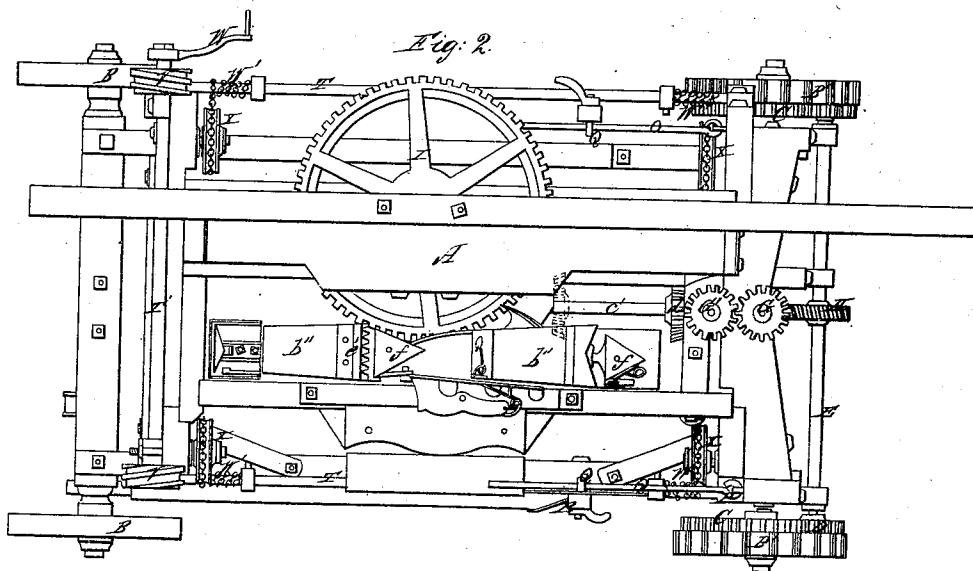
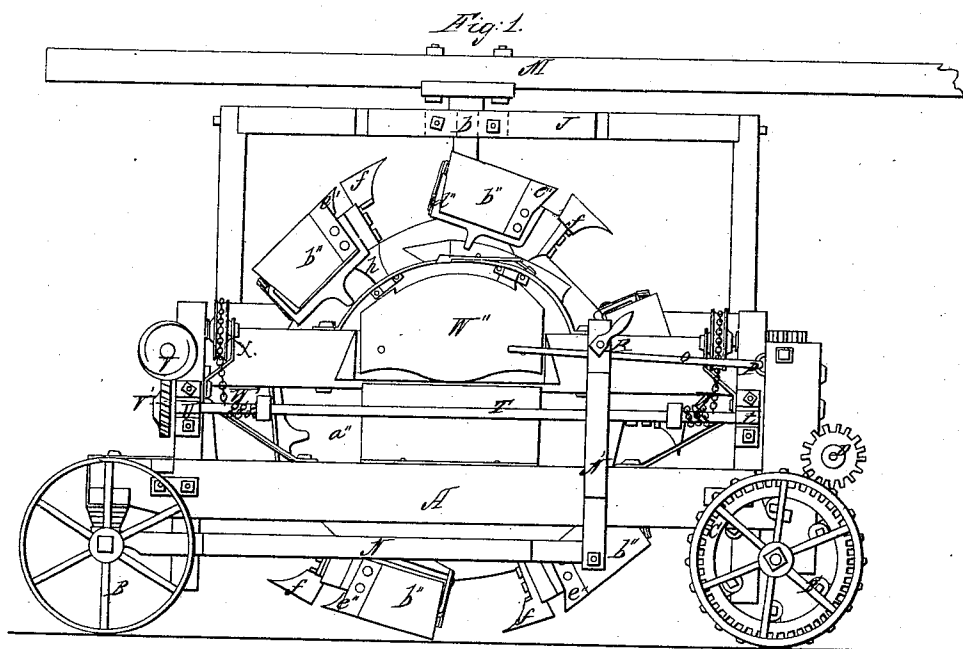


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Excavator.

N^o 59,140.

Patented Oct. 23, 1866.



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Excavator

N^o 59,140.

Patented Oct. 23, 1866.

Fig. 5.

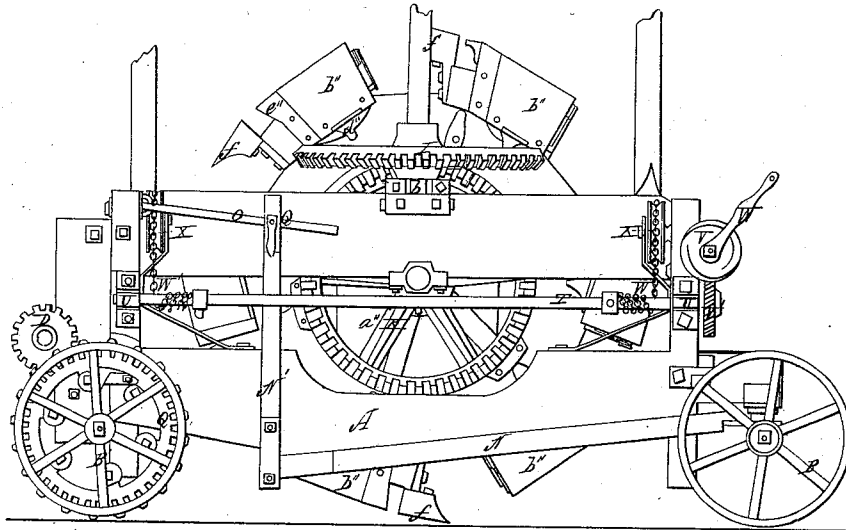


Fig. 4.

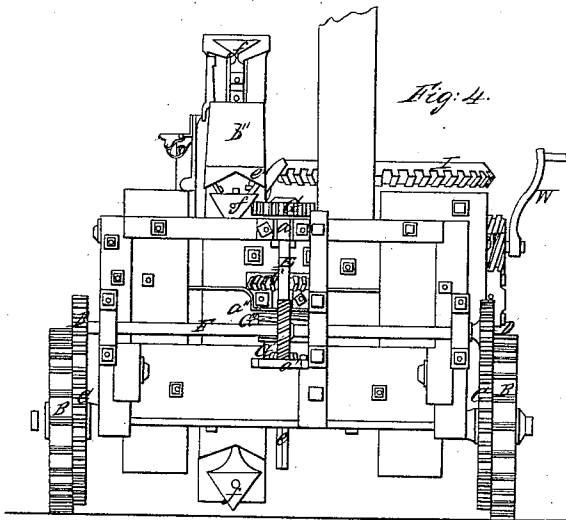


Fig. 6.

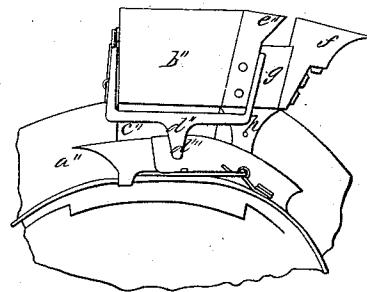


Fig. 6.

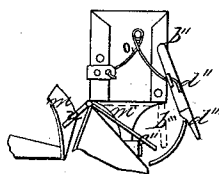


Fig. 7.

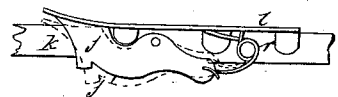


Fig. 8.

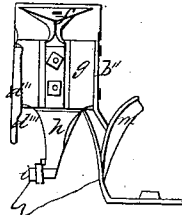
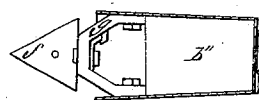


Fig. 9.



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UNITED STATES PATENT OFFICE.

DAVID SAWYER, OF WEBSTER, ASSIGNOR TO HIMSELF AND ROBERT BARBER, OF PERRYSBURG, OHIO.

IMPROVED DITCHING-MACHINE.

Specification forming part of Letters Patent No. 59,140, dated October 23, 1866.

To all whom it may concern:

Be it known that I, D. SAWYER, of Webster, in the county of Wood and State of Ohio, have invented certain new and useful Improvements in Ditching-Machines; and I do hereby declare that the following is a full and complete description of the same, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1, Plate 1, is a side view of the machine; Fig. 2, a top view of the same. Fig. 3, Plate 2, is a side view opposite from Fig. 1; Fig. 4, a rear-end view of the machine. The smaller figures are detached sections, to be referred to hereinafter.

Like letters of reference refer to like parts in the several views.

A, Fig. 1, Plate 1, is a strong wooden frame, mounted upon two pairs of wheels, B B'. B, the front and leading wheels, are placed upon an axle-tree independent of the frame, but to which it is attached by a king-bolt, as is an ordinary carriage. The axle-tree of the hind wheels, which are the drivers, is connected to the frame in a permanent or rigid manner. To the inner side of the driving-wheels is bolted the geared wheel C, into which the spur-wheel D upon the extreme end of the shaft E plays. F is a vertical shaft, the upper end of which works in the box *a* and the lower in a step, *a'*. On the extreme upper end of this shaft is secured the pinion G, and to the lower end the endless screw or worm G''. Into this screw works the angular-tooth pinion H, for a purpose hereinafter referred to.

I, Figs. 1 and 2, is a crown-wheel, the upper end of the shaft of which is secured to the supplementary frame J by a journal-box, (indicated by the dotted lines *b*, Fig. 1,) the lower end resting in a step, *b'*. K is a large bevel-wheel, meshing into the crown-wheel I, which in turn gears to a small bevel-pinion (indicated by the dotted line *c''*, Fig. 2) on the inner end of the shaft *c'*. On the outer end of this shaft is another pinion of the same size and character, at *d*, Fig. 2, which in turn meshes into the wheel *d'*, Fig. 4, which is also of the same size and character as the wheels *d*. On the upper end of the shaft on which is the wheel *d* is a small wheel, G', of the same size and charac-

ter of wheel G, both of which and their relation to each other are shown in Fig. 2. This arrangement of gearing is for the purpose of propelling the machine while in operation, and is accomplished in the following manner: By means of the sweep M, Fig. 1, the crown-wheel is made to revolve, and in so doing drives the large bevel-wheel K, which, as above stated, gears into the small bevel-pinion *c''* on the inner end of the shaft *c'*, on the opposite end of which is the transfer-wheel *d*, Fig. 2. This transfer-wheel, working in the corresponding bevel-wheel *d'* on the square vertical shaft *e*, through which it slides upward and downward, for a purpose hereinafter shown, transfers the movement to the wheel G by the intermediate transfer-wheel G'. The wheel G, being on the shaft F, and on the lower end of which is the endless screw or worm G'', turns the shaft E by means of the worm and wheel H. The wheels D on the extreme ends of the shaft in turn drive the larger wheels C C, which being connected to the driving-wheels B, the machine is thereby propelled forward in the direction of the front wheels, B, and by which the machine is guided in its course of excavation, as follows: The front wheels, as above remarked, being connected to the machine as are the front wheels of a carriage, are moved around by the side links N and levers N'. One end of the link is attached to the axle-tree of the front wheels, the other to the short arm of the levers N', connected to the lower side of the frame. On pulling the right-hand lever in the direction of the rear of the machine, the right-hand wheel is thereby pushed around forward. At the same time the left wheel turns in the opposite direction, and so, vice versa, on the reverse action of the lever.

O is a rod, and connected to the machine by the loop and staple P. This rod slides in a staple, Q, at the upper end of the lever. One shank of the staple projects through the lever, and is provided with a hand-nut, R, for the purpose of tightening the staple on the rod, whereby the lever is securely held, also the wheels, in any desired position.

The supplementary frame J is so arranged as to slide upward and downward within the frame A by means of the side shaft, T, Figs.

1 and 2, connected to the sides of the frame A by the journal-boxes U and shaft T', extending across the front of the frame, to which it is attached in the same way as the shaft T. On the extreme ends of the shaft T' is a screw-wheel, V. This wheel plays in the toothed wheel V' on the front end of the side shaft, T, and by which it is turned by the crank W. W' is a chain, one end of which is attached to the supplementary frame J, the other passing over the sheave X and connected to the side shaft, T. Each corner of the frame is alike provided with a chain and arranged in the same way.

By this arrangement of shafts, wheels, and chains it will be obvious that the frame may be lowered or raised at will. By turning the crank the chain winds around the shaft, thereby drawing up the frame to any desired height, when on the reverse action of the crank the frame is lowered, the weight of it causing it to descend. The purpose of raising and lowering the frame will be shown hereinafter.

The excavating-section of the machine is constructed as follows: To the large bevel-wheel K, heretofore described, is attached a circular plate or disk, *a''*, Fig. 3, Plate 2, to the sides of which are connected the scoops or buckets *b''*, Fig. 5. *c''* is the bottom of the bucket, and is hinged to one side for the purpose of allowing it to drop down, for a reason hereinafter shown. *d''* is a bail attached to the side of the bucket, and by which the bottom is held up. One end of the bucket is open, and is provided with a sharp cutting-edge, *e''*. Some of these edges are straight across, others more or less angular, and some with teeth. Immediately in front of the opening in the bucket is a triangular-shaped spade or digger, *f*, and is connected to it by the head *g*. This head is bolted to the inside of the bucket, as shown in Fig. 9. A stem, *h*, connects it with the disk *a''*, and is secured by a strap and bolt, *i*. *j*, Fig. 7, is a cam, and pivoted to the top of the arc *k*. *l* is a guide. *m*, Fig. 6, is also a cam. The purpose of these cams and guide will be shown hereinafter.

The operation of this machine is as follows: The machine being placed over the line of ditching, the power is then applied by the sweep M to the wheel I, which, on turning, drives the wheel K, to which the disk and buckets are connected. As they revolve they are gradually lowered into the ground by the arrangement above described until the required depth of the ditch is obtained. The propelling apparatus during this commencement of digging from the surface down, being ungeared, is now regeared, and the machine thereby moves forward in the line of work. This gearing and ungearing of the propelling arrangement is done by lifting the wheel G' above the wheel G, into which it meshes. The shaft *e*, on which the wheel G' is keyed, passes loosely through the bevel-wheel *d'*; hence it can be lifted up or out and replaced, as the circumstances may require.

It will be seen by the movements of the machinery that the excavating is from below upward. The spades or diggers, by their peculiar angular and pointed character, are easily driven into the ground, thereby loosening it, so that it can be readily taken up by the buckets. These, as above mentioned, being each provided with sharp cutting-edges or teeth, cut and scrape the bottom and sides of the ditch, thus leaving it clean and smooth and of a uniform depth and width, the width being that of the bucket, while the depth may be more or less, as the nature of the work may demand, by the raising or lowering of the excavator, in the manner as above described.

The bucket is discharged of its contents as follows: As it passes over the arc *k* the arm *d'''*, depending from the bail, strikes against the cam *j*, which forces it from under the bucket, or from the position as shown in Fig. 8 to that shown in Fig. 6, and is retained in this position by the slide *l*. On the bail being thus removed from under the bucket, the bottom drops down and its contents fall upon the apron W'', and down which it slides to the ground along the side of the ditch. The bucket being thus emptied, the bottom is again closed by an arm, *n*, Fig. 6, projecting from the hinged side of the bottom. This arm, as the bucket passes, strikes against the cam *m*, and thereby throws up the bottom, or from the position shown in Fig. 6 to that indicated by the dotted lines *m'*, when at the same instant the bail has passed the cam *j* and slide *l*, and is then forced under the bucket, or from the position shown in Fig. 6 to that indicated by the dotted lines *b'''*, by the springs *o*, and so on in each revolution of the bucket, the arm *d'''* and cam *j* opening the bottom, and the arm *n* and cam *m* closing it, and when thus closed immediately the bail is forced under it by the spring, as above described.

The purpose of pivoting the cam *j* to the arc is that it may offer no obstruction to any reverse movement of the bucket, but may be easily pushed back by them out of the way in the direction indicated by the dotted lines *j'*, Fig. 7. It is again brought back into place for opening the bucket by the spring *r* immediately on their having passed. Hence it will be seen that any backward movement is attended by no possible danger to the machine.

By the arrangement of the front wheels in the manner as above described the machine can be directed so as to work in a curved as well as in a straight line, as the nature of the ground or other circumstances may require. So, also, in moving the machine from place to place, it can be drawn and turned as an ordinary carriage.

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

1. The wheels B, C, D, and H and shaft E, as arranged with shafts F, *e*, and *e'*, wheels G G' and *d d'*, for the purpose and in the manner set forth.

2. The wheels I and K and sweep M, as arranged with the wheels *c'*, *d d'*, G G', and B,

C, and D, for the purpose and in the manner described.

3. The links N and lever N', rod O, and staple P, as arranged, for the purpose and in the manner specified.

4. The shaft T, chains W, and wheels V', as arranged with the sheave X, wheel V, and frame A, in the manner and for the purpose set forth.

5. The bucket b'', cutting-edges c'', in combination with the head g, spade f, for the purpose as specified.

6. Bail d'', arm d''', as constructed, and op-

reated by the cam j, slide l, and spring o, for the purpose described.

7. The bottom c'' and arm n, as arranged, and operated by the cam m, as, for, and in the manner set forth.

8. The adjustable cam j, slide l, and spring r, as arranged, for the purpose and in the manner specified.

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