

*G. W. Cherry.*

Nº 2,017.

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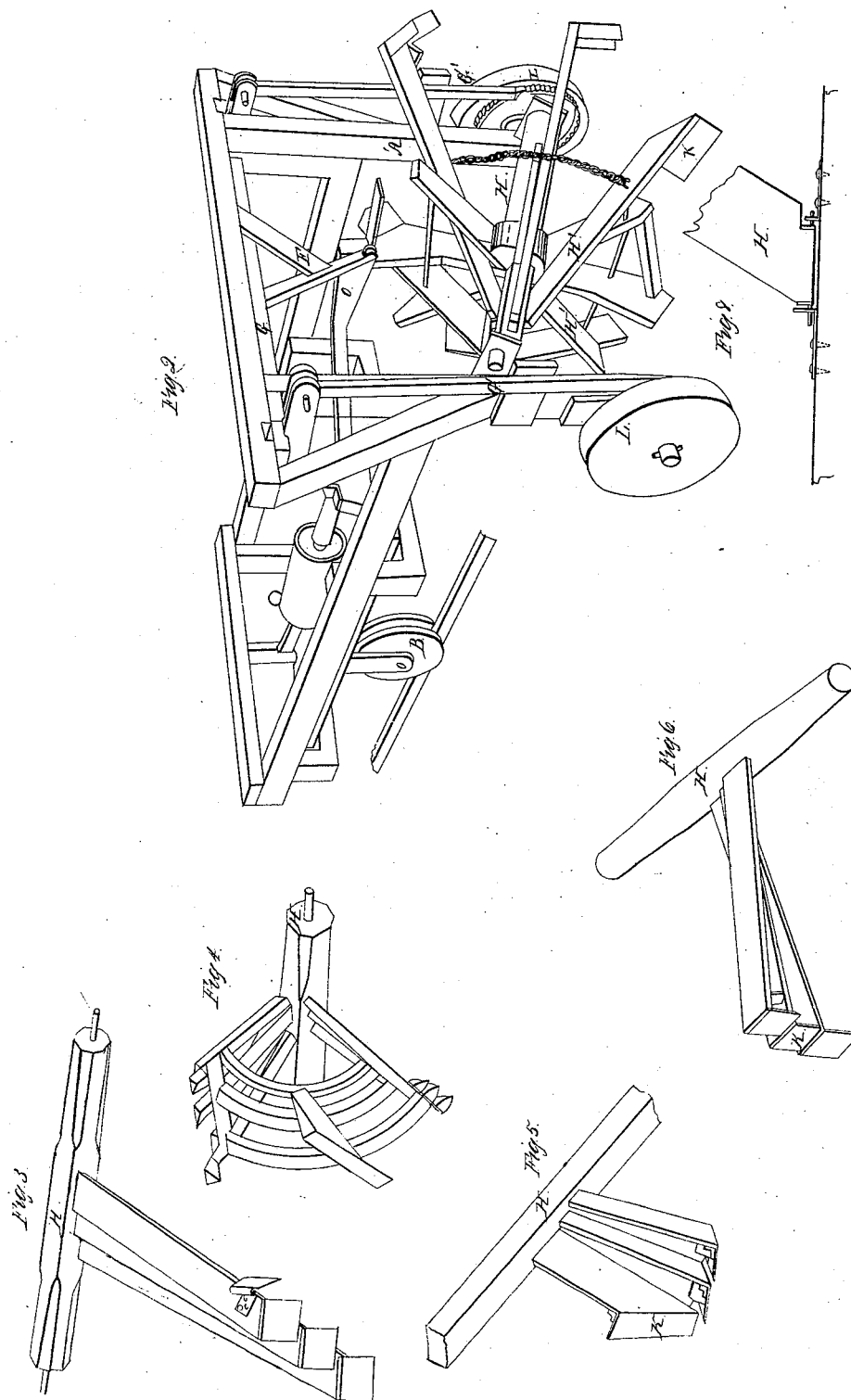
G. W. Cherry.

Sheet 2-2, Sheets.

Excavator.

No 2,017.

Patented Mar. 26, 1841.



# UNITED STATES PATENT OFFICE.

GEORGE W. CHERRY, OF WASHINGTON, DISTRICT OF COLUMBIA.

## MACHINE FOR EXCAVATING DITCHES.

Specification of Letters Patent No. 2,017, dated March 26, 1841.

*To all whom it may concern:*

Be it known that I, GEORGE W. CHERRY, of the city of Washington and District of Columbia, have invented a new and useful Improvement in machines for Excavating Ditches and other Purposes, the description of which I have given in the annexed specification, reference being had to the drawings, making a part of the same.

- Figure 1, represents a perspective view, showing the excavator and inclined axle. Fig. 2 represents a perspective view of the machine modified in the manner of arranging the arms on the inclined axle, and showing how it may be used by steam. Figs. 3, 4, 5, 6 different modifications of the shape of cutters and scrapers. Fig. 7 represents a view of the support to the inclined axle at the highest end. Fig. 8 section of one of the arms with a hinge.

Similar letters refer to similar ones in the drawing.

- This machine is composed of a frame the driving wheel B, and its sweep B<sup>s</sup> and guiding wheel B'; third, the tightening grooved wheel D with its lever C; fourth, the grooved roller E; fifth the vibrating axle G and pawls—G' G'; sixth the inclined axle H with its arms H', &c.; the carriage wheels L, and ratchet wheels M.

- The frame.*—This is made of wood; having two side pieces of the length proper for the machine; two uprights at the back end, which are high enough to allow a cap piece which connects the tops of them to pass clear of the arms from the inclined axle (to be hereafter described)—and low enough to reach a little below the axle of each carriage or ratchet wheel (to be described). The cap piece before mentioned, extends beyond each of the uprights, and a trace is connected with ends of the cap piece to the uprights of the frame, by this means, giving strength and stability to the said frame. By way of distinction I will call the uprights just mentioned the main uprights of the frame; I also call that part of the machine where the power is applied the front part; and its opposite the back part of the frame. Adjacent to the upright, (near which the lowest end of the inclined axle rests) is another upright, nearly as long as the other, about 6 to 12 inches therefrom,

and connected by a cap and bottom piece to the main upright adjacent. Into this last mentioned upright, one of the side pieces before mentioned is tenoned. The side piece of the opposite side is tenoned into the main upright of that side. A short distance say a foot from this main upright, and parallel thereto I suspend from the under side of the side piece before mentioned, a stick of timber, reaching nearly as low down as the main upright does, and to which it is connected by a bottom cup piece, of the same dimensions. This arrangement, forms a rest or support for the axle of the inclined axle hereafter to be mentioned. The ends of the side pieces before mentioned, in front of the frame, are connected together by a piece of timber, and on this piece of timber I raise two short uprights each one, directly over the top of each side piece, a cap piece of like dimensions connects them, at a short distance from this frame of uprights and cap piece just mentioned, a horizontal piece of timber reaches across from the top of one side to that of the other and remains fixed there, and is pierced with a number of holes, to insert a pin therein for purposes hereinafter to be mentioned, other pieces of timber pass over the top of the frame, the uses of which will be described in the sequel. This frame is modified to suit it for the purposes of steam power, by having a platform suspended from the sides of the frame on which lie the piston, &c., of the engine, this can be better seen in the example Fig. 2, Plate 2.

*The driving wheel B and sweep B<sup>s</sup>, and guiding wheel B'.*—The driving wheel B is of sufficient diameter to move freely within the side pieces of the frame and is placed in front, and attached to a vertical shaft, which shaft reaches from the cap piece of the short uprights (before mentioned) down to the axle of the guiding wheel B'; attached to this driving wheel, are two sweeps, long enough to effect the desired object, and to which the animal power is applied. This driving wheel revolves independently and around the shaft. The driving wheel is made thick enough to allow two grooves or channels to be made in its periphery, and each distinct from the other. A rope is to be passed around these grooves and connect-

ed with other rollers and wheels hereafter to be mentioned; at the lower end of the said vertical shaft, is the guiding wheel, which has a wide channel cut in its periphery, which channel rests on a temporary wooden track, made of any desired length, and secured from moving by pins driven through the wood into the ground; on the upper end of this vertical shaft, just above the upper surface of the said driving wheel, is inserted a lever (or any other apparatus of like nature,) which is long enough to rest on and over the cross piece, before mentioned pierced with holes. The object of this lever is to give the guiding wheel its required direction, which when accomplished is prevented from changing by a pin being inserted by the side of the lever into one of the many holes on the cross piece before mentioned.

*The tightening grooved wheel D and lever arm C.*—The lever arm aforesaid passes over and a little longer than the width of the frame; having its fulcrum on the top of one of the side pieces (before mentioned). The power is applied to the other end of the lever and after its position has been fixed by the hand, is prevented from changing it by a pin being inserted in one of many holes (on the top the other side piece) by the side of the lever. Immediately under the center of this lever I attach a triangular shaped piece of wood, the hypotenuse of which being placed lowermost forms the inclination, which I give to the tightening wheel. The flat side of this wheel is placed parallel to the hypotenuse aforesaid and immediately under it, and revolving therearound an axle, projecting downward from the said triangular shaped wood, a groove is cut in the periphery of this wheel, around which a rope is passed, coming from the driving wheel before mentioned. The object of the above mentioned wheel, is to tighten the rope passing around the driving wheel—which is effected by the aid of the arm or lever being moved toward the back end of the frame, and there secured by a pin as before mentioned.

*The grooved roller E.*—This wheel or roller (shown at E Fig. 1) is similar to the tightening wheel just mentioned, except that it is vertical, and moving around a horizontal axle, which is inserted into an upright projecting from a crosspiece resting on the top of the frame. The rope after leaving the wheel connected with inclined axle (to be hereafter mentioned) passes over this wheel to the periphery of the driving wheel before mentioned.

*The vibrating axle G, and pawls G' G', and pendulum rod F.*—This vibrating axle is placed just back of the main uprights before mentioned, and immediately adjacent to the cap piece connecting them; and is a

little longer than the distance between the said uprights about the middle of this vibrating axle, reaches down an arm or pendulum rod (F) low enough to be touched by the cams or projections on the plane side of the wheel attached to the inclined axle. The lower end of this arm, &c., has on it a small roller, which rolls over the cams, &c., reducing thereby the friction. At each end of this vibrating axle is an arm, in which is inserted a pawl. These pawls reach down to the ratchet wheels attached to the carriage wheels to be hereafter described. The inclined axle H with its grooved wheel I and arms, &c., all combine to form the excavator. This axle is made of any suitable material, and is placed at any desired inclination. The lowest end rests on the bottom cross piece before mentioned joining the main upright A<sup>1</sup> and A<sup>2</sup>. As this end is to be raised when required, a movable strap or band is placed over the axle, secured by any convenient arrangement. The higher end of the inclined axle, is inserted into a square support H<sup>3</sup> (shown at Fig. 7 on a large scale)—which support is square, at right angles to the inclined axle;—this support has on each end an axle, which works in brackets (as shown in Fig. 7). This arrangement affords the lower end of the inclined axle the opportunity to be raised or lowered at pleasure, assisted by a rope or chain, from a windlass or cylinder (N Fig. 1). The higher end of the inclined axle, moves freely around in the center of the above mentioned square support. In the frame of Fig. 2 the ends of the inclined axle revolve in a fixed and permanent support attached to the main upright. From these inclined axles arms are projected at right angles thereto, as H' in Fig. 1, or radiating at suitable angles therefrom a common center, as at Fig. 2.

In the first example, any suitable number of arms project at right angles from the inclined axle, having on their ends various shaped cutters and scrapers, by which a suitable form is given to the ditch, while excavating it. Each of these arms have an apron or slide, (H<sup>2</sup>) which causes the earth so to slide off onto the embankment. Each of these arms are a great deal wider than they are thick. The narrow side of the arm next to the lowest end of the inclined axle, is parallel to one side of the ditch; on the opposite side of the arms is permanently fixed a large circular grooved wheel (I Fig. 1); and which is concentric with the inclined axle—H. The periphery of the wheel is grooved to admit a rope from the driving wheel before mentioned. This groove may be straight, or zigzag, continuous, or in sections. On each side of this groove pins are placed alternately; leaning outward from the bottom of said groove; the rope afore-

said passes between the pins, and by this means is prevented from slipping off. Cams or inclined planes of wood are placed on the broad side of the aforesaid wheel which give an alternate motion to the pendulum before mentioned, attached to the vibrating axle. On the extreme ends of the aforesaid arms, respectively are placed the scrapers and side cutters (K Figs. 1, 2). These cutters and scrapers are modified in various ways.

The bottom scrapers may be divided into three equal parts, each part attached to a separate arm differently inclined from each other, and also each scraper having a little side or slope cutter adjacent thereto. Or: they may have a long, and short side or slope cutters as at Fig. 1,—or the side cutters aforesaid may be also subdivided, as shown in Figs. 3, 5 and 6. The above arrangements of subdivision is intended to give ease to the cutters, and thereby offering less resistance to the machine in its operations. I have also another modification as shown in Fig. 4 where the cutters are divided into three or more equal parts, inserted on the ends of arms at right angles to each other and connected by quadrants—each set of arms being provided with plow-like scrapers, and between the set above mentioned, a full length scraper passing over all the quadrants aforesaid. In the example Fig. 2, this inclined axle has the arms differently arranged, by one of the ends of each of them being inserted about the same position on the inclined axle, and inclined therefrom at any suitable angle, having on the opposite ends of each of the arms aforesaid, scrapers and cutters. Some of these arms are not as long as others, in order to give the scrapers and cutters additional opportunities to excavate the ditch with greater ease to the machine, one or two of these arms are movable on a hinge, which is near the common place of insertion on the inclined axle, (and a section is shown at Fig. 8). When it is desired to move the machine, the arms are loosened from one another, and raised upward, and secured, until wanted. The arms of both (Figs. 1, 2) are braced, by rods of wood or iron, passing from one arm to another. From the inclined axle (of the 2d figure); as many secondary arms project at right angles therefrom, as there are inclined arms, each of them coming in contact, with the inclined arm nearest to them, and projecting a suitable distance above them. By this means, they act on the roller of the pendulum rod before mentioned, and give an alternate motion to the vibrating axle, and also enable the end of the reaching arm, attached to the piston rod to pass over them, and move the inclined axle.

*The carriage wheels L L and ratchet wheels*

*M M.*—The former made of suitable size, their axles are attached to the main up-rights before mentioned. On the inner side of each wheel is attached a circular ratchet wheel (as shown on the right hand carriage wheel in Figs. 1, 2) made of brass or other metal, with teeth (ratchet shape) cut in the periphery—the pawls before mentioned working therein.

*Operation.*—The machine being in working order, I lay down a wooden track in advance, which I secure to the ground temporarily by pins, and on this track I placed the guiding wheel B'. The power being now attached to the sweeps, turns the driving wheel, and by means of the rope passing therefrom and over the grooved roller, and around the wheel of the inclined axle, gives motion to the arms containing the scrapers, &c. The downward projecting or pendulum rod is moved alternately forward by the cams aforesaid on the wheel of the inclined axle, and thereby causing the pawls to catch in the teeth of the ratchet wheel, and giving a progressive motion to the carriage wheels, in the direction of the aforesaid wooden track. Should the rope or strap around the driving wheel be slackened by any means it can be tightened by means of the roller with its movable arm or lever. When one of the arms arrives in the highest position as shown in Fig. 1 the earth slides down the apron of the arm partly, and partly on the apron placed on the frame adjacent thereto down to the side of the ditch forming thereby an embankment of the excavated materials. In the modification I have made for the use of any kind of steam apparatus I connect to the end of the piston rod a reaching arm O Fig. 2. The end of this reaching arm, on its under side is shaped like an obtuse angle. The downward stroke of the piston rod brings the reaching arm with it, and also (when the cams are in the right position) the secondary arms of the inclined axle, and thus the axle aforesaid is turned. The back stroke of the piston rod brings the reaching arm again in a proper position, over another cam, or secondary arm, and the downward stroke again performs the motion as before. To lift up the inclined axle from its lowest position I attach a hook with a rope from a windlass or cylinder with a crank as shown in Fig. 1.

What I claim as my invention and improvement and which I wish to secure by Letters Patent is—

1. The manner of moving the machine forward by means of the cams attached to the arms of the inclined wheel acting on the arm attached to the vibrating axle, and by the arms and pawls communicating motion to the ratchet wheels, as described—but it will be remembered that I do not claim the

method of giving a forward motion to the machine simply by means of the ratchet wheels and pawls, except as above limited.

2. The connection of two or more arms  
5 to the inclined axle by means of hinges, so as to raise them from the ditch as specified.

3. The method of guiding the machine by

means of the grooved guide wheel in combination with the movable rail track as described.

G. W. CHERRY.

Witnesses:

THOS. H. DEWITT,

WM. P. ELLIOTT.