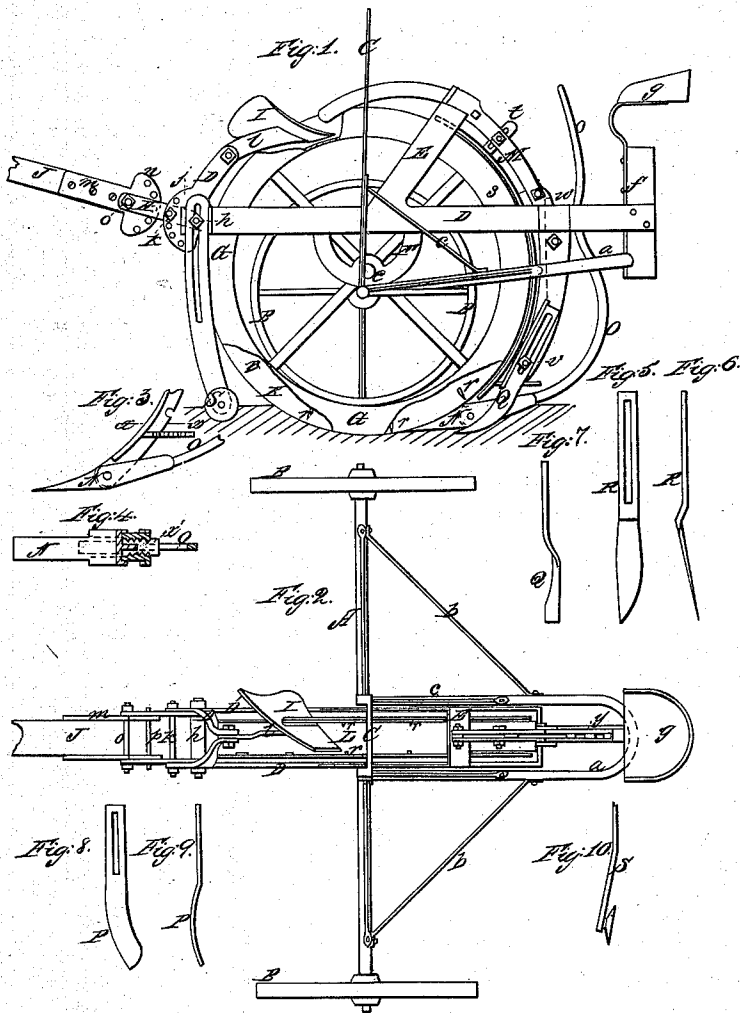


*J. A. Parsons.*

*Ditching Machine.*

*N<sup>o</sup> 105,364.*

*Patented Jul. 12, 1870.*



*Witnesses:*

*A. D. Merkle  
Sam'l. Marr*

*Inventor:*

*Joseph A. Parsons  
by Charles W. Eyer*

# United States Patent Office.

JOSEPH A. PARSONS, OF CLEVELAND, OHIO.

Letters Patent No. 105,364, dated July 12, 1870.

## IMPROVED DITCHING-MACHINE.

The Schedule referred to in these Letters Patent and making part of the same.

### To all whom it may concern:

Be it known that I, JOSEPH A. PARSONS, of Cleveland, in the county of Cuyahoga and in the State of Ohio, have invented certain new and useful Improvements in Ditching-Machines; and do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawing making a part of this specification, in which—

Figure 1 is a side elevation of my device, with the nearest traction-wheel removed, and with a portion of the nearest flange of the excavation-wheel broken out;

Figure 2 is a top plan view of my device;

Figure 3 is a side elevation of the excavator;

Figure 4 is a rear elevation of the excavator, below the line *x x* of fig. 3;

Figure 5 is a side elevation of the front colter;

Figure 6 is a front elevation of the same;

Figure 7 is a front elevation of the adjustable side plowshare;

Figure 8 is a side elevation of the rear colter;

Figure 9 is a rear elevation of the same; and

Figure 10 is a front elevation of the trimming-wheel and the arm upon which it is pivoted.

Like letters of like kind denote like parts in each figure.

My device relates to a ditching-machine, mainly for the making of drainage ditches, in which tile may be laid, constructed in such a manner that the earth excavated may be raised by means of the rotation of a wheel, and deposited upon one side of the cut, and so that the driver may readily and easily adjust the depth of the cut to the inequalities of the ground; and

The invention consists in the means employed for raising and discharging the earth after its excavation, consisting of a large central wheel of novel construction; in the devices for excavation, consisting of a novel excavator, assisted by a certain plowshare, by two colters and by a trimming-wheel; in the devices for regulating the depth of the cut; in the devices for regulating the vertical direction of the draft at all stages of the cutting; in a shield over the excavation-wheel, and the devices for its adjustment; in the devices by which the excavation-wheel is vertically and automatically adjustable; in the novel construction and arrangement of the axle-frames of the machine; and in the combination and arrangement of the various operative parts of the same; all as more fully described and set forth below.

In the drawing—

A represents an axle, the middle portion of which is bent into a yoke, *a*, projecting from the central lateral line to the rear of the machine.

The traction-wheels B turn upon the ends of this axle, and are placed at such a distance apart as will enable them to go clear of the earth thrown out in excavation.

Diagonal braces *b* connect the ends of the axle near the wheels with points on the yoke *a*, near its outer end.

From the axle, at the points where the yoke *a* connects with it, another yoke, C, is attached, which rises vertically above said axle, to a distance from it about equal to that of the yoke *a*.

Diagonal braces *c* extend from the axle, near its outer ends, to the sides of the yoke C, and similar braces *d* extend from the yoke *a*, near its outer ends, to the yoke C.

A double frame, D, runs lengthwise of the machine, having two sides parallel in every plane, and connected together near their centers longitudinally by a yoke, E, rising above said frame and toward the rear, at an angle of about forty-five degrees.

A couple of semicircular yokes, F, depend from and are attached to the lower centers of each portion of the frame D, and form bearings for the axle *e*, which turns in them, and carries the excavation-wheel G, more fully described hereinafter.

The sides of the frame D, in its protraction to the rear, are drawn more closely together, so as to embrace and hold fast an excavator-frame and shield, more fully described hereinafter, and, in its still further protraction to the rear, embraces the standard *f*, for the driver's seat *g*, which standard is pivoted between the rear end sides of said frame.

The bottom of this standard *f* is also pivoted over the rear end of the yoke *a*, so that there is a vertical play to said yoke *a* and to the axle A.

At the forward end of the frame D its sides are secured, at a proper distance apart, by a bolt, *h*, having screw-nuts at either end thereof, to which is also pivoted a clevis, H, placed between the front ends of the sides of said frame D.

These front ends just mentioned terminate in semicircular wings *j*, provided with a series of holes near their outer rims, for the purpose of receiving a bolt, *k*, which passes through said sides and through the clevis before named.

The object of this bolt and the series of holes in the wings *j* is to regulate the vertical position of the outer ends of the clevis, as desired.

Above said wings the sides of the frame D bend upward and backward, and embrace and secure an arm, *l*, to which is attached the spout I, hereinafter described.

The tongue J of the machine is provided upon each side with plates *m*, having wings *v* at their inner ends, of a semicircular form, each of which is provided with a series of corresponding holes about its exterior.

The tongue is pivoted upon the clevis H by a bolt, *o*, passing through the outer ends of said clevis, and through the plates *m* and the tongue J.

A bolt, *p*, passes through the holes mentioned in

the wings *n*, below the clevis *H*, and thus regulates the slope of said tongue, the projecting ends of said bolt striking against the sides of the clevis; and thus preventing the tongue from dropping any further down, at the same time offering no resistance to turning the tongue upward, and bending it downward, even over the machine, so as to be out of the way.

The excavating-wheel *G*, whose diameter is nearly double that of the traction-wheels *B*, secured, as before mentioned, upon the axle *e*, which is pivoted to the yoke *F*, is arranged longitudinally and laterally in the center of the machine, rotating between the sides of the frame *D*, and within the yokes *a*, *C*, and *E*, and has a broad rim, to the outer edges of which are attached broad flanges *K*, extending outwardly, so as to leave a deep and nearly rectilinear channel, *L*, on the outside, entirely around the periphery of said wheel.

The outsides of these flanges are in parallel lines, but being thickest where they are joined to the rim of the wheel, and beveled on the inside, so as to form outer cutting-edges, the bottom of channel *L* is a little narrower than at its top.

On the outside of these flanges, near the outer edges, are secured triangular ears, the office of which is to hold the earth which is excavated within the channel *L* during the rotation of the wheel *G*.

The spout *I*, attached to the arm *l* before mentioned, is arranged diagonally across the periphery of said wheel *G*, inclining downwardly, and extending a suitable distance on one side, laterally beyond said wheel, so as to deliver the earth, as it is excavated, outside of the line of the ditch.

This spout is a spiral scroll in form, having its inner end within and fitting pretty closely to the channel *L*, but having spaces upon the sides of that portion within said channel for the ears *r* to pass through.

An excavator-frame and shield, *M*, before mentioned, of which the frame is made, in two pieces, arranged in parallel planes, encircles the outside of the rear periphery of the wheel *G*, and is secured at its top and front to the outside of the top of the yoke *E*.

Its shield is an inner plate, *s*, equal in width to the channel *L*, curved to correspond with the periphery of the wheel *G*, and placed near to it, passing under the yoke *E*.

This shield is adjustable vertically at its top and front by means of a proper screw-bolt in the frame *M*, which passes through a slotted standard, *t*, attached to said shield, which standard also passes up through said frame *M*.

The lower end of the upper section of said frame *M* is secured to and within the sides of the frame *D*, where said section passes between said sides, and the upper end of the lower section of said frame *M* is secured to the outside of the side pieces of said frame *D*, while the lower end of said lower section of the frame *M* is secured in position by a bolt-screw, *v*, provided with screw-nuts at each end, which passes through it from side to side.

The shield *s* before mentioned has a rib, *w*, upon the center of its outside, running down the same from a point just above the frame *D* to a point at or near the bolt *v*, where it has an offset-plate, *x*, extending outwardly between and beyond the sides of the lower section of the frame *M*.

This offset-plate *x* is serrated upon its edges, corresponding to serrations upon the lower inner portions of the sides of said lower section of said frame *M*.

The object of these serrations is to adjust the position of that part of the shield *s*, in regard to the channel *L*, by means of the screw-bolt *v*.

Below said offset-plate *x* the rib *w* is widened considerably, and its lower front passes through the excavator *N*, which is there pivoted to it. This excavator has a width a little less than that of the channel *L*,

within which its cutting front is arranged very nearly in the center of the lower periphery of the wheel *G*, and is beveled upon its upper front, so as to give a cutting lateral edge, like a chisel, across its entire width.

To its rear end the excavator *N* has secured a lever, *O*, which curves backward and upward, passing between the side of the frame *D*, in the rear of the frame *M*, which sides have at that point a suitable rack, *y*, to engage said lever in various positions, and terminates in a handle in front of the driver's seat *g*.

Upon one side of the lower section of the frame *M*, and between guides upon the same, is placed the colter *P*, of the form portrayed in figs. 8 and 9, and slotted, so as to be adjustable vertically upon the bolt *v*.

Upon the outer side of said frame, and between suitable guides upon the same, is placed the side plowshare *Q*, curved so as to cut inwardly on its bottom, and having a sharp colter edge to cut vertically, and adjustable vertically by means of a slot upon its body, in connection with the bolt *v*.

Upon the front end of the frame *D*, and upon one of the sides of the same, and within suitable guides upon the same, is placed the colter *R*, of the form shown in figs. 5 and 6, adjustable vertically through a slot upon its body; by means of a screw-bolt, *h*.

In like manner, the trimming-wheel *S*, pivoted upon a proper slotted arm, is secured to the opposite side of the frame *D*, and adjusted upon the same screw-bolt *h*.

All the various parts of this machine are constructed of suitable metal, except the tongue and the standard to the driver's seat, which may be made of wood.

The operation of this machine, and of its several parts, is as follows:

Having attached to it a proper team, and the excavator raised so as to bring its cutting-edge within the channel of the excavating-wheel, and entirely above the ground, and the rear colter and plowshare raised in like manner, it may be drawn afield, the excavation-wheel rotating and serving, to some extent, as a traction-wheel.

The flanges of this excavation-wheel will not, by their cutting into the ground, materially increase the draft upon an ordinary dirt road, and will be found in the field to assist greatly in turning the machine, acting as a pivot in that movement.

When the machine is upon the line of the ditch desired, the driver sets the excavator to the cutting depth desired, by pushing from him the lever *O*, and locking it in place in the rack *y*, the movement of which lever operates the excavator upon its pivot and raises or depresses it.

In the rotation of the excavation-wheel, its flanges will cut into sand or soft earth their entire depth, compressing the same somewhat in the operation, thus making two nearly parallel vertical cuts directly in front of the excavator, which, following, raises a belt of earth of the interior lateral dimensions of the channel, in said excavation-wheel, and of a depth equal to the distance between the outside of the rim of said wheel and the inside of the shield.

The ears *r*, upon the inside of the flanges, being wedge-shaped at their bottoms, enter easily into the earth, and being flat at their tops, and curved at their fronts, retain and hold in place the belt of earth as it is raised by the excavator.

In the further rotation of the wheel, this belt of earth thus raised, maintaining its form substantially, is carried around said wheel, until its front enters upon the spout *I*, over which it passes, and is discharged upon the ground on one side, and at a suitable distance from the ditch.

The traction-wheels, meanwhile, being far apart, one on each side of the ditch, entirely avoid the same and the earth thrown out in excavation.

It will be found necessary in the excavation of sand to take a more shallow cut, and to adjust the shield quite closely to the mouth of the channel L, so as to keep the sand, as it were, boxed up during its transfer from the ditch to the spout; but in working in clay, the shield may be removed a considerable distance from the wheel, and the excavator set to a corresponding depth.

In the excavation of sand, neither the colter P nor the plowshare Q should be used, and they may be raised out of the way.

In working in clay, with a deep cut, it will be necessary to use the colter P, which cuts down and trims off one side of the ditch a little, so that the excavation-wheel will not bind nor jam in its revolution, and it also takes a little deeper cut than the flanges of said wheel, and causes the belt of earth, before spoken of to be more easily raised.

In working in gravel or very hard earth, it will be necessary to use the plowshare Q, which cuts into and loosens the earth to a point below the excavator and below the flanges, and at the same time trims out one side of the ditch, so that the wheel may not bind within it.

The distance of the shield from the wheel is regulated by means of the standard *t*, and the serrations in the offset plate *x* and the corresponding serrations upon the insides of the frame M.

It has been an objectionable feature in ditching-machines that the cut has been of a depth uniformly corresponding to the surface of the ground, so that the bottom of the ditch would be too deep and too shallow in places.

In my invention, the adjustability of the excavator being within the constant control of the driver, he may instantly, by means of the lever O, close at hand, make deep or shallow cuts where needed, or, when necessary, no cut at all.

The excavating-wheel having an automatic vertical adjustability, sinks by its own weight to the bottom of the cut, as the work progresses, and performs its work in the same way without regard to the vertical position of the traction-wheels.

This vertical adjustability is effected by the way in which the wheel is pivoted within the frame D, and within the yokes *a*, C, and E.

A further advantage is found in the method employed in pivoting the main shaft of the traction-wheels, through the yoke *a*, upon the standard *f*, in the fact that said traction-wheels, instead of being drawn, as is usual, are impelled forward by the pressure of said standard upon said yoke, and through said yoke upon said shaft, whereby, as the excavation-wheel sinks into its cut, and the forward end of said yoke is raised above the horizontal plane of its rear end, the weight of the traction-wheels and connections is thrown more and more upon said standard and less upon the ground. The excavation-wheel being at the same time drawn downward to some extent by the traction, and pressed downward by the upward inclination of the forward end of said yoke, is pressed into the ground with a force much greater than would be derived from its gravity alone.

In this way, the increasing pressure of the excavation-wheel as it descends into its cut, is continually counterbalanced by the lessening weight upon the traction-wheels.

In the operation of ditching, it is of great importance to keep the line of draft upon a nearly horizontal plane, and to this end there is a variable adjustability of the tongue, so that it may be kept in the proper plane, however deep the cutting may be.

This is effected by the adjustability of the clevis within the wing *j*, upon the front end of the frame D, and also by the adjustability of the tongue itself

by means of its wings *n*, by the action of either of which a considerable variation may be made in the plane of the draft, and, by the joint action of both, all the variation required for the deepest cut may be made.

In meeting a stone or other rigid obstacle in ditching, the tongue being pivoted loosely in the clevis, the inclination of the frame D and excavating-wheel is to pitch or incline forward, so as to raise the back part of said wheel, and allow the excavator to escape injury.

To effect this result is the purpose of the detachable pin through the wings *n*, below the clevis, which prevents the front of the machine from rising, but offers no impediment to its sinking.

After a ditch has been sunk the desired depth, it is usual to trim out one or both sides of the top, making the ditch wider in that part for the convenience of those who lay the drains, who otherwise, in ditches of ordinary depth and width, would be unable to do their work conveniently, or even effectively.

To perform this work, I make use of the colter R, which begins its work in paring or trimming off one side of the ditch, when it has been sunk about half of its entire depth.

This colter, however, I confine to clay, sand, and such earth as is easily affected by a cutting edge.

Where the ground is very hard or gravelly, the trimming-wheel S should be used, whose operation in such places will be found more effective and a much less hindrance to the draft.

The principal merits of my machine may be found in the simplicity and effectiveness by which the cutting, raising, and discharging of the earth are accomplished, in the readiness with which the devices for these objects may be adjusted, in the great strength and comparative lightness of the whole apparatus, and in the ease with which it can be drawn and operated while performing its work.

Having thus fully set forth the nature, method of operation, and merits of my machine,

What I claim as my invention therein is—

1. The excavator-wheel G, provided with flanges K, with the channel L, with the ears *r*, constructed substantially as described and shown, and arranged to operate as and for the purpose set forth.

2. The pivoted excavator N, provided with the lever O, constructed substantially as described and shown, and arranged to operate as and for the purpose set forth.

3. In combination with the excavator N, the adjustable plowshare Q, constructed substantially as described and shown, and arranged to operate as and for the purpose set forth.

4. In combination with the excavator N, the adjustable colter R, constructed substantially as described and shown, and arranged to operate as and for the purpose set forth.

5. The frame M, provided with the shield *s* and rib *w*, constructed substantially as described and shown, and arranged to operate as and for the purpose set forth.

6. In combination with the frame M, provided with the shield *s* and rib *w*, the slotted stud *t*, in connection with a suitable bolt, and the corresponding serrations of the offset plate *x*, and of the sides of the frame M, constructed as described, and arranged as and for the purpose set forth.

7. The combination of the excavator-wheel G and the adjustable frame M, provided with the flanges K, channel L, and ears *r*, constructed substantially as described and shown, and arranged as and for the purpose set forth.

8. The arrangement of the adjustable trimming-wheel S, rotating upon a proper slotted standard,

constructed substantially as described and shown, and as and for the purposes set forth.

9. The arrangement of the adjustable trimming-coltter P, constructed substantially as described and shown, and as and for the purposes set forth.

10. The combination of the excavator N with the trimming-wheel S, when constructed and arranged to operate as and for the purpose set forth.

11. The combination of the excavator N with the trimming-coltter P, when constructed as described, and arranged to operate as and for the purpose set forth.

12. The arrangement of the axle A, the yoke a, and the standard f, when constructed substantially as described and shown, and as and for the purposes set forth.

13. The combination of the excavator-wheel G, the shaft e, the frame D, and the yokes E and F, when

constructed as described and shown, and arranged to operate as and for the purposes set forth.

14. The arrangement of the traction-wheels B, the axle A, the yokes a and C, and the braces b, c, and d, when constructed as described, and as and for the purpose set forth.

15. The devices by which the draft is adjusted, consisting of the wings j and n, provided with holes about their rims, the bolts k and o, the clevis H, the straps m, and a proper tongue, J, when constructed and arranged as described and shown.

In testimony that I claim the foregoing, I have hereunto set my hand this 23d day of May, 1870.

JOSEPH A. PARSONS.

Witnesses:

JOHN G. WHITE,

R. E. MIX.