(No Model.) 2 Sheets—Sheet 1.

O. C. CARR.

DITCHING AND TILE LAYING MACHINE.

No. 375,602. Patented Dec. 27, 1887.

Fig. 1.

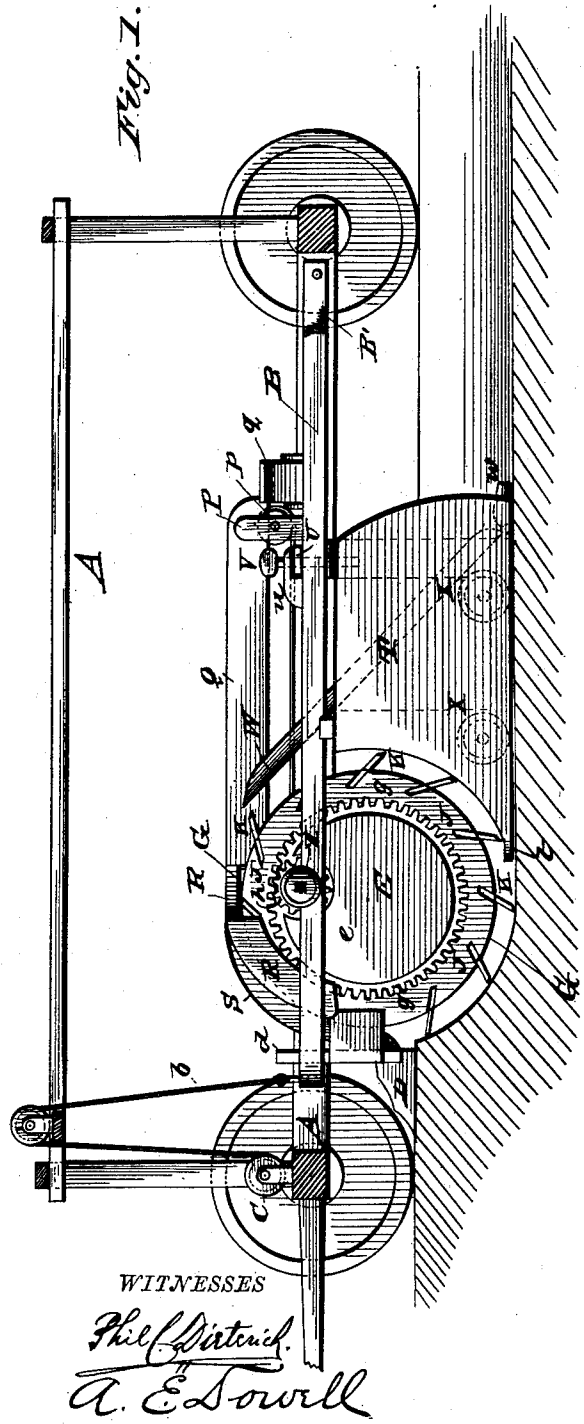
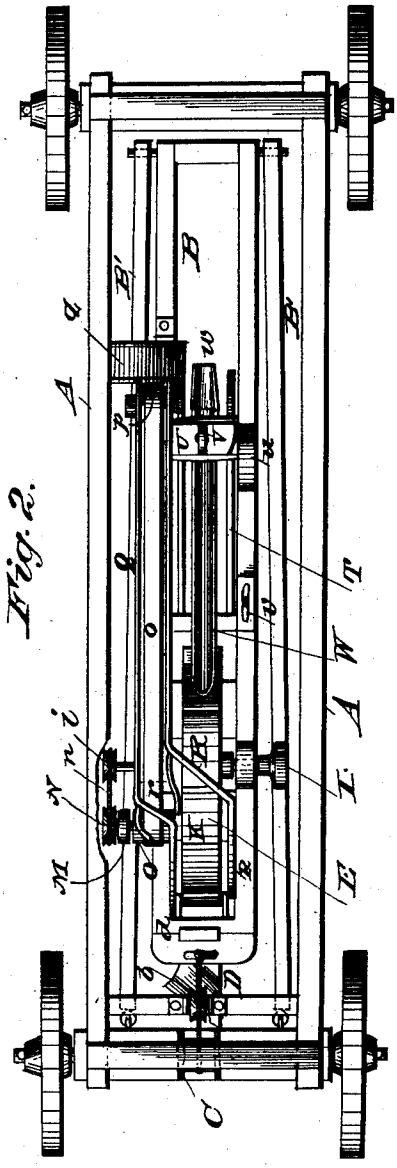


Fig. 2.



WITNESSES

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(No Model.) 2 Sheets—Sheet 2

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Fig. 3.

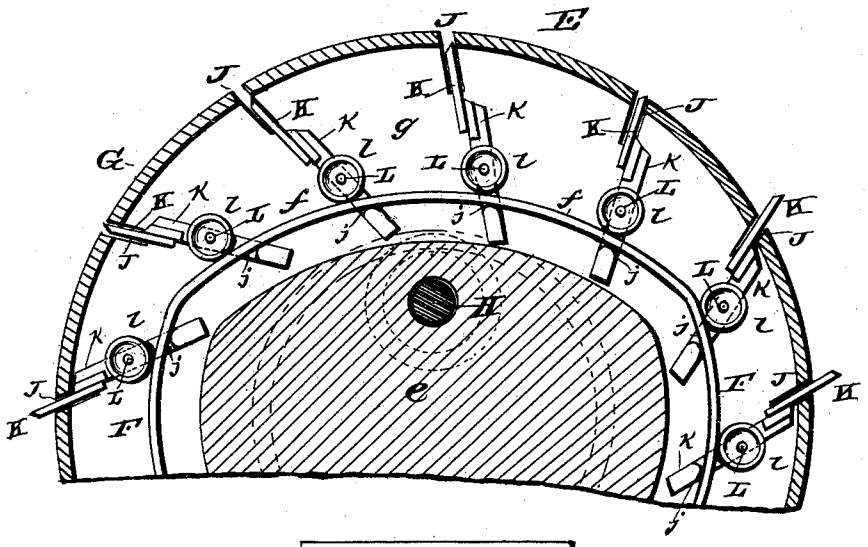


Fig. 4.

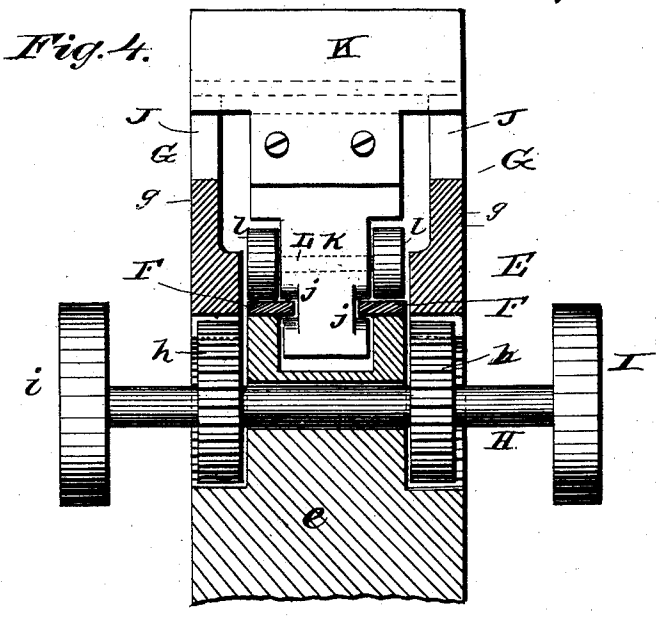
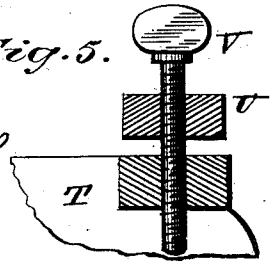


Fig. 5.



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UNITED STATES PATENT OFFICE.

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DITCHING AND TILE-LAYING MACHINE.

SPECIFICATION forming part of Letters Patent No. 375,602, dated December 27, 1887.

Application filed June 10, 1887. Serial No. 240,915. (No model.)

To all whom it may concern:

Be it known that I, OMAR C. CARR, of Grand Rapids, in the county of Wood and State of Ohio, have invented certain new and useful Improvements in Ditching and Tile-Laying Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification, in which—

Figure 1 is a side elevation of a ditching and tile-laying machine, showing the same in operative position. Fig. 2 is a plan view of the same. Fig. 3 is an enlarged sectional view of a portion of the cutter-wheel. Fig. 4 is a transverse vertical section of the same. Fig. 5 is a detail sectional view of a portion of the runner, showing the adjusting mechanism.

This invention is an improvement in ditching and tile-laying machines; and it consists in the novel construction and arrangement of parts, hereinafter described, illustrated in the drawings, and particularly specified in the claims hereto appended.

Referring to the drawings by letters, A designates the supporting and transporting frame for the ditching mechanism proper. This frame is rectangular, and is mounted upon proper wheels at front and rear. In the interior of frame A is situated a narrow longitudinal frame, B, which is connected to frame A by means of rods B′ B′, which are loosely connected to the front end or axle of frame A and extend rearward to the rear end of frame B, to which they are pivotally connected, as shown, so that frame B can move independently of frame A, as is obvious. The frame B carries the ditching and tile-laying mechanisms hereinafter described. To the front of said frame is secured a chain or cord, *b*, which passes over a pulley in the top of frame A, and thence down to and around a drum or similar device, C, on the front axle or bar of frame A. By means of these devices the front ends of frame B can be raised or lowered to adapt it for transportation or for work and for varying the depth of the cut.

D designates a plow secured to a vertically-adjustable bracket or bar, *d*, as shown, at the front end of frame B, and by which the ground is first broken when the machine is in operation.

In rear of plow D, between the side rails of frame B, is the cutter-wheel E, which is constructed as follows:

e designates a fixed circular casing or disk, which may be made solid or in parts. This disk is of such diameter and is secured to frame B in such manner that its top portion stands slightly above frame B and its bottom lies considerably below the plow D, as shown. The periphery of disk *e* is grooved or channeled, as shown, and on the opposite inner edges of this channel are bolted the angular track-rails F F, the inner edges of which extend into and over the channel, as shown. At the top of disk *e* the tracks are depressed, forming cams *f f*, for a purpose hereinafter shown.

G designates an annular hollow ring or band, which is fitted upon the periphery of disk *e*, as shown, its sides or annular flanges *g* inclosing between them the side edges of the disk near the periphery thereof. For the purpose of cheapness and rendering the applying and removal of ring G easy, I propose making this band in sections and bolting them together in position. For instance, the rim of band G and its sides or flanges *g* may all be made separate, and then be bolted together upon disk *e*. The annular flanges *g g* are toothed internally for engagement with pinions *h* on a shaft, H, which is journaled in the sides of frame B, passing through the upper edge of disk *e* and bearing a pinion, *h*, on each side thereof, and on its extended ends, outside of frame B, shaft H bears, respectively, a pulley, I and *i*. By means of shaft H and its pinions *h* motion is imparted to band G and the latter caused to revolve around disk *e*, as is evident.

The revoluble band G is provided at equidistant points on its periphery with transverse slots J, which are inclined at an angle to the periphery of the band. In each of these slots is arranged a corresponding blade, K, the head of which corresponds in width and depth to the slots J, and each blade has a shank, *k*, which passes between the edges of the track-rails F F, but is wider than the space between said edges, so that in order to permit its free movement with the band G when the latter is

rotated, and also to prevent its escaping from slots J, the shanks *k* are formed with opposite side notches, *j*, which embrace the edges of the rails F F and serve a further purpose, hereinafter explained.

In order to reduce friction between the blades and rails F during the rotation of the band G, I provide the shanks *k* of the blades with a short transverse shaft or lugs, L, on which are mounted, at opposite sides of the shanks, the friction wheels or rollers *l l*, which bear upon the outer periphery of rails F F and support the blades thereon without friction. It is evident that the blades may be formed separate and bolted or otherwise secured to their shanks instead of making them in a solid piece.

M designates an upstanding bracket secured to one of the side rails of frame B in front of shaft H, and which has journaled in its upper end a short shaft, *m*, which bears on its outer end a pulley, N, which is run by a belt, *n*, from the pulley *i* on shaft H, and on its inner end is a sprocket or similar wheel, O, over which runs an endless-belt conveyer, *o*, which extends from a similar wheel, *p*, mounted on a bracket, P, at the rear end of frame B, as shown.

Q designates a conveyer-trough secured between the brackets M and P, and over the bottom of which belt *o* passes. At the rear end of this trough is arranged a directing-chute, *q*, which is adapted to be turned either right or left, so as to throw the dirt escaping from trough Q either into or out of the ditch or trench dug by the machine when in operation.

The front end of trough Q extends forward to the highest point of the periphery of band G, and there its side piece, R, which stands next to band G, is bent forward and across the periphery of said band and forms a scraper-blade, which serves a purpose hereinafter shown. After crossing band G, the piece R is carried forward and downward around the band G until it connects with a shield, S, which is secured over the cutter-wheel just in rear of the plow D. The side *r* of trough Q is bent inward until it stands flush against the adjoining periphery of band G, and it is extended forward and downward to shield S, similar to part R. The shield S and sides R *r* thus form a trough or guide for the cutter-wheel, so that when in operation the earth and débris excavated by said wheel will be prevented from falling to one side, but will be carried upward until it is scraped or directed off said wheel by the part R upon the conveyer-belt in trough Q. The part of side R crosses wheel E at a tangent, so as to more effectually cause the excavated material to fall upon the belt.

The operation of this portion of the invention, which forms the ditching mechanism proper, is as follows, first premising that the arrangement of tracks F F and the rollers on the shanks *k* of the cutter-blade is such that, except where said tracks are depressed, as at cams *f f*, the blades K K are projected or stand out from the periphery of the band G, so that when the latter is rotated the blades will cut or excavate the earth when the cutter-blade is in working position and the machine moving forward: The frame B is lowered, so that its cutter-wheel and plow will enter the ground, and the frame A is then moved forward, carrying with it the frame B in the line on which the drain is to be made at the same time that the shaft H is rotated by means of the pulley I and a belt running therefrom to any proper engine, which may, if desired, be mounted upon frame A, or may be belted from a portable engine in advance of and moving the frame A, either of which may be found most desirable or convenient. The rotation of shaft H is such that a movement is imparted to band G and its blades K contrary to the movement of the machine. The plow D breaks a furrow in front of the cutter-wheel, regulated in depth by its adjusting-bracket, as described, and below the lower edge of shield S, so that the latter will not be injured. The blades K K, revolving with the band G, rapidly cut away the earth and carry it upward to the scraper R; but in order to prevent damage to said scraper or blades it becomes necessary to retract them or withdraw them into slots J. This is accomplished by means of the notches *j* in the shanks *k* of the cutters and the depressions or cams *f f* of tracks F F, for upon reaching these cams the notches engage against the lower surfaces of the track-rails and forcibly draw the blades inward, and these cams are arranged in such manner and for such a distance in advance of and below the scraper R that the blades K are entirely retracted when they pass below said scrapers, as is evident, and no damage is caused to the working part of the machine, and the excavated material is cleanly brushed off into the trough A upon the conveyer-belt *o* and carried back to the rear of the machine and deposited, as described. After passing by the scraper R, the cams *f f* are diminished until the tracks F F resume their original contour and the wheels *l l* cause the expulsion or projection of blades K to their normal position. If desired, friction-rollers similar to *l l* may be employed for engaging the under surface of the track instead of notches *j*, if desirable; but as there is no strain or force required to retract the blades the notches *j* are operative and reduce the cost of the machine considerably.

I will now describe the construction of the tile-laying portion of the machine.

T designates a hollow casing or runner of general rectangular form and corresponding in width to wheel E, and situated in rear of the same, being provided at its front end with the cutter or scraping blade *t*, as shown, which has a central rounded point or scorer, which marks the bottom of the trench properly for receiving the tile-sections and preventing them rolling sidewise. The runner T has its front

end hinged or detachably secured to the frame B in rear of wheel E, and its rear end is attached to frame B by a screw-rod, V, which engages in an opening in a removable cross-piece, U, secured between brackets *u* on the side rails of the frame B, and by means of which rod the runner can be adjusted by the operator to keep it and the tiles, as they are laid, in proper level or alignment. In order to assist the operator in keeping the machine level, I provide a spirit-level or similar device, *v*, which is secured to one of the rails of frame B, so that any deviation of the runner and cutting-wheels from a proper plane can be compensated for by adjusting rod V, and thereby the runner.

W designates a delivery spout or trough extending from the front upper end of runner T to the rear lower end thereof, where it is connected to a hinged rear portion or foot, *w*, which is adapted to lie partially beneath the tile last laid until the succeeding tile is in proper position for laying, thereby keeping the tiles true in relation to each other. The weight of tiles in spout W is usually sufficient to keep the tiles at the lower end thereof in sufficiently close relation. The tiles can be supplied to the spout by hand in the ordinary manner, and the operator can, by pressing on the last tile put in the spout, assist their delivery during the operation of the machine.

X X designate wheels or rollers, upon which runner T is supported in the ditch.

When not in operation, or when it is desired to transport the machine to different points, the front end of frame B is lifted by means of chain *b*, as described, and the rear end is supported upon the runner, as is evident.

It will be observed that the frame B, while drawn by the frame A, is entirely independent of the lateral or vertical movements of the latter, so that the plane of the cut will not be affected by the irregularities of the ground over which frame A passes.

If it is only desired to cut a trench without laying the tiles, the runner T can be detached from the frame B, and the operation of the other parts will not be affected by its removal.

Having thus described my invention, what I claim is—

1. In a tile-laying and ditching machine, the combination, with the main supporting and carrying frame, of the adjustable frame secured thereto, the plow secured to the front end of said frame, the cutter-wheel E, and the conveyer-belt and devices for clearing said wheel, and the runner D, its tile-delivery spout, and hinged foot thereon, all constructed and arranged substantially in the manner and for the purpose specified.

2. The combination, with the supporting-frame, of the cutter-frame E, composed of a disk, *e*, having annular cam track-rails secured thereto, the annular channeled and slotted bands G, surrounding disk *e*, the cutter-blades K, playing in said slots, the devices for throwing these blades into or out of said slots, the conveyer-belt and scraper for discharging the excavated material from the wheel, and suitable operating mechanism for the wheel and conveyer, all constructed and arranged substantially as set forth.

3. The combination, with the frame B, its plow D, and fixed disk *e*, of the annular slotted band G, surrounding disk *e*, the blades K, moving in the slots of said band and having shanks *k*, provided with friction-rollers *l* and notches *j*, with the annular track and cam rails F F, secured to disk *e* and engaging the shanks of blades K, mechanism for rotating band G, and the conveyer-belt and scraper R, all constructed and adapted to operate substantially as set forth.

4. The combination of the frame A and frame B, mounted therein, with the plow D and cutter-wheel E and its actuating mechanism mounted on frame B, the conveyer-trough Q and belt *o*, and the pieces R and *r*, shield S, and directing-chute *q*, all substantially as specified.

5. The combination of frames A and B, the plow D, cutter E, constructed as described, and conveyer-belt, trough, and scraper R, mounted on frame B, and their actuating mechanisms, with the tile-delivery runner T, its spout W and hinged shoe *w*, and the adjusting-screw rod V for the runner, all constructed and adapted to operate substantially as described.

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

OMAR C. CARR.

Witnesses:
GEO. LASKEY,
ISAAC LUDWIG.