of the standards at a suitable distance above the plow-beam, and N represents a horizontal yoke-bar having bifurcated arms which embrace the outer sides of the standards, and extend from one end of the frame I to the other, the rear end of the said yoke-bar being provided with a projecting tongue, N'.

O represents a sliding block, which is provided in its sides with longitudinal grooves, that are adapted to receive the top bars, L, of the frame, and thereby the said block is free to slide longitudinally between the said top bars in a forward or rearward direction in the frame.

P represents a similar sliding block, which engages the opposing side of the horizontal bars M, and is arranged at the front end of the frame, the said block P having a roller, R, journaled in its center at the rear side.

S represents the plow-standard, that is pref-

erably made of steel and extends through the opening H in the rear end of the plow-beam. To the upper end of the said plow-standard is pivoted a clip, T, to the lower end of which is swiveled an elevating-screw, U. The said elevating-screw passes through and engages a threaded opening in the sliding block O, and by turning the said screw it will be apparent that the plow-standard may be either raised or lowered. The front edge of the plow-standard bears against the roller R.

V represents a wedge, which bears between the rear side of the plow-standard and the front side of the rear standard, K, of the frame. The function of this wedge is to keep the front edge of the plow-standard in contact with the anti-friction roller R, and thereby prevent longitudinal motion of the plow-standard.

As the block O is free to slide longitudinally in the frame I, it will be evident that the plow-standard may be adjusted either to a vertical or to a longitudinally-inclined position at a suitable angle.

The front edge of the plow-standard is beveled on opposite sides, and thereby sharpened, to convert the plow-standard into a cutter or knife, and to the lower end of the said plow-standard is attached a foot or share, W, which is substantially circular in form at its rear end, and is tapered and inclined at its front end, to provide a sharpened wedge-shaped cutter, W′, which will readily penetrate the earth when the plow is drawn along. The rear end of this foot or share slightly exceeds in cross-section the diameter of the tiles that are to be laid, and the said rear end of the foot is hollowed out to form a cylindrical chamber, W^2, into which the first drain-tile of the series is adapted to be fitted or placed, as will be described hereinafter.

From the front wall of the cylindrical chamber W^2 projects a rearwardly-extending hook-rod, W^3, to which is attached an open link, X. A link, X′, fits on the said link, and is adapted to slide longitudinally thereon, and a hook-arm, X^2, is pivoted to the rear end of the link, the front end of the said hook-arm being adapted to be engaged by the sliding rings X′, as will be very readily understood.

Y represents an evening-trough, which is rectangular in cross-section and is tapered from its rear end to its front end, and provided on its upper side with openings which extend nearly the entire length of the trough, and are adapted to be covered by a hinged lid, Y′. A shoe or runner, Y^2, is placed under the bottom of the evening-trough, the said shoe or runner being inclined at a suitable angle, and thereby adapted to support the evening-trough at a suitable angle upon the ground, with its rear end raised higher than the front end thereof. At the front end of the evening-trough, on the upper side thereof, is journaled a transverse anti-friction roller, Y^3.

Z represents an inclined feed-trough, the front end of which corresponds in height with the lower side of the rear end of the evening-trough. The latter is provided at its rear end with hooks, which are adapted to engage eyes secured to the front end of the feed-trough, so as to connect the latter to the evening-trough. The bottom or platform of the feed-trough is equal in width to the diameter of the tiles to be laid, and to one side of the bottom or platform is hinged a leaf, Z′, which is adapted to be lowered to a horizontal position or raised to any desired angle, and is provided at its outer side with a longitudinal flange, Z^2.

A′ represents a series of chain-sections, each of which is equal the length of about twenty cylindrical drain-tiles such as shown at Fig. 1. Each section of the chain is provided at its rear end with a hook, which is adapted to engage an eye formed at the front end of a rod-section, B′. The rear ends of the said rod-sections are provided with hooks C′, adapted to engage the front end of the next adjacent chain-section, and thereby the said chain-section and rod-sections are adapted to be connected together in continuous series. On each rod-section is secured a longitudinally-sliding head, E′. The said head is wedge-shaped and broadest at its front ends. On opposite sides of each head B′, at the rear end thereof, are made openings E^2. F′ represents dogs, which are pivoted in the rear sides of the head, and are adapted to project outwardly through the openings E^2.

The operation of my invention is as follows: An opening of a suitable depth and size is dug in the earth at the point from which the drain is to start, and in the said opening is placed the evening-trough Y, the rear end of the said trough being on a level with the surface of the ground. One of the chain-sections is then attached to the link X, in the rear of the plow-foot, by means of the ring X′ and the hook-arm X^2, and the said chain-section is caused to extend through the evening-trough. The feed-trough is then attached to the rear end of the evening-trough, and the drain-tiles which are to be laid are placed upon the wing Z′, and the latter is tilted so as to move the drain-tiles onto the inclined bottom of the feed-trough, and they are slid successively down the same into the evening-trough, the rod-section attached to the chain-section being passed through the said drain-tiles as they enter the evening-trough. This operation is repeated until the first section of the chain is entirely covered by the drain-tiles, and when the section of the chain is full the head is moved rearwardly on the rod and the dogs distended, and thereby caused to clamp against the rear end of the last section of the drain-tiles, the said section of the drain-tiles being provided on opposite sides with suitable notches adapted to receive the dog. The plow is then drawn forward along the proposed line of the drain by means of a capstan, or other suitable device, thereby causing the plow-foot to run in the ground at a suitable distance below the surface and to draw the drain-tiles in the ground after it.

As soon as the last tile of the first section leaves the feed-trough, other tiles are placed upon the same, and another chain is attached to the hook at the rear end of the rod-section, and additional tile-sections are threaded or placed upon the second section of the chain as before, and so on until as many sections of the chain as may be desired have been coupled together and the drain-tiles laid in the ground for a distance of about four hundred or five hundred feet.

It will be observed that all of the sections of the drain-tiles which are intermediate between the sections thereof having the notches *a* are entirely free from strain, the strain being borne by the said sections having the notches *a*.

Just before the plow is started the lids Y′ are closed over the upper side of the evening-trough, to prevent dirt from falling into the said trough upon the tile-sections as they pass through the same. The function of the anti-friction roller Y^3, at the front end of the evening-trough, is to facilitate the escape of the tile-sections from the same as they successively pass the said roller.

When a suitable number of the drain-tiles have been laid in the ground in a continuous line, an opening is dug in the ground down to the foot of the plow, so as to expose the same. The ring X′ is then slipped forwardly on the link X, thus releasing the hook-arm X^2 and causing the same to disengage the front end of the chain. A hook-rod is then attached to the rear end of the continuous chain, and the latter is drawn rearwardly from the plow-foot. At the first rearward motion of the chain the sliding heads E′ on the rod-sections B′ move rearwardly, and thereby release the dogs and cause them to disengage the tile-sections, which leaves the chain free to be withdrawn rearwardly from the said tile-sections, and then the operation of laying the tiles, before described, is repeated until a drain of the requisite length has been made.

It has been found difficult heretofore to prevent the rear end of the plow-beam from rising while it is in motion, and thus causing the plow-foot to come too near the surface of the ground. To avoid this objection, I pivot a rearwardly-extending swinging arm, *c*, to the rear portion of the yoke-arm N, and upon the said swinging arm I place a longitudinal movable weight, *d*. By moving the said weight rearwardly on the swinging arm it exerts so powerful a leverage upon the rear end of the plow-beam as to keep the plow-foot at the requisite depth in the earth. This weighted swinging arm is also useful to prevent the plow from tilting when going around curves, as this may be done by moving the said arm to one side, so that its weight will be exerted upon the outer side of the plow-beam.

In order to facilitate raising and lowering the plow-foot, I provide a rectangular box or frame, *e*, which is embedded in the under side of the plow-beam at the rear side of the opening H, and is provided with an anti-friction roller, which bears against the rear side of the plow-standard.

In Fig. 7 I illustrate a modified form of the device for grasping the tile-sections, in which I pivot the dogs to a ring, which is adapted to slide back and forth upon the rod-sections with the head thereof, instead of pivoting the dogs to the said head, as shown in Fig. 6.

Having thus described my invention, I claim—

1. In a plow for laying drain-tiles, the combination of the beam, the standard extending through the same, the frame I, the screw to raise or lower the standard, and the sliding block in which the elevating-screw works, substantially as described.

2. In a plow for laying drain-tiles, the combination of the beam, the vertically-movable standard, the frame, the sliding box P, having the roller bearing against one side of the standard, and the wedge bearing against the opposite side of the standard, for the purpose set forth, substantially as described.

3. In a plow for laying drain-tiles, the combination of the beam, the frame I thereon, the plow-standard extending through the beam, the longitudinally-movable sliding blocks O P, secured to the frame, and the elevating-screw working in the said blocks and connected to the standard, substantially as described.

4. In a drain-tile-laying machine, the combination of a beam, a fixed frame carried thereby near its rear end, a vertically-movable standard guided in the frame, a yoke fitted around the frame and pivoted at its front ends thereto, and a rearwardly-extended arm connected to the yoke and having a movable weight, as and for the purpose set forth.

5. In a drain-tile-laying machine, the combination of a beam, a fixed frame carried thereby near its rear end, a vertically-movable standard working in the frame and having a swivel, T, at its upper end, a movable block, O, supported in the upper end of the frame, an elevating-screw working in said block and connected to the swivel of the standard, a movable block, P, working in the frame beneath the upper block and having a roller riding against one side of the standard, and a wedge bearing against the opposite side of the standard, as and for the purpose set forth.

6. The combination, with a plow for laying drain-tiles, of the stationary inclined evening-trough secured in the ground in rear of the plow, and through which the series of tiles trailed behind the plow are directed into the ground, substantially as described.

7. The combination, with a plow for laying drain-tiles, of a stationary evening-trough arranged in rear of the plow, and a feed-trough forming a continuation of the evening-trough, as and for the purpose set forth.

8. The combination, with a plow for laying drain-tiles, of a stationary inclined evening-trough arranged in rear of the plow, and a feed-trough arranged in rear of and connected

to the evening-trough to form a continuation thereof, as and for the purpose described.

9. The combination, with a plow for laying drain-tiles, of a closed evening-trough arranged in rear of the plow and having the loosely-journaled friction-roller in its front end, as and for the purpose described.

10. The combination, with a plow for laying drain-tiles, of a closed evening-trough arranged in rear of the plow, and a feed-trough forming a continuation of the evening-trough, and provided on one side with a swinging leaf adapted to be turned to an upright position to direct the tiles upon the body of the trough, as and for the purpose described.

11. A feeding-trough for tile-laying machines, having the inclined bottom provided on one edge with a longitudinal inclined flange, and a swinging leaf hinged to the opposite edge of the bottom and having a similar inclined flange at its free edge, as and for the purpose described.

12. An evening-trough for drain-tile laying machines, having the inclined bottom, the connected sides, the lids or lid hinged to one of the sides and adapted to rest upon the other side to close the upper end of the trough, and a roller journaled in the upper portion of the trough at its front end, as and for the purpose described.

13. In a machine for laying drain-tiles, the combination, with the rod-section connected with the foot of the plow and adapted to pass through one of the tiles to be laid, of the extensible dogs connecting with the said rod-section, as and for the purpose described.

14. In a machine for laying drain-tiles, the combination, with the rod-section connected with the plow-foot, of a wedge-shaped head fitted on the rod-section to center the latter within the tile, as set forth.

15. In a machine for laying drain-tiles, the combination, with a rod-section adapted to be connected with the plow-foot, of a sliding wedge-shaped head fitted on the rod-section, and the pivoted dogs having their free ends extended beyond the head, as and for the purpose set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

JOSEPH McMULLIN.

Witnesses:
H. C. KIRK,
J. V. PACE.