(No Model.) 2 Sheets—Sheet 1.

R. H. KERSEY.

DITCHING MACHINE.

No. 369,948. Patented Sept. 13, 1887.

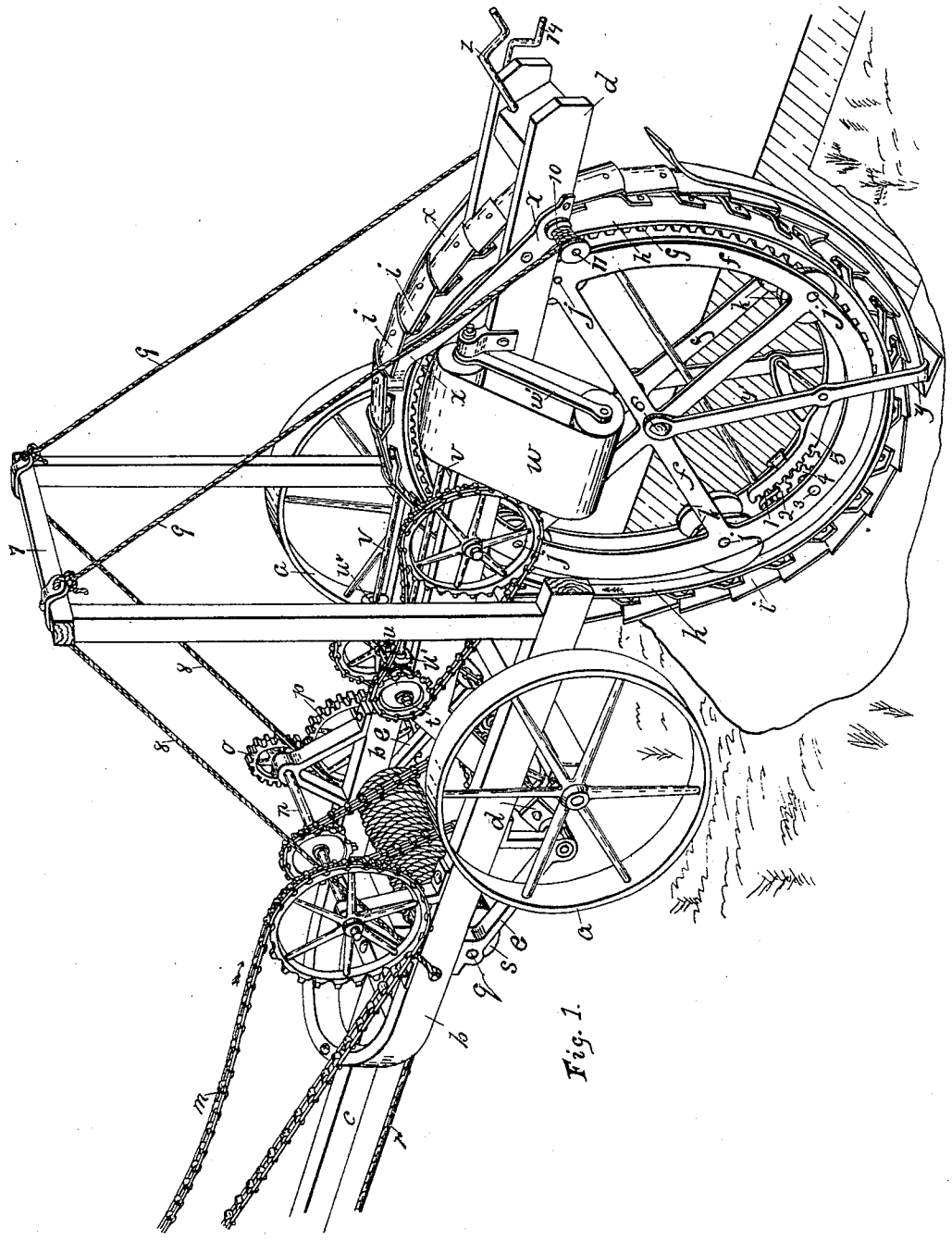


Fig. 1.

Witnesses.
J. M. Chandler
G. F. Burroughs

Inventor.
Robert H. Kersey
By his Atty W. R. Chandler

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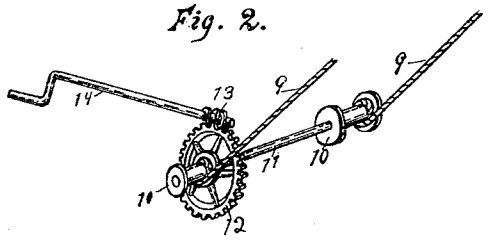
(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.



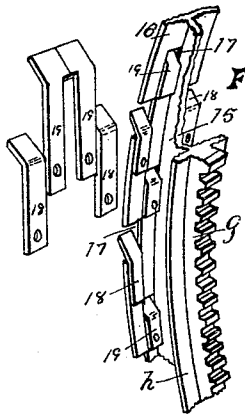


Fig. 5.

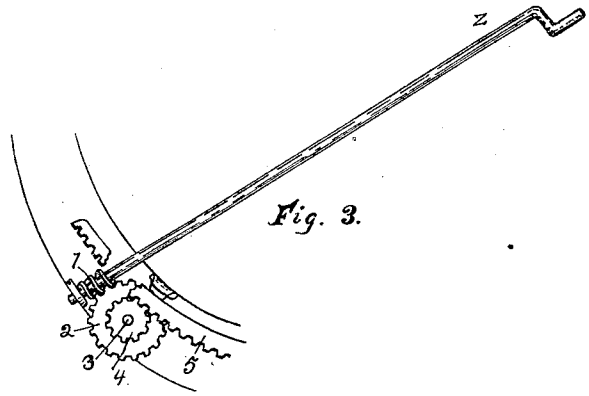


Fig. 3.

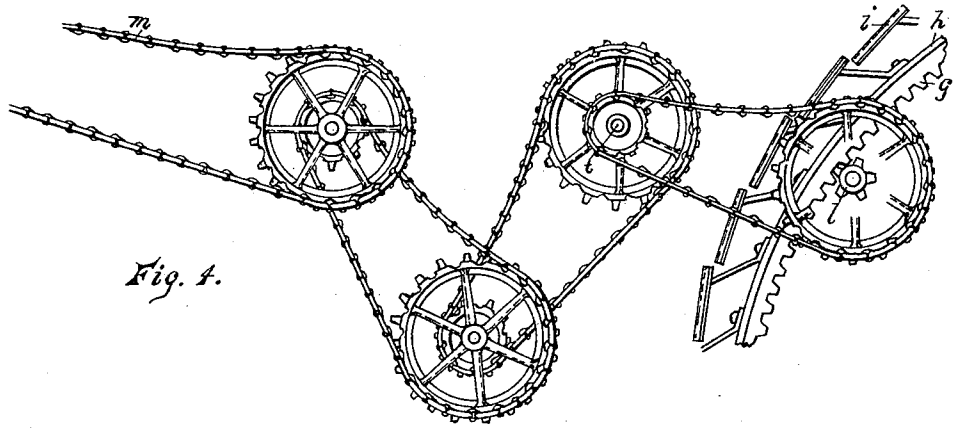


Fig. 4.

Witnesses.
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UNITED STATES PATENT OFFICE.

ROBERT H. KERSEY, OF LEBANON, INDIANA.

DITCHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 369,948, dated September 13, 1887.

Application filed March 10, 1887. Serial No. 230,360. (No model.)

To all whom it may concern:

Be it known that I, ROBERT H. KERSEY, a citizen of the United States, residing at Lebanon, in the county of Boone and State of Indiana, have invented certain new and useful Improvements in Ditching-Machines; and I do hereby 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.

This invention relates to that class of ditching-machines usually employed in forming ditches for the laying of drain-tile in which a wheel provided with a series of shovels or scoops about its periphery is employed for the purpose of loosening and elevating the earth excavated by the machine. As heretofore constructed these machines have generally consisted of a series of rigid scoops attached to the periphery of the wheel, which was itself a rigid construction supported by an axle revolving in a carrying-frame. These machines could not be worked in ground containing bowlders, as their construction was such that when the scoops came in contact with a large stone they would not easily enter one of the scoops. The machine was of necessity either stopped or broken.

As it is frequently desirable to drain ground containing more or less bowlders and to excavate the necessary ditches for that purpose by machinery, it will be apparent that a machine was wanted which, while retaining the necessary strength and efficiency to properly excavate a ditch, would at the same time have sufficient flexibility to allow it to keep in motion and gradually loosen and remove any stone of ordinary size with which it might come in contact.

The object of my invention is therefore to produce a ditching-machine that shall embody in its construction the necessary elements to make it efficient as an excavator and at the same time have sufficient flexibility to withstand the contact with bowlders, such as may be encountered in the ordinary operation of forming ditches for draining purposes.

In constructing this machine I first form a suitable frame to support the ditching mechanism. This frame is mounted, preferably, upon two carrying-wheels placed just in front of the excavating-wheel, so that they shall be supported by the firm ground in advance of the excavation. This frame carries the excavating-wheel and the mechanism by which its movements are controlled, the power to operate the machine being supplied by an ordinary portable steam-engine placed in advance of the ditching-machine and connected therewith, or it may be operated by any other suitable motor—as, for instance, a suitably-constructed horse-power; and the invention consists, essentially, in the novel construction of the excavating-wheel and yielding cutters or shovels attached thereto, and in certain details of construction, which will be hereinafter fully described, and then specifically pointed out in the claims.

In the accompanying drawings, which illustrate my invention, suitable letters and figures of reference indicate like parts in the several figures.

Figure 1 is a perspective view of my improved tile-ditcher in position for operation. Fig. 2 is a perspective view of a device for raising and lowering the cutting-wheel. Fig. 3 is an elevation of the device for leveling the scraper which trims the bottom of the ditch. Fig. 4 is an elevation of the train of wheels and sprocket-chains by which power is transmitted from the engine to the cutting-wheel. Fig. 5 is a perspective view of a portion of a second form of a cutting-wheel, in which the cutting-surface is made in a different manner from that shown in Fig. 1.

In the above figures, *a a* represent ground-wheels supporting the frame-work of the machine.

b b is the main frame, having a draw-bar, *c*, which connects the machine to the engine or other motor in front and steadies it when in operation.

d is an auxiliary frame supporting the cutting-wheel and its immediate machinery, and is pivoted in brackets *e e* on the frame *b*, so that its rear end may have a vertical movement.

The cutting-wheel is supported by two circular frames, *f f*, attached rigidly to the frame *d*.

The excavating-wheel consists of an external rim, *h*, having an internal gear, *g*, attached thereto or forming a part thereof and placed within the rim *h*. This rim has a number of yielding cutters or shovels, *i i*, attached to its circumference, which shovels are connected with the rim *h* by means of spring-steel bars *i'*, that will allow the shovel to give back or yield when it comes in contact with a stone, and by successive strokes of the shovels, following each other in rapid succession, the stone is loosened from its bed and carried up to the surface.

Rotating on shafts *j j* in frames *f f* are four or more pairs of supporting-wheels, *k k*, upon which the cutting-wheel revolves, the wheels *k k* bearing upon the inner portion of the rim *h h* upon each side of the internal gear, *g*. The cutting-wheel is revolved by a spur-pinion, *l*, Fig. 4, having its shaft journaled in frame *d*, and which is driven by the train of sprocket wheels and chains, (shown in Fig. 4,) and by chain *m* from the engine to which the machine is attached. On the shaft *n*, driven by chain *m*, is a spur-pinion, *o*, engaging with a gear-wheel, *p*, and the shaft *q*. In order to give a forward movement to the whole apparatus, a rope, *r*, is attached at one end to the forward part of the engine or other motor, taken forward some distance, and passed through a sheave properly anchored to withstand the strain, said rope being then brought back to the machine and its other end wound upon a drum, *s*, secured upon the shaft *q*. By the rotation of this drum the engine and machine are drawn slowly forward as the cutting-wheel is turned, and the formation of the ditch progresses.

Upon the shaft *t* are placed two bevel-gears, *u u*, which engage with two corresponding gears, *u' u'*, on the shafts *v v*, which are mounted in suitable journal-bearings upon the auxiliary frame *d*. Each of the shafts *v v* revolves a carrier, *w*, usually of canvas, upon either side of the machine. These carriers may be made of any desired length, so as to deposit the excavated earth at a greater or less distance from the ditch, as may be required to suit the soil or depth to which the excavation extends. It will be observed that the arms *w'*, which extend from the shafts *v'* and carry the loose roller over which the outer end of the traveling apron passes, are loosely journaled upon said shafts, so that the outer end of the carrier may be raised or lowered and retained in the desired position by any suitable stop attached to the frame of the machine.

The cutters *i* are set at a slight angle with the rim *h*, the forward end of the cutter in a slightly larger circle than that of the rear end, so that as the cutting-wheel revolves each cutter shaves off a thin layer of earth, which is carried up on the rim *h* until it gets above the carriers W, upon which it is then turned by spring-scrapers *x*, secured to the frame *d*. A plow or scraper, *y*, suspended by arms *y'* to the frames *f*, follows after the cutting-wheel, and is adjusted by a hand-crank, *z*. This scraper shapes the bottom of the ditch, leaving it perfectly smooth and level. In Fig. 3 is shown the device for adjusting this scraper. The crank-rod *z* has a bearing at its lower end in the frame *f*, and carries a worm, 1, which operates a worm-wheel, 2, upon the shaft 3, journaled in frame *f*. A spur-pinion, 4, upon the shaft 3, meshing in a rack, *b*, hinged to the frame of the scraper *y*, serves to draw the scraper forward under the wheel, or allow it to fall back, as desired, the frame of the scraper *y*, being pivoted by the arms *y'* to the center of the frame *f* at 6, permitting the movement.

Each side of the cutting-wheel is covered over to the perimeter of the cutters with a sheet-metal disk (not shown in the drawings) secured to the outside of frame *f* and fitting close to the rim *h*, which prevents earth from getting into the internal gear and disarranging the movement of these parts of the machine.

A vertical frame-work, 7, is built upon the rear end of the frame *b* and braced by two ropes or rods, 8 8, attached to the forward part of frame *b*. Two ropes, 9 9, are secured to the upper portion of this frame, and, being brought down to the rear part of frame *d*, are wound upon two drums, 10 10, secured upon shaft 11, which is journaled in frame *d*. This shaft 11 has a worm-wheel, 12, secured thereon, which is revolved by a worm, 13, on a crank-rod, 14, secured on the frame *d* and operated by the hand. This device serves to raise and maintain the cutting-wheel off of the ground when moving the machine from place to place.

In Fig. 6 is shown another form of cutting-wheel different from that shown in Fig. 1. The internal gear, *g*, and rim *h* are the same, and the wheel is supported and revolved the same as that shown in Fig. 1. In the center of the rim *h*, upon its periphery, is placed a circular web, 15, and upon the outside of this the second rim, 16, of the same width and shape as rim *h*. Rim 16 has openings 17 cut through it at equal distances from each other, through which project yielding cutters 18 19, which are riveted upon an inner surface of rim 16, as shown. The inner rows of cutters, 19, alternate with the outer rows, 18, and overlap the web outside of the rim, as shown, so as to cut the full width of the wheel. This wheel is also covered with the sheet-metal disks before spoken of. I prefer to use this wheel instead of that shown in Fig. 1, as the perforated outer rim forms a support for the cutters when under great strain, as when the machine is operating in stony ground.

It will be apparent that the positions of the excavating-wheel and scraper with relation to the surface of the ground may be easily regulated by manipulating the shafts *z* and 11, both of which are under the immediate control of the attendant following in the rear of the machine.

Having thus described my invention, I claim

as new, and desire to secure by Letters Patent, the following:

1. As an improvement in ditching-machines, the spokeless excavating-wheel mounted upon suitable carrying-wheels and provided with a series of scrapers or shovels connected with the wheel by a spring attachment, substantially as set forth.

2. In a ditching-machine, the spokeless excavating-wheel having an internal gear, through which it is rotated, and further provided with an outer and inner rim, the outer rim perforated to allow the shovels or scrapers to pass through the same and to be partially supported thereby, all arranged and operating as specified.

3. In a ditching-machine, an excavating-wheel provided with spring-shovels and an internal gear, in combination with its supporting-frames *f f*, wheels *k k*, journaled in said frames, and the pinion *l*, with its driving mechanism adapted to rotate said excavating-wheel, substantially as set forth.

4. In a ditching-machine, the main frame *b*, the supplemental frame pivoted to the main frame, the upright frame mounted upon the main frame, the excavating-wheel, and the ropes and spools arranged to raise or lower the excavating-wheel with relation to the main frame, as set forth, in combination with the adjustable scraper-arms supported from scraper-frame *f f*, and the adjusting devices by means of which the position of the scraper with relation to the excavating-wheel is regulated, all arranged for joint operation substantially as set forth.

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

ROBERT H. KERSEY.

Witnesses:

CHARLIE E. KERSEY,

THOMAS M. PURDNE.