Dec. 14, 1943. G. WATSON 2,336,658

APPARATUS FOR LAYING TILE DRAINS

Filed Oct. 12, 1942 2 Sheets-Sheet 1

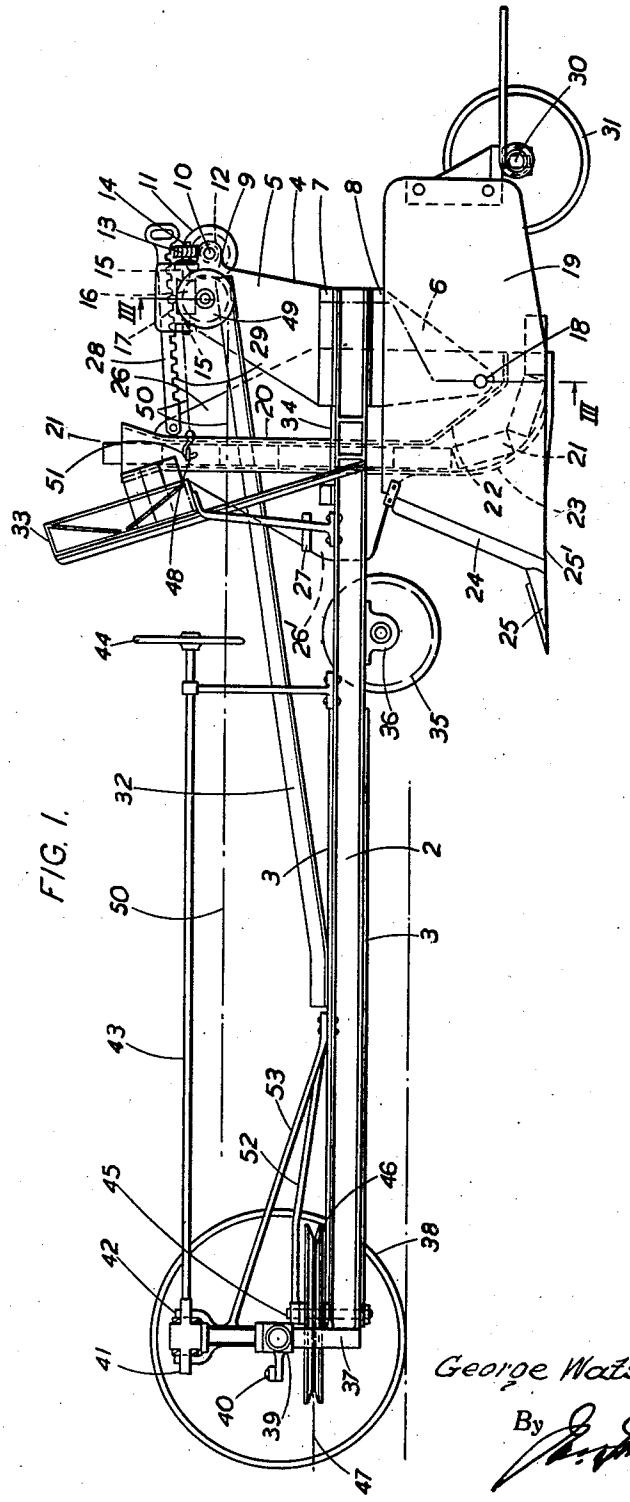


FIG. 1.

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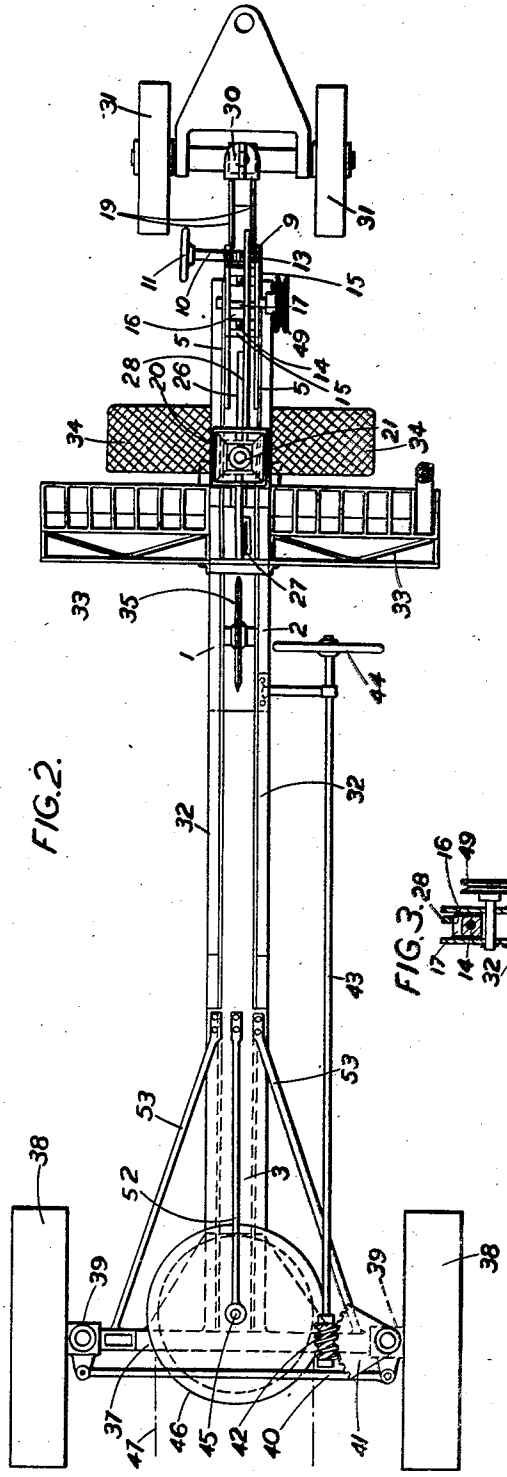


FIG. 2.

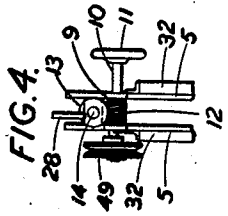


FIG. 4.

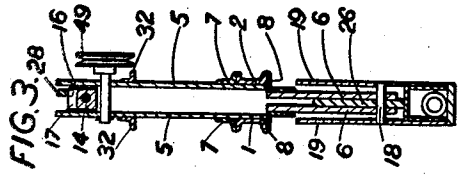


FIG. 3.

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UNITED STATES PATENT OFFICE

2,336,658

APPARATUS FOR LAYING TILE DRAINS

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Application October 12, 1942, Serial No. 461,825
In Great Britain April 15, 1942

12 Claims. (Cl. 111—5)

The present invention relates to apparatus for laying drainage tiles in the agricultural operation of draining land.

In the agricultural operation of draining land the land is trenched according to the fall of the land and short pipes, usually of clay, are laid in abutting relation at the bottom of the trench. The short pipes employed are usually termed "tiles." After the tiles have been laid the earth thrown up during the formation of the trench is returned to the trench to cover up the tiles. In operation as a drainage system, surface water enters the drain thus formed at either end of each tile or through any pores in the tiles and runs away through the drain thus formed.

The main object of the present invention is to provide simple, easily manipulatable and effective means for laying the tiles in which the tilt of the plough is readily adjustable and the apparatus is not likely to get out of order.

Another object is to devise tile laying apparatus in which the plough is readily entered into the land and withdrawn therefrom under power thereby eliminating the hand digging of trenches to bed the plough at the beginning of a run or to uncover the plough at the end of a run.

A further object of the invention is to ensure the laying of the tiles on the even bed produced by the plough and a still further object is to prevent earth thrown up by the plough from falling back into the trench until the tiles are evenly laid.

Still another object of the invention is to devise apparatus in which the laying of the tiles takes place on the clean bed formed by the plough and in which the work done by the apparatus can be inspected from the rear of the machine before earth falling back into the trench covers up the tiles which have been laid therein.

The invention will now be described by way of example with reference to the accompanying drawings which show by way of example a preferred embodiment thereof.

In the drawings:

Figure 1 is a side elevation of one form of construction

Figure 2 is a corresponding plan, some of the parts at the left hand end being omitted

Figure 3 is a section on the line III—III of Figure 1, and

Figure 4 is a partial view of the right hand end of Figure 1.

Referring to the drawings apparatus for laying drainage tiles in the agricultural operation of draining land is provided with a chassis structure formed of two longitudinals, preferably channel section members 1, 2, to the top and bottom flanges of which are secured plates 3. The plates 3 extend from the front of the structure 1, 2 to about the middle thereof and are in opposed relation.

At the rear end of the structure 1, 2 is mounted a fulcrum element 4 formed of a pair of parallel plates 5 extending upwardly and a pair of parallel plates 6 extending downwardly. The plates 5 are secured to the members 1, 2 by angle irons 7, whilst the plates 6 are secured to members 1, 2 by angle irons 8.

In lugs or brackets 9, extending rearwardly from the plates 5, is mounted a spindle 10 to which are keyed a hand wheel 11 and a worm 12. The worm 12 gears with a worm-wheel 13 keyed to a screw 14 rotatably mounted in bearings 15 mounted between the plates 5. The screw engages with a nut member 16 which is provided with a dog 17.

In the plates 6 is mounted a fulcrum pin 18 on which are pivotally mounted two rearwardly extending walls 19. Between the walls 19 is located a tubular member 20 which is fixed to or integral with the walls 19. As shown in the drawing the tubular member has a substantially vertical upper portion and a lower rearwardly extending portion of gradual curvature. The tubular member 20 may be of circular or rectangular cross section of sufficient cross sectional area to allow tiles 21 to pass freely therethrough in abutting succession. The rear wall 22 of the tubular member is preferably widely spaced from the front wall 23 to allow the tiles 21 to pass freely through the rearwardly curved lower portion of the tubular member 20. The fulcrum pin 18 is preferably located near the outlet end of the tubular member but slightly towards the front of the structure 1, 2.

Between the forward ends of the walls 19 is mounted a removable coulter 24 and a share 25 having an instep 25^1.

To the front and back of the tubular member 20 are secured plates 26, 26^1, which extend upwardly. On the plate 26^1 is mounted a spirit level 27. The portion of the plate 26, above the structure 1, 2 is preferably of triangular shape and near its apex has a rack or notched bar 28 pivotally secured thereto. The notches 29 of the bar 28 cooperate with the dog 17.

Between the rear ends of the walls 19 is mounted a detachable axle 30 on which are mounted road wheels 31. The arrangement of the road wheels 31 is such that during transport of the

apparatus on the road they hold the structure 1, 2 and thus the plough 25, tubular member 20 and walls 19, a predetermined height above the road surface. When the apparatus is used for trenching the wheels 31 are removed.

For the purpose of rigidity the fulcrum element may be secured to the structure 1, 2 by braces 32.

On the structure 1, 2 are mounted carriers 33 for drain pipe sections.

On the structure 1, 2 may also be mounted, on one or both sides of the tubular member 20, a foot plate 34, two being shown in the drawings, to enable one or more workmen, whilst standing thereon to take tiles from a carrier 33 and place them one after the other into the tubular member 20.

In front of the tubular member 20 and just behind the plates 3 a disc coulter 35 is mounted in brackets 36 secured to the bottom flanges of the members 1, 2.

The front end of the structure 1, 2 is provided with an axle 37 of which the outer ends are offset upwardly. On the axle 37 are mounted two widely spaced wheels 38 on which the apparatus runs on the land in which the drain pipe is to be laid.

Stub axles 39, on which the wheels 38 are mounted, are connected together by a track rod 40. One of the stub axles 39 has secured thereto a toothed segment 41 with which engages a worm 42 provided at one end of a shaft 43. On the other end of the shaft 43 is keyed a steering wheel 44.

On a vertical pivot 45, at the front end of the structure 1, 2, is mounted a traction pulley 46 around which is passed a traction cable 47 of which one end is secured to a fixed point, whilst the other end is secured to a drum for the purpose of being wound thereon. For example, one end of the cable may be secured to a fixed point on a tractor, whilst the other end is connected to a winch on the tractor. The drum may however be driven in any other well known manner such as by a separate engine or tractor.

The pulley 46 may be replaced by a hook for attachment of a single or multiple purchase tackle actuated by a suitable prime mover at one end of a field or in any other suitable position.

For the purpose of lowering the plough 25 and the tubular member 20 into the ground a ring 48 is secured to the tubular member 20.

By attaching one end of a flexible element such as a chain or a rope 50, by means of a hook 51 to the ring 48 and hitching e. g. by clamping, the other end of the rope 50 to the cable 47 or hitching direct to the tractor, the tractive power is applied to the rope and the plough 25 and tubular member 20 are pulled into the ground. When however, the plough 25 and tubular member are to be raised out of the ground, the rope 50 is also passed around a vertically disposed pulley 49 on the fulcrum element 4.

When the plough 25 and tubular member 20 have been lowered into the ground the required distance the notches 29 of the bar 28 are brought into engagement with the dog 17 which, if not in the correct position for engagement, can be moved as required by manipulating the hand wheel 11.

The spirit level 27 serves to indicate when the plough 25 and tubular member 20 have been lowered to the required depth and also serves to show whether they deviate from this position whilst the drain pipe is being laid.

The walls 19 serve to prevent soil from falling into a trench which is being formed before the tiles have been laid therein. It is also possible to look down through the space between the walls and see whether the tiles are being laid correctly.

As by means of the construction above described, the power of a tractor or other prime mover is used for raising and lowering the plough 25 and tubular member 20 a considerable advantage is obtained over manually operated mechanism as it enables the plough to be drawn into the ground by the action of a tractor or other prime mover, without the necessity of first digging a portion of trench of sufficient length to receive the plough and tubular member. Also at the end of the operation the plough can be moved into an inclined position whilst still in the ground so that it can be drawn out of the ground by the action of a tractor or other prime mover.

The tubular member may be formed by securing suitably spaced and correspondingly shaped plates between two side walls which are extended rearwardly to form the walls 19.

Portions of the walls 19 may also be cut away towards the rear ends thereof so that they do not dig into the ground when the assembly is being raised out of the ground.

A brace 52 is secured at one end to the structure 1, 2 whilst its other end receives the upper end of the pivot 45.

The front axle 37 may also be braced by stays 53.

I claim:

1. Apparatus for laying tiles in trenches in the agricultural operation of draining land, comprising a unit pivotally mounted in the apparatus for tilting in a vertical plane, said unit including a plough and a tubular member, the plough being arranged in advance of the tubular member, and the tubular member comprising an upper substantially vertical portion and a lower rearwardly extending portion of gradual curvature adapted to lay tiles on the bed of the trench formed by the plough, said unit also including a pair of walls disposed longitudinally of the apparatus and extending rearwardly from said plough past said tubular member, the walls being connected to the plough and the tubular member and pivotally mounted on the apparatus for tilting the unit in a vertical plane, the walls being connected at the front and extending downwardly to prevent earth, thrown up by the plough, falling into the trench before the tiles are laid therein, and means for securing the plough and tubular member in position of angular adjustment relative to the apparatus.

2. Apparatus for laying tiles in trenches in the agricultural operation of draining land, comprising a chassis structure including a pair of longitudinals connected together in spaced relation, elements depending at the rear end of the chassis, a fulcrum pin carried by said elements, a unit pivotally mounted in the apparatus for tilting in a vertical plane, said unit including a plough and a tubular member, the plough being arranged in advance of the tubular member, and the tubular member comprising an upper substantially vertical portion and a lower rearwardly extending portion of gradual curvature adapted to lay tiles on the bed of the trench formed by the plough, and a pair of walls disposed longitudinally of the apparatus and fixed on said pin, the plough being secured to the front end of said walls, and the tubular member being formed between them

integrally therewith, the fulcrum pin being disposed near the outlet end of the tubular member, said walls being connected at the front ends and extending past the rearwardly curved portion of the tubular member and downwardly to the sole of the plough, an upstanding support at the rear end of said chassis and adjustable connecting means between the upper portion of the tubular member and the upstanding support whereby the tubular member may be actuated to carry out a scissors like movement about the fulcrum pin to tilt the plough, and means for securing the plough and tubular member in position of angular adjustment relative to the apparatus.

3. Apparatus for laying tiles in trenches in the agricultural operation of draining land, comprising a unit pivotally mounted in the apparatus for tilting in a vertical plane, said unit including a plough and a tubular member, the plough being arranged in advance of the tubular member, and the tubular member comprising an upper substantially vertical portion and a lower rearwardly extending portion of gradual curvature adapted to lay tiles on the bed of the trench formed by the plough, said unit also including a pair of walls disposed longitudinally of the apparatus and extending rearwardly from said plough past said tubular member, the walls being connected to the plough and the tubular member and pivotally mounted on the apparatus for tilting the unit in a vertical plane, the walls being connected at the front and extending downwardly to prevent earth, thrown up by the plough, falling into the trench before the tiles are laid therein, and wherein the tubular member is of rectangular section and is formed between the pair of walls by inserting between them front and rear walls for the tubular member, which are connected to the side walls thereof comprised in the said pair of walls, and means for securing the plough and tubular member in position of angular adjustment relative to the apparatus.

4. Apparatus for laying tiles in trenches in the agricultural operation of draining land, comprising a chassis structure including a pair of longitudinals connected together in spaced relation, elements depending at the rear end of the chassis, a fulcrum pin carried by said elements, a unit pivotally mounted in the apparatus for tilting in a vertical plane, said unit including a plough and a tubular member, the plough being arranged in advance of the tubular member, and the tubular member comprising an upper substantially vertical portion and a lower rearwardly extending portion of gradual curvature adapted to lay tiles on the bed of the trench formed by the plough, and a pair of walls disposed longitudinally of the apparatus and fixed on said pin, the plough being secured to the front end of said walls, and the tubular member being formed between them integrally therewith, said tubular member being of rectangular section and formed between the pair of walls by inserting between them front and rear walls for the tubular member, which are connected to the side walls thereof comprised in the said pair of walls, the fulcrum pin being disposed near the outlet end of the tubular member, said walls being connected at the front ends and extending past the rearwardly curved portion of the tubular member and downwardly to the sole of the plough, an upstanding support at the rear end of said chassis and adjustable connecting means between the upper portion of the tubular member and the upstanding support whereby the tubular member may be actuated to carry out a scissors like movement about the fulcrum pin to tilt the plough, and means for securing the plough and tubular member in position of angular adjustment relative to the apparatus.

5. Apparatus for laying tiles in trenches in the agricultural operation of draining land, comprising at the rear end thereof a unit pivotally mounted in the apparatus for tilting in a vertical plane, and at the front end thereof a vertical axle, a pulley mounted on the axle to enable the apparatus to travel under power applied through a traction cable passed about the pulley, and a pulley at the rear end of the apparatus whereby a flexible element, connected to the unit direct or after passing about the pulley at the rear of the apparatus, may be employed to provide power operated means of tilting the unit, said unit including a plough and a tubular member, the plough being arranged in advance of the tubular member and the tubular member comprising an upper substantially vertical portion and a lower rearwardly extending portion of gradual curvature adapted to lay tiles allowed to fall through the tubular member in abutting relation on the bed of the trench formed by the plough during the travel of the apparatus, and means for securing the plough and tubular member in position of angular adjustment relative to the apparatus.

6. Apparatus for laying tiles in trenches in the agricultural operation of draining land, comprising at the rear end thereof a unit pivotally mounted in the apparatus for tilting in a vertical plane, and at the front end thereof a vertical axle, a pulley mounted on the axle to enable the apparatus to travel under power applied through a traction cable passed about the pulley, and a pulley at the rear end of the apparatus whereby a flexible element connected to the unit direct or after passing about the pulley at the rear of the apparatus, may be employed to provide power operated means of tilting the unit, said unit including a plough and a tubular member, the plough being arranged in advance of the tubular member and the tubular member comprising an upper substantially vertical portion and a lower rearwardly extending portion of gradual curvature adapted to lay tiles on the bed of the trench formed by the plough, said unit also including a pair of walls disposed longitudinally of the apparatus and extending rearwardly from said plough past said tubular member, the walls being connected to the plough and the tubular member and pivotally mounted on the apparatus for tilting the unit in a vertical plane, the walls being connected at the front and extending downwardly to prevent earth thrown up by the plough falling into the trench before the tiles are laid therein, and means for securing the plough and tubular member in position of angular adjustment relative to the apparatus.

7. Apparatus for laying tiles according to claim 2 comprising at the front end of the apparatus a vertical axle, a pulley mounted on the axle to enable the apparatus to travel under power applied through a traction cable passed about the pulley, and a pulley at the rear end of the apparatus whereby a flexible element connected to the unit direct or after passing about the pulley at the rear of the apparatus, may be employed to provide power operated means of tilting the unit.

8. Apparatus for laying tiles according to claim 3 comprising at the front end of the apparatus a vertical axle, a pulley mounted on the axle to enable the apparatus to travel under power ap-

plied through a traction cable passed about the pulley, and a pulley at the rear end of the apparatus whereby a flexible element connected to the unit direct or after passing about the pulley at the rear of the apparatus, may be employed to provide power operated means of tilting the unit.

9. Apparatus for laying tiles according to claim 4 comprising at the front end of the apparatus a vertical axle, a pulley mounted on the axle to enable the apparatus to travel under power applied through a traction cable passed about the pulley, and a pulley at the rear end of the apparatus whereby a flexible element connected to the unit direct or after passing about the pulley at the rear of the apparatus, may be employed to provide power operated means of tilting the unit.

10. Apparatus for laying tiles according to claim 2 comprising at the rear end of the chassis structure, a pair of depending plates, the fulcrum pin being carried by said plates, a stiffening web secured to the rear of said tubular member and extending along the upper vertical portion and down between the said depending plates along the lower rearwardly curved portion of said tubular member, a notched link hinged to said web, upstanding arms on said chassis at the rear end thereof, a dog mounted to be adjustable longitudinally of the chassis between said upstanding arms, said notched link being engageable over said dog to adjust the position of the plough, a vertically disposed pulley mounted on said upstanding arms and a horizontally disposed traction pulley at the forward end of said chassis structure, whereby the unit may be power operated from a traction cable passing around said traction pulley.

11. Apparatus for laying tiles according to claim 4 comprising at the rear end of the chassis structure, a pair of depending plates, the fulcrum pin being carried by said plates, a stiffening web secured to the rear of said tubular member and extending along the upper vertical portion and down between the said depending plates along the lower rearwardly curved portion of said tubular member, a notched link hinged to said web, upstanding arms on said chasis at the rear end thereof, a dog mounted to be adjustable longitudinally of the chassis between said upstanding arms, said notched link being engageable over said dog to adjust the position of the plough, a vertically disposed pulley mounted on said upstanding arms and a horizontally disposed traction pulley at the forward end of said chassis structure, whereby the unit may be power operated from a traction cable passing round said traction pulley.

12. Apparatus for laying tiles according to claim 6 comprising front road wheels mounted on the chassis structure said horizontally disposed pulley being mounted on the chassis between the road wheels and rear road wheels mounted on an axle removably carried at the rear end of said walls.

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