(No Model.) 3 Sheets—Sheet 1.

D. WILDE.

STEAM DITCHING AND TILE LAYING MACHINE.

No. 359,701. Patented Mar. 22, 1887.

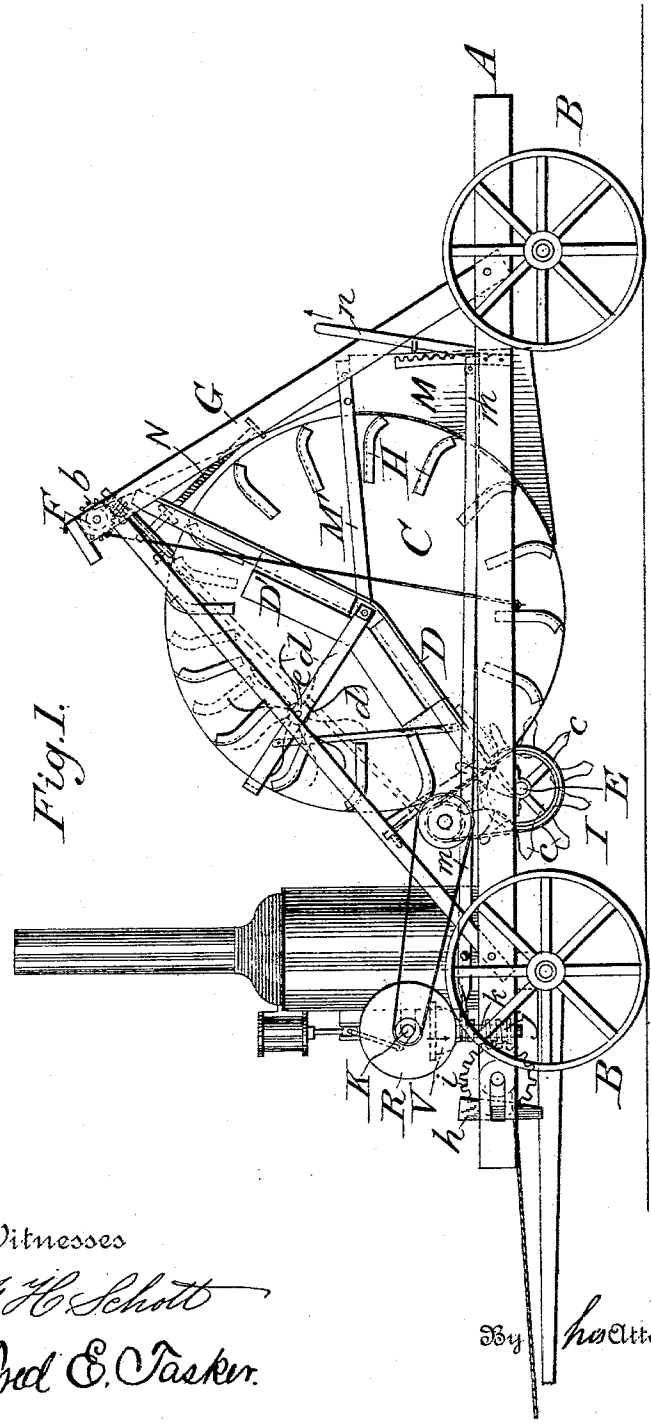


Fig. 1.

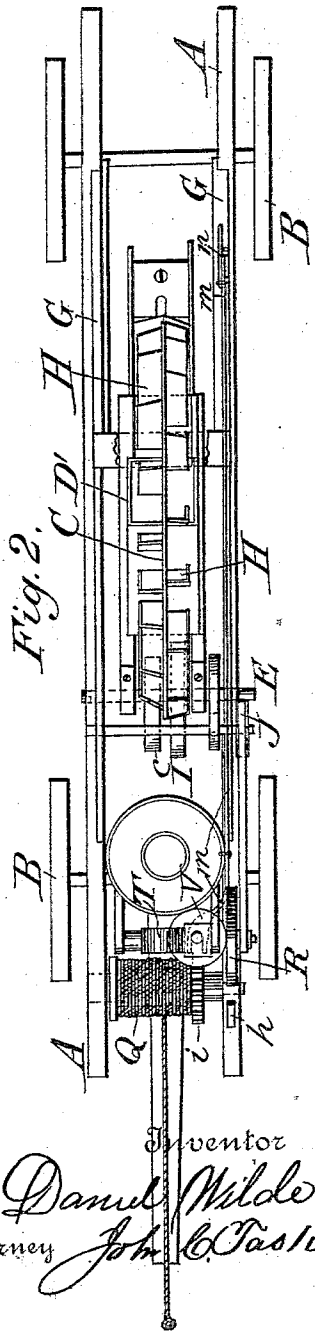


Fig. 2.

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(No Model.) 3 Sheets—Sheet 2.

D. WILDE.

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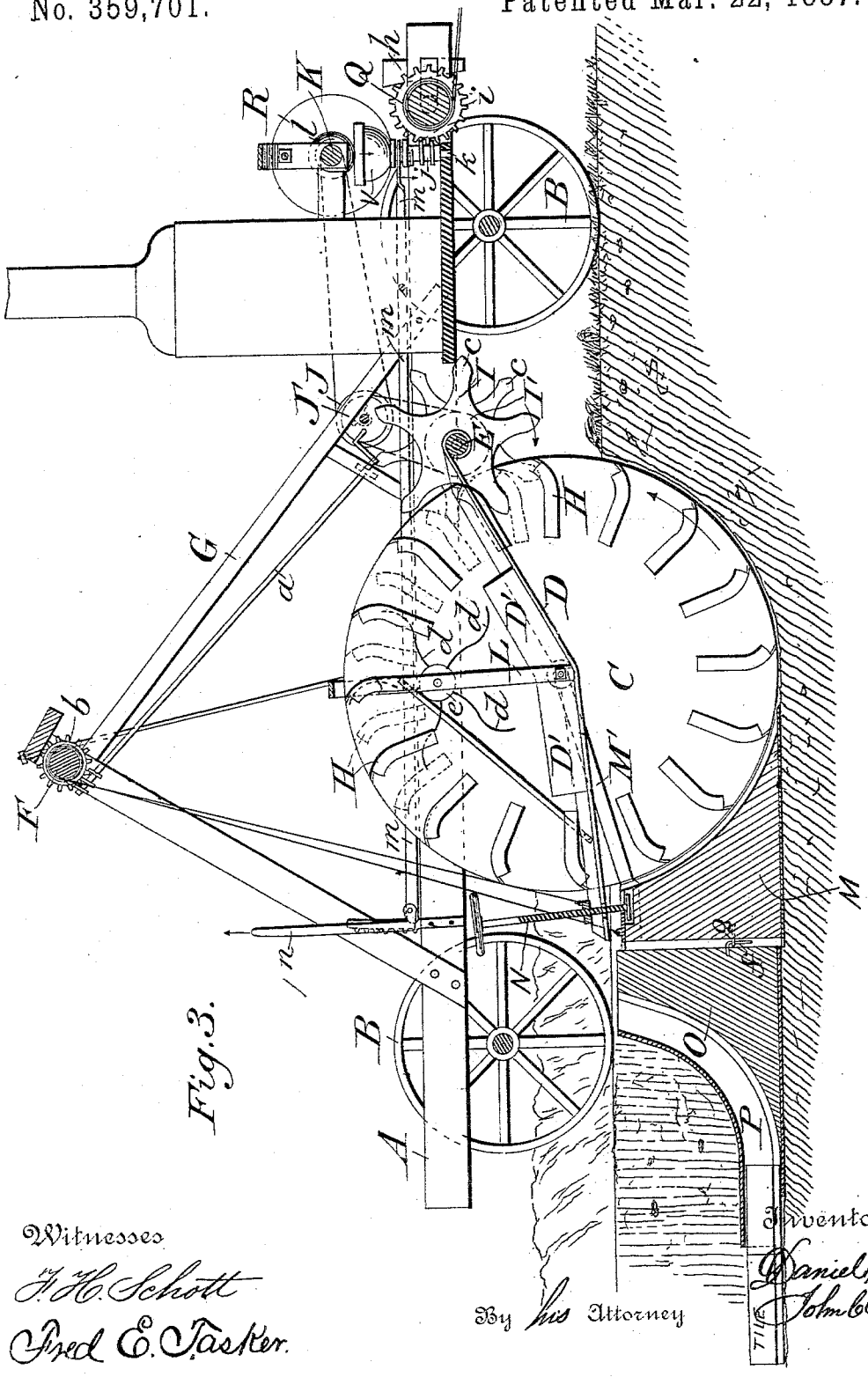


Fig. 3.

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(No Model.) 3 Sheets—Sheet 3.

D. WILDE.

STEAM DITCHING AND TILE LAYING MACHINE.

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Fig. 4.

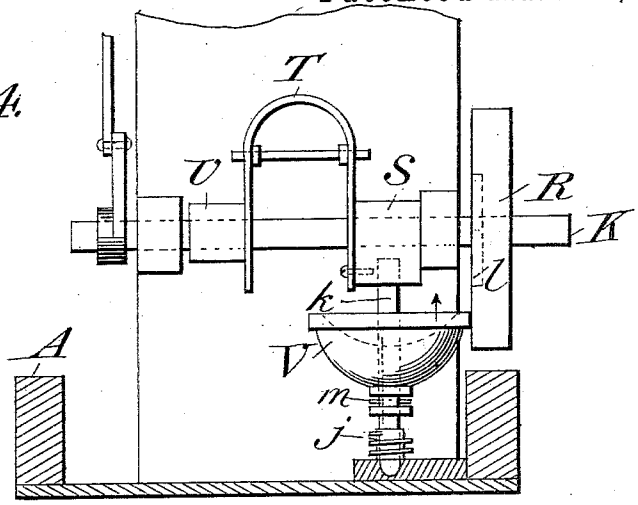
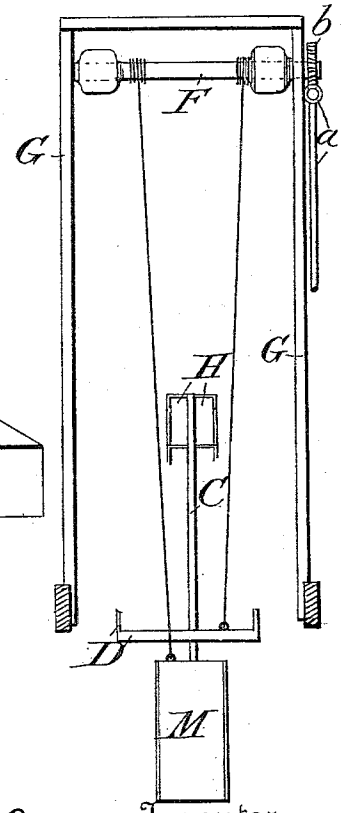


Fig. 7.



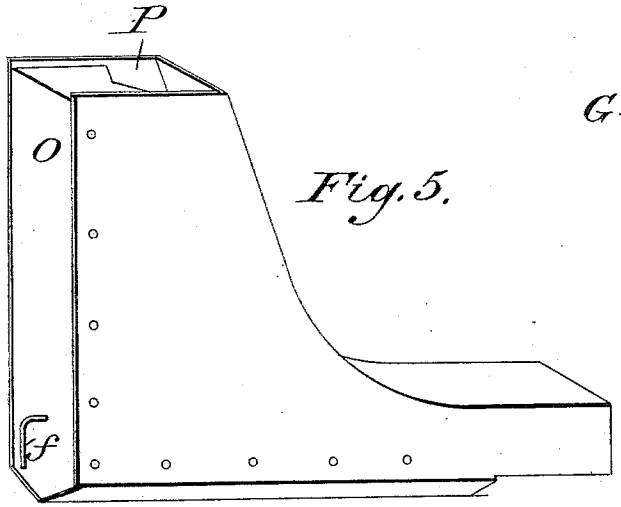
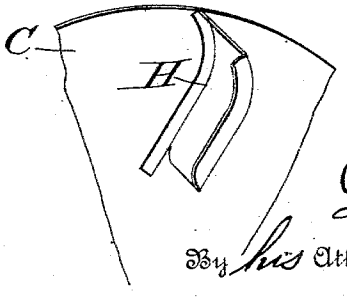


Fig. 5.

Fig. 6.



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Daniel Wilde
By his Attorney John C. Tasker

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UNITED STATES PATENT OFFICE.

DANIEL WILDE, OF WASHINGTON, IOWA.

STEAM DITCHING AND TILE-LAYING MACHINE.

SPECIFICATION forming part of Letters Patent No. 359,701, dated March 22, 1887.

Application filed August 26, 1886. Serial No. 211,882. (No model.)

To all whom it may concern:

Be it known that I, DANIEL WILDE, a subject of the Queen of Great Britain, residing at Washington, in the county of Washington and State of Iowa, have invented certain new and useful Improvements in Steam Ditching and Tile-Laying 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, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to a ditching-machine whereby ditches or trenches that are intended to be left open or are to be furnished with pipes or tiles may be easily excavated; and it consists in the construction and combination to be hereinafter fully described, and then pointed out in the claims.

In the annexed drawings, illustrating my invention, Figure 1 is a side elevation of my improved ditching-machine with the parts thereof mounted on the carriage in position for transportation. Fig. 2 is a top plan view of the same. Fig. 3 is a side elevation showing the parts in the position they will assume in the actual operation of digging a ditch. Fig. 4 is a front end elevation showing the parts forward of the engine, with the drum removed. Fig. 5 is a perspective view of the tile-depositing device. Fig. 6 is a detail of one of the buckets on the digger-wheel, and Fig. 7 shows the ropes, &c., for raising the digger-wheel frame.

Similar letters of reference designate corresponding parts throughout the several views.

A represents the horizontal frame, and B B the wheels, of the carriage that supports the excavating mechanism, the engine, and other parts.

C represents the ditching or excavating wheel, which is journaled in an adjustable frame consisting of two parallel bars, D, located one on either side of the wheel and connected together by suitable cross-pieces. This digger-wheel frame is fulcrumed at one end upon a transverse shaft, E, properly journaled in the horizontal carriage-frame, while the other end of said wheel-frame is movable up and down between the side bars of the horizontal frame by means of ropes passing up over a drum, F, carried at the apex of a triangular frame, G, reared upon the carriage for the purpose. The required rotation of the drum F is secured by a crank-shaft, *a*, having a worm that engages the cogged periphery of a rim, *b*, on the drum. Thus the wheel C is capable of vertical adjustment, and may be lifted to the position shown in Fig. 1, for the more convenient locomotion of the carriage from place to place; or it may be lowered, as seen in Fig. 3, into operative position to excavate a ditch of greater or less depth. While the means described for elevating the wheel may be convenient in some instances, I do not by any means intend to confine myself to that construction, but claim the right to use any devices not incompatible with the purpose in view.

The excavating-wheel C consists simply of a circular disk, provided on each side with a series of spades or scoops, H, preferably of the form best shown in Fig. 6, and having their ends next the periphery of the disk curved forward, so that the rear face of the scoop or bucket will be convexed, for the purpose to be hereinafter stated. The buckets on one side of the wheel alternate with those on the other side.

The wheel C is operated by means of a peculiarly-shaped actuating-pinion, I, carried by the shaft E, which likewise supports the wheel-frame, as aforesaid. Said actuating-pinion is preferably formed as two duplicate pinions placed side by side, so that their arms *c* may alternate with each other, this alternation being necessary to bring the arms into proper relation to the buckets H, which also alternate. The pinions are so located that the arms *c* will project over the periphery of the wheel C, and the arms are curved and pointed, the curvature therefore corresponding approximately with the convexity of the buckets H. It will thus be evident that when the pinions are rotated the arms *c* will engage the buckets, and by lifting them revolve the ditcher-wheel. The arms *c* are formed such a distance apart that as one leaves the bucket which it has raised its successor will just be passing beneath and raising the next bucket. In this

way the wheel C is revolved by a power applied to the periphery and directly in line with the buckets which are entering and cleaving the earth. Obviously this mode of causing the bucket to work by applying a lifting power directly above it is calculated to produce the best results.

The pinions I are driven by a belt or chain connection with a pulley, J, carried on the carriage-frame, which receives its motion by connection with the driving-wheel shaft K of an engine carried on the frame of the carriage. Other connections than these may, of course, be used between the engine and the pinions I.

The earth is completely removed from the scoops or buckets by means of a circular series of compoundly-curved arms, *d*, preferably made of some spring metal, and secured to a hub, *e*, which is journaled in a standard, L, fastened upon the wheel-carrying frame D. There are two of these cleaning devices, one on each side of the excavating-wheel. The arms *d d* are so disposed between the scoops or buckets that the revolution of the wheel rotates the series of arms about the center of their hub *e*, and causes them to scrape the interior of the scoops. As the dirt or earth falls from the buckets it strikes the inclined boards D′D′, that are secured to the bars D, and slides off outside of the ditch.

M designates a crummer or follower, consisting of a box or frame, flat upon the bottom and curved on the forward face, to correspond with the periphery of the wheel C. It is pivotally secured to the bars D D of the wheel-frame, by means of arms M′ M′, at the point where the wheel is journaled, and hence is elevated with the said frame when the latter is raised to the position in Fig. 1, for a rope is connected to the top of the crummer, and fastened also to the drum F. The design of the crummer is to follow the digging-wheel in the bottom of the ditch or trench, deepening and smoothing the bottom of the same and leaving it in suitable condition to receive the pipe or tile. This crummer supports the weight of the digging-wheel when the latter is operating in the ditch, and regulates the depth of the ditch, for the rear end of the digger-wheel frame is connected with the crummer by a removable adjusting-screw, N, passed through said wheel-frame and properly secured to the crummer, as shown in Fig. 3. Now, since the heel or rear end of the bottom of the crummer rests on the bottom of the trench, if the distance be increased between the rear end of the digging-wheel frame and the rear end of the crummer, (by turning the regulating-screw N,) the axis of the digger-wheel will be raised, and, also, the point of the crummer will be raised, which causes the crummer to make an incline in the bottom of the trench. By decreasing the distance between the rear end of the wheel-frame and the crummer the reverse action is obtained. The wheel and the point of the crummer being depressed causes the wheel to dig deeper until the line of draft is equalized, when, as before, the depth of the trench is kept uniform.

In practice it is often found that the surface of the ground to be ditched is so soft that the carriage-wheels sink therein and move unevenly, thus making it impossible to keep a uniform grade to the bottom of the trench; but when my improved crummer is used its long bottom surface, bearing upon the hard surface of the bottom of the ditch and upholding the digging-wheel, obviates the difficulty just mentioned. When the weight of the digging-wheel, its attachments, and the extra weight caused by the resistance of the ground to the upward cut of the scoops is added to the surface-wheels, said wheels often crush in the walls of the trench and fill it up before the pipe or tile is laid. This difficulty is also obviated by the use of the crummer.

The tile-laying attachment O is attached to the crummer by suitable means, when desired—as, for instance, by the hook *f* and eye *g*. The attachment O is provided with a curved passage, P, through which the tile is carried down and left in a horizontal position in the ditch. Any subsequent caving in of the ditch will thus find the tile ready laid.

On the extremity of the horizontal carriage-frame A, forward of the engine, is mounted in suitable bearings a drum, Q, provided with a cog-wheel, *i*. To this drum is fastened a cable, the other end of which is secured to some fixed object at a distance. The winding of the cable upon the drum therefore will regulate the forward progress of the machine over the ground. This winding is accomplished by steam-power furnished by the engine. It has already been seen that the engine furnishes power to revolve the shaft K, and thus actuate the excavating-wheel. On this same shaft is a fly-wheel, R, a movable box, S, a spring, T, and a rigid box, U.

V indicates a horizontal friction-wheel, whose rim bears against the face of the fly-wheel R, and which is provided with a vertical worm-shaft, *j*, through which, in connection with the wheel, passes loosely a vertical shaft, *k*, whose lower end is journaled in the frame and the upper end in the box S. Thus the friction-wheel is movable longitudinally on its own shaft; but it must turn with it by providing a feather-and-groove connection. The worm *j* engages the cog-wheel *i*. The fly-wheel R has a disk-face, against which the rim of the wheel V bears; but the middle portion of this face is recessed at *l*, and as the friction-wheel V is vertically movable, it is obvious that it may be so placed opposite the recess *l* as that the fly-wheel will not communicate motion to it, and it may be placed nearer to or farther away from the outer edge of wheel R, so as to vary and regulate the speed. The vertical adjustment of the friction-wheel V is effected by a lever, *m*, having a handle, *n*, and bifurcated end, that incloses the worm-shaft *j*. It is evident, therefore, that by the

several devices just described the engine will furnish power to wind the cable upon the drum and move the machine forward. When the machine is traveling forward too fast and it is desired to arrest it and still keep the ditching-wheel running, the operator will cause the lever *m* to be depressed, which will raise the friction-wheel close to the shaft and opposite the recess *l*, in which condition of things the drum will no longer revolve.

When the cable is all wound up and it is desired to unwind it, the wedge *h* may be removed and the drum-shaft displaced from its normal position sufficiently to disengage the gear *i* and the worm *j*. The cable may then be easily unwound and secured to an anchor in a new place. The adjustable character of the wheel V with respect to the periphery of the wheel R, against which it bears, enables the operator to have complete and absolute control of the rate of advancement of the machine, irrespective of the speed of the cutting-wheel and the engine which actuates it.

I hereby disclaim any intention to cover by this patent any of the devices shown in Patents Nos. 316,396, April 21, 1885, 244,400, July 19, 1881, and 312,631, February 24, 1885.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a ditching-machine, the combination, with the ditching-wheel, of a twin or duplicate actuating-pinion therefor, the duplicate parts of said pinion having alternating arms, which are fashioned substantially as and for the purposes set forth.

2. In a ditching-machine, the combination of the horizontal carriage-frame, the ditching-wheel supported adjustably in said frame and provided with series of alternating curved buckets, the duplicate actuating-pinion, whose arms act upon and lift the buckets, and suitable driving-power for said pinion, substantially as described.

3. In a ditching-machine, the combination of the horizontal carriage-frame, the ditching-wheel supported adjustably in said frame and provided with series of buckets, the cleaning device for said wheel, consisting of a series of radial arms that scrape the buckets, the duplicate actuating-pinion, whose arms act upon and lift the buckets, and a suitable driving-power for said pinion, substantially as herein specified.

4. In a ditching-machine, the combination of the horizontal carriage-frame, the adjustably-supported ditching-wheel, the cleaning device for said wheel, the duplicate actuating-pinion, and the crummer supported by arms that are fulcrumed upon the ditching-wheel shaft, substantially as described.

5. The combination, with the ditching-wheel and its actuating and cleaning mechanism, of the crummer, constructed substantially as described and supported by arms that are pivotally connected with the ditching-wheel shaft, said crummer being provided with an adjustable connection with the ditching-wheel frame for regulating the distance between them, substantially as described.

6. The combination, with a ditching-machine, constructed substantially as herein set forth, of the tile-laying attachment O, provided with the curved channel P, said attachment being connected with the crummer M and adapted to slide upon the bottom of the ditch, substantially as described.

7. The combination of the frame A, the adjustable wheel-frame D D, supported within the frame A and provided with inclined boards D′ D′, the wheel C, having buckets H and journaled in the frame D D, the frame G, carrying drum F, the cleaning devices for the wheel carried by the standards L, and the duplicate actuating-pinion I, substantially as described.

8. The combination of the frame A, the engine mounted thereon, the drum Q, journaled in one end thereof and having a cog-wheel, *i*, a removable wedge, *h*, for releasing the shaft of the drum, and suitable connections between the engine and the drum for actuating the latter, substantially as and for the purposes set forth.

9. The combination of the drum Q, having cog-wheel *i*, the friction-wheel V, having worm-shaft *j*, that engages the cog *i* and is carried by the shaft *k*, the driving-shaft carrying the driving-wheel R, recessed at *l*, the movable box S, spring T, and solid box U, and the bifurcated lever *m*, engaging the worm-shaft *j*, substantially as shown and described.

In testimony whereof I affix my signature in presence of two witnesses.

DANIEL WILDE.

Witnesses:
A. S. FOLGER,
FRANK EDWORTHY.