F. B. Scott.

Excavator.

No. 26,934. Patented Jan. 24, 1860.

Fig. 2.

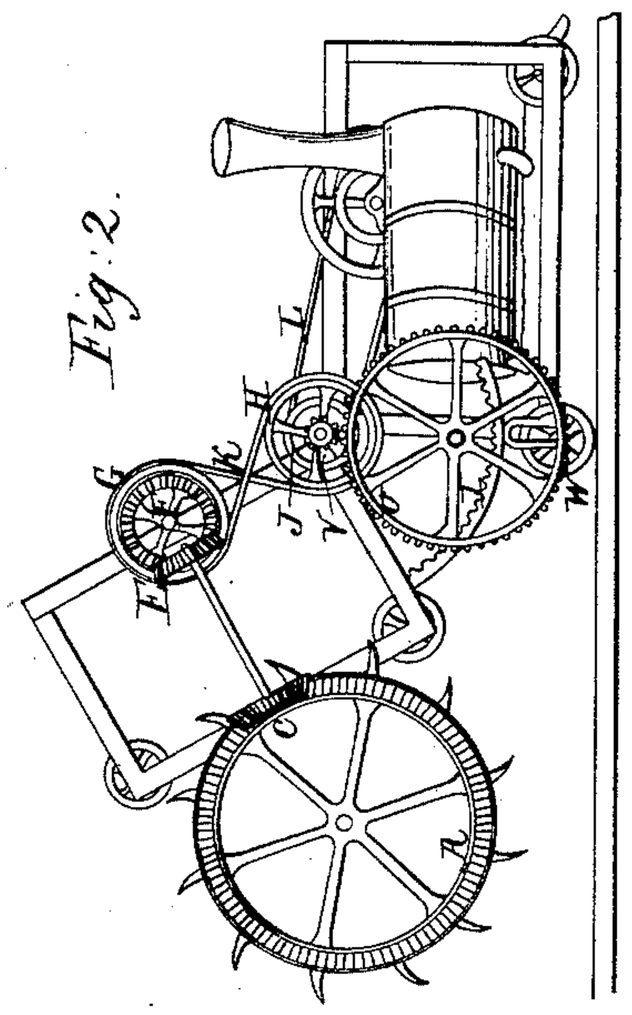


Fig. 5.

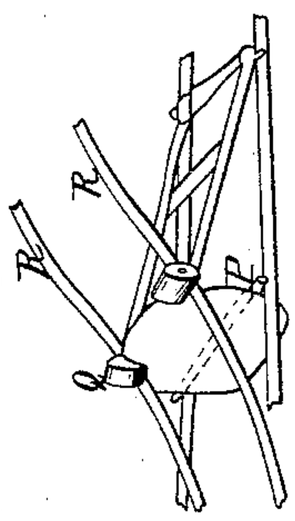


Fig. 9.

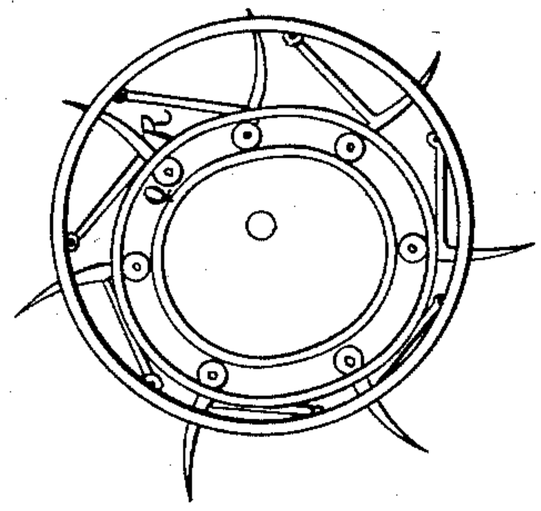


Fig. 7.

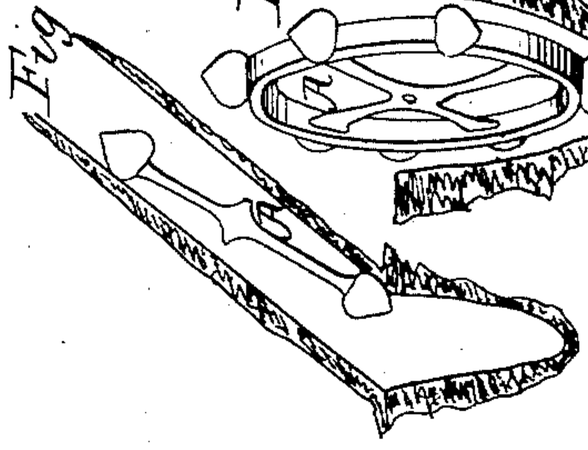


Fig. 8.

Fig. 1.

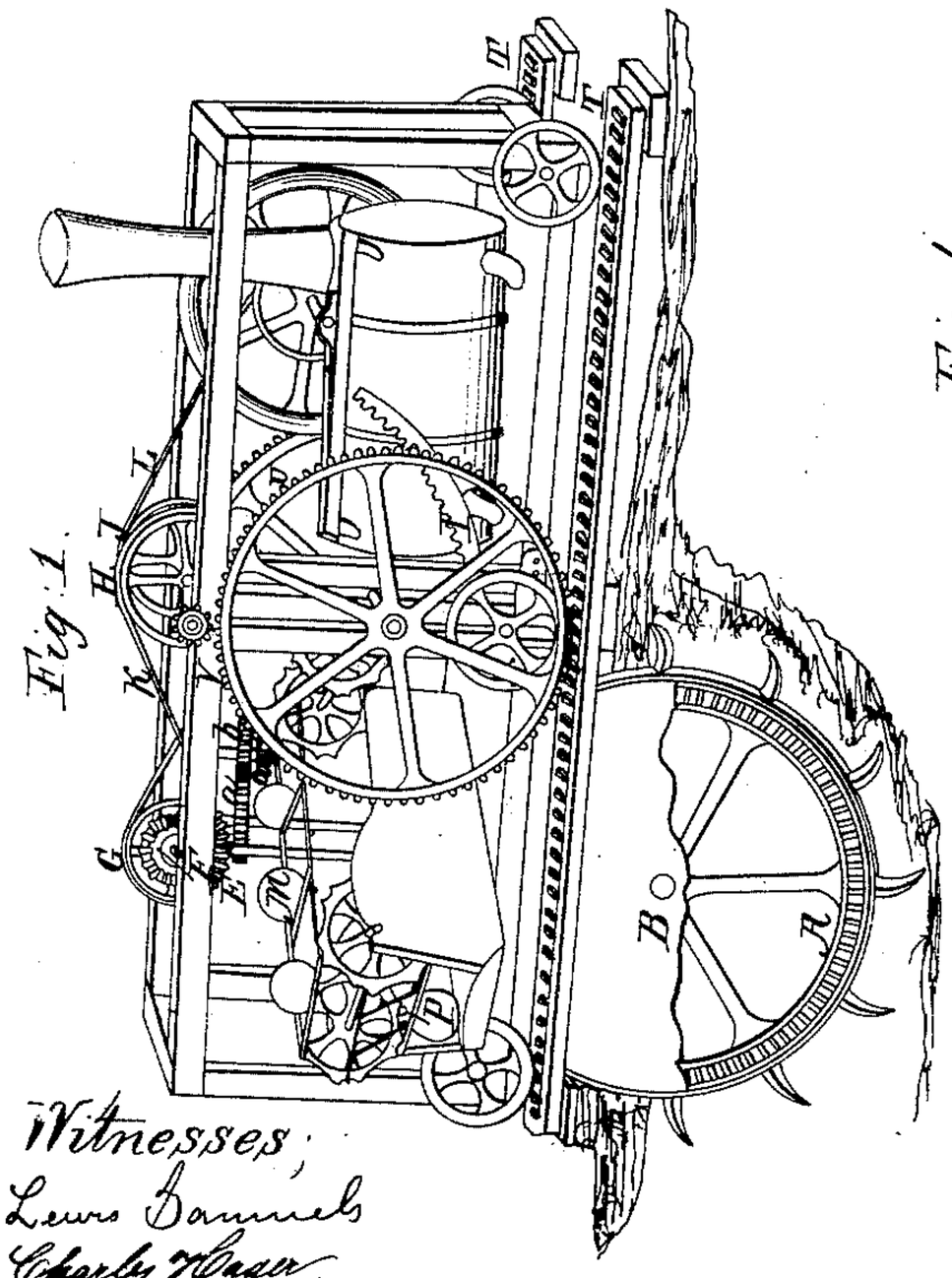


Fig. 4.

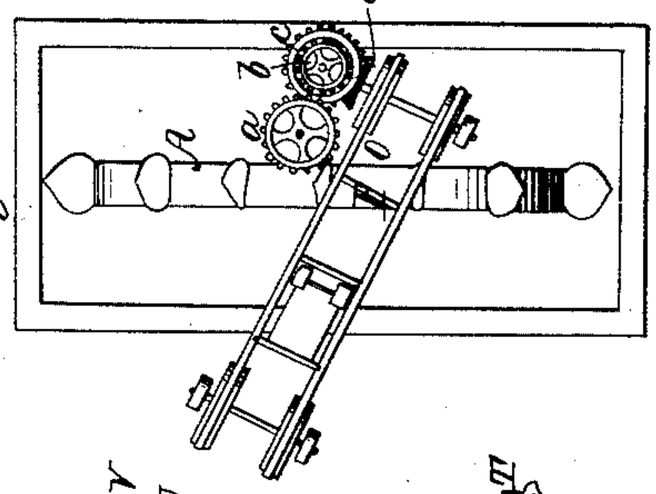


Fig. 6.

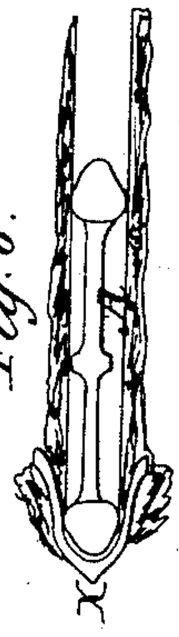
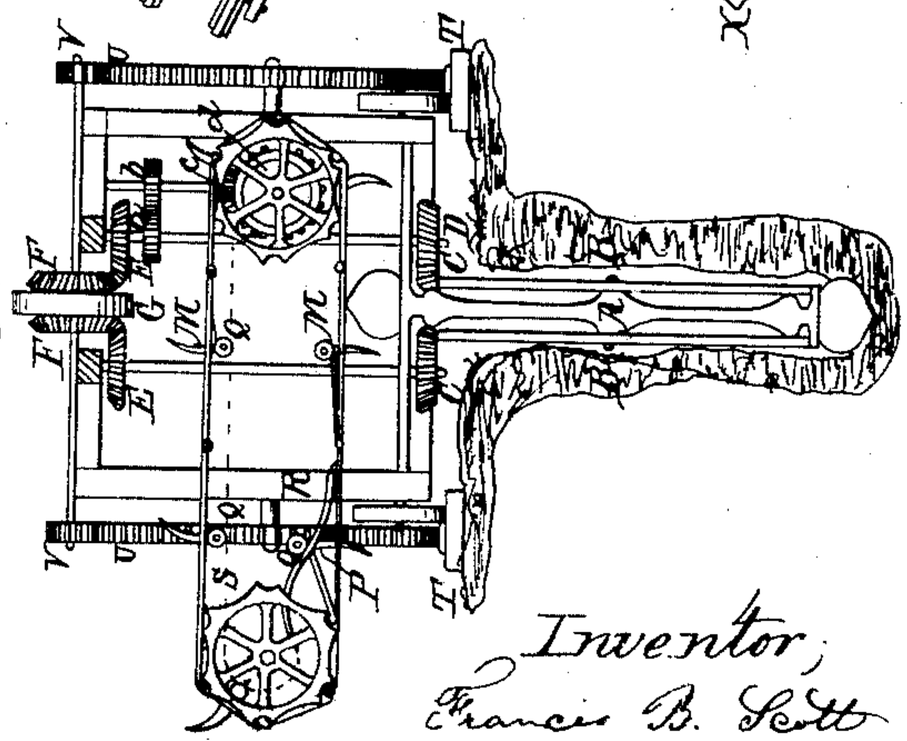


Fig. 3.



Witnesses;
Lewis Daniels
Charles Hager

Inventor;
Francis B. Scott

UNITED STATES PATENT OFFICE.

FRANCIS B. SCOTT, OF BUFFALO, NEW YORK.

DITCHING-MACHINE.

Specification of Letters Patent No. 26,934, dated January 24, 1860.

To all whom it may concern:

Be it known that I, FRANCIS B. SCOTT, of Buffalo, in the county of Erie and State of New York, have invented a new and useful Improvement in Excavators, more especially adapting them to the purposes of deep tile-draining; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1 is a perspective view; Fig. 2, a longitudinal elevation; Fig. 3, a transverse section, and Fig. 4 a top view.

A, Fig. 1 is a revolving wheel of spades, held in its place by its axles resting in the sides of the shields, B, Figs. 1 and 3. It is rotated by bevel wheels working into cogs attached to its sides, as seen at C, Figs. 2 and 3. These can be single, or better, double as shown, Fig. 3, C, D, holding the wheel better in its place, and giving greater strength. In place of the second wheel, a small roller could be substituted on one side to steady the excavator-wheel. Instead of bevel wheels working into the sides, cog wheels working into cogs in the inner rim of the excavator wheel, would accomplish the same purpose, namely, allowing the excavator wheel to work in the trench below its own axis.

The wheels C and D receive their motion by shafts from miter-wheels, E which connect with F, Figs. 1, 2, 3. On the same shaft with F is the belt wheel G from which a belt runs to H, Figs. 1 and 2. On the same shaft with F is the belt wheel G from which a belt runs to H, Figs. 1 and 2. On the same shaft is a second wheel J which connects by a belt with the motive power.

To raise and lower the excavator-wheel, the frame of the machine is made in two parts, as shown, Fig. 2. The two parts connected with hinges on the top near V, Figs. 1 and 2, and opened and shut, to raise or lower the wheel, by the assistance of a curved rack I, Figs. 1 and 2, on each side. A pinion, may work into the curved rack to move it, or a ratchet be used to hold it.

By setting the shaft holding the middle belt-wheels H and J, Figs. 1 and 2 in a line with the center of the hinges, which hold together the frame, the one half of the frame can be raised and lowered without slackening either the belt K connecting the wheel H with the machine, or the belt L connecting the wheel J with the motive power.

To clear the spades, as they come up to the top, clearers are attached to an endless chain, see M, Figs. 1 and 3. The endless chain being above the reach of the spades, and the clearers passing between the spades carry the earth out, over the earth-platform to N, Fig. 1 and there deposit it a safe distance from the excavator. O, Fig. 4 shows the relative position of the endless chain to the excavator, it not being directly across, but at such an angle that the clearers can pass through the spades without coming into contact.

The endless chain receives its motion from a cog-wheel on the shaft *a*, Figs. 1, 3, and 4 connecting with cog wheel on shaft *b*, on which is a bevel wheel *c*, connecting with *d*.

As, in working in an adhesive soil, the clearers, themselves, would soon become clogged, I keep them clean by causing them to rise and fall through a slot, or before a scraper, which crosses the endless chain immediately before the clearer, as seen P the scraper, Figs. 1, 3 and 5. To raise the clearers through the slot I attach to their upper part, small rollers Q, Figs. 3 and 5 which on coming near the place of discharge, run up an inclined plane R until the clearer is raised sufficiently high to scrape itself clean before P. The rollers, after passing the inclined plane, run in a guide, dotted line S, Fig. 3, to keep the clearers in place while passing around. Instead of the roller, slides could be attached for the same purpose, and the clearers, attached to a wheel, instead of an endless chain, could be raised and lowered through a slot or before a scraper by the rollers or slides running in a cam, as seen in Fig. 9. The distance of the cam from the wheel being greater on the one side than on the other, is the same to the wheel, as the inclined plane is to the endless chain.

To move the machine forward and hold it up to its work I lay a movable track of plank, on which is a toothed rack T, Fig. 7, in which the toothed wheels U, Figs. 1 and 2 work, being moved by pinions V on the center shaft. These wheels (U) are attached to the first half of the machine, so as not to be raised, on raising the excavator-wheel. To keep the track from moving out of its place, stakes are driven into the ground on each end.

To back, or shift the machine, the two center truck-wheels W, Figs. 1 and 2 on which the frame rests are on axles which can be raised and lowered by screws in sliding boxes. By lowering the axles, the machine is raised off the track, the weight resting on the two center wheels, on, or about a balance: by which means the machine can be much easier turned or shifted.

To prevent any earth from clogging up the cogs in the sides of the excavator wheel, the sides of the wheel are covered with shields. B, Fig. 7, shows a shield in part, the rest being removed to show the cogs. B, Fig. 3, shows a transverse section of the shields. As shown in Fig. 3 the sides of the shields can be made to hold the axles of the excavator-wheel. The edge of the shield is made a little flanged, to fit into a channel in the excavator-wheel. Some packing, such as india-rubber, or some material which will not cause much friction, to exclude the loose dirt may be used between the wheel and the shields.

To prevent any loose dirt, which, falling from the spades, on their rising above the surface, might fall back in to the trench, I place immediately before the spades, a scraper, something in the form of a letter V as shown X, Fig. 6, which would rest on the earth and be held in slides which would allow it to raise and lower with the variations of the surface, and as it moves forward with the machine, it would throw the loose fragments to the right and left from the edges of the trench. The two sides need not be connected in front, but be separate, so that they could be set a little nearer to, or farther from, the sides of the spades.

To remove large stones out of the trench it would be necessary to back the machine and use a crow-bar; or if a large bowlder raise the excavator-wheel and pass it, then lower the wheel and go on, a man with a spade cutting round the bowlder afterward.

To cut an open ditch, wide at the top and narrow at the bottom, the excavator-wheel could be set before the work in an oblique position, as shown in Figs. 7 and 8, either by setting the machine oblique to the axles of the wheels by which it is sustained, or by making the part of the frame which holds the excavator-wheel movable, so as to set the wheel obliquely. To cut the ditch much wider at the top, the ground would have to be gone over twice; first, running forward the length of the track laid, with the wheel in a direct position; then backing and running forward with it in an oblique position. By this means the earth would be prevented pressing against the advancing side of the excavator wheel when moving forward obliquely.

That the bottom of the drain shall not partake of the inequalities of the surface, but preserve a true line of descent, I make the platform or track, a gage, by grading or blocking its bed to bring it to the line of descent I design the drain to run; that line being shown by stakes or marks according to a previous survey.

As the trench would not be sufficiently wide for a man to stand in it; it would be necessary to lay the tiles with a kind of tongs, or a bent rod, now in common use to lower them to their place.

To operate the machine I first survey the ground and stake it out, showing by the height, or by marks, the line of descent on which the track shall be laid. I lay down the track, set the machine on it, the center truck wheels being lowered. The machine is set in motion, the excavator working its way down the full depth before the machine moves forward. On the excavator reaching the bottom the center truck wheels are raised, by which the toothed wheels which move the machine forward are brought into the toothed rack. As the truck is left behind, it is taken up and set down forward, according to the line marked out. As the spades bring up the earth, the V scraper in front moves the loose earth from near the edges of the trench. The clearers on the endless chain pass between the moving spades, and carry the earth off over the platform N, at the end of which it is discharged. The clearers scrape themselves clean by rollers running up the inclined plane, raising them before the scrapers, as before described. What little earth would remain on the edge of the scraper need not be named. If the excavator strikes a stone the belt K or L would slip before the cogs would break.

The advantages of my machine consist: Firstly, in its being adapted to tenacious clays, every part being made to scrape itself clean. Secondly, the clearers, being on an endless chain, can carry the earth farther away than if on a wheel, and better admit of disposing of it. Thirdly, in not having to excavate so much earth as by manual labor, the trenches being cut about six inches wide. Fourthly, in having a true gage on the surface instead of leveling the bottom of the trench by the eye. Fifthly, in reaching the greatest depth by the smallest wheel, it being capable of working with more than three-fourths its whole diameter in the trench. Sixthly, cutting the whole depth by once going over the ground. Seventhly, being able to raise and lower the excavator-wheel without its having to stop working. Eighthly, its adaptability: a small one could be worked by men, a larger one by horses, and the best by a two horse engine. Ninthly, the quantity of work done in a given time and for a certain sum: A machine with a two horse engine is capable of cutting trenches four feet deep at the rate of 200

rods per day, and five rods per day is a good day's work for one man. If each spade should cut an advance of half an inch, and there are twelve spades, it gives six inches per revolution of wheel, which at twelve revolutions per minute, would be 360 feet per hour or over 200 rods per day. Allow a third for stoppages and say 150 rods per day, with two men to attend. A two horse engine making 100 strokes per minute, and this reduced to twelve revolutions of the excavator-wheel per minute, and the purchase near the rim instead of on its axle, gives power to raise a great weight and bring up stones three inches in diameter, with a strong machine. The actual quantity brought up by each spade, at one time would not, in a 6 in. trench be more than six or seven pounds of earth.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The shields B at the sides of the excavator wheel, as described.

2. Attaching the clearers which pass through the spades to an endless chain.

3. The clearers which clear themselves by being raised up through a slot or before a scraper by rollers or slides attached to the clearers, which run on an inclined plane or in a cam, substantially as specified.

4. Making the frame in two parts with hinge joints, and center shaft on line with hinge joints and the curved rack, for the purpose specified.

5. The combination of the toothed rack T T with the excavator for the purpose of a gage on the surface to determine the line of descent of the bottom of the trench, substantially as described.

6. The combination of the V shaped scraper X with the excavating wheel A substantially as herein specified.

FRANCIS B. SCOTT.

Witnesses:

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