M. NEWMAN, 2d.

MACHINE FOR EXCAVATING.

No. 7,787. Patented Nov. 19, 1850.

Fig. 2

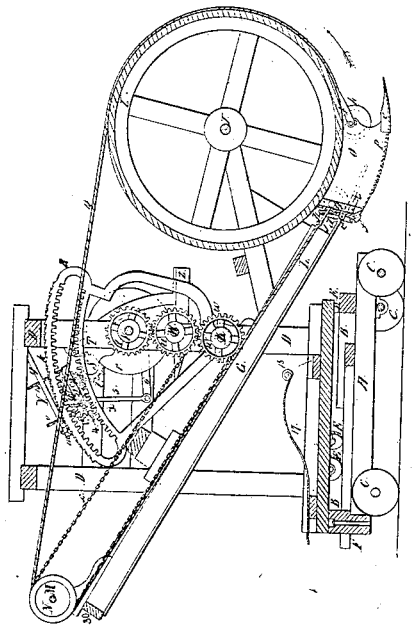


Fig. 4

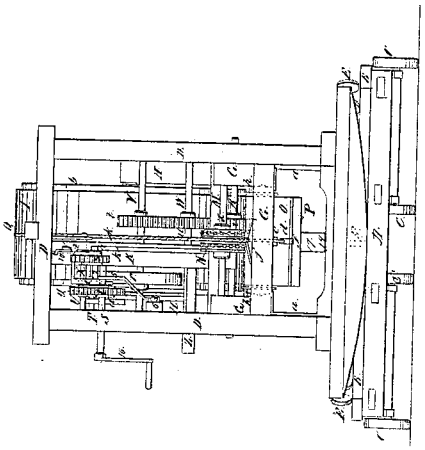


Fig. 1

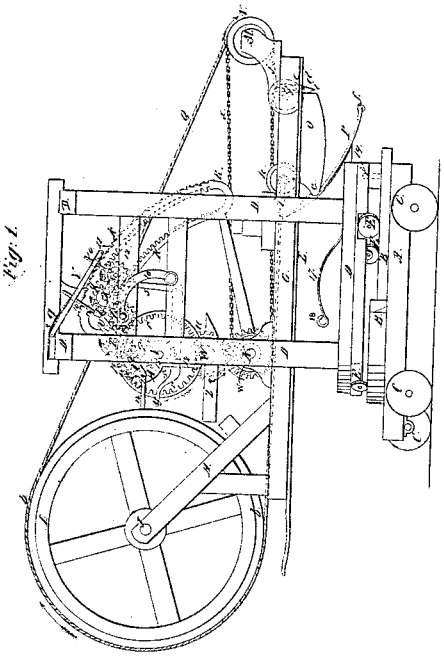
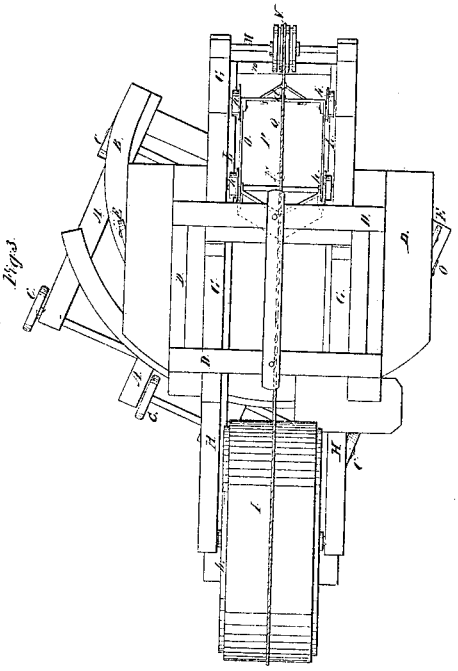


Fig. 3



UNITED STATES PATENT OFFICE.

M. NEWMAN, 2D, OF LANESBORO, PENNSYLVANIA.

EXCAVATING-MACHINE.

Specification of Letters Patent No. 7,787, dated November 19, 1850.

To all whom it may concern:

Be it known that I, MARTIN NEWMAN, 2d, of Lanesboro, in the county of Susquehanna and State of Pennsylvania, have invented certain new and useful Improvements in Machinery for Excavating Earth, &c.; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1, is a side elevation. Fig. 2, is a longitudinal vertical section through the center looking from the side opposite Fig. 1. Fig. 3, is a plan showing the principal parts. Fig. 4, is a back view.

Similar letters of reference indicate corresponding parts in each of the several figures.

The nature of my invention consists, in a rotating cylinder or drum hung in suitable frame work so constructed that it can be elevated or depressed, or moved in either direction sideways. The cylinder is driven in either direction by a band or chain from a pulley actuated by suitable mechanism; attached to the band or chain is the bucket or scoop which digs out and carries away the earth. This is provided with wheels and while it is not upon the drum runs upon a railway on the frame, but when it comes in contact with the drum it has a motion in a circular direction and at that time it is intended to perform its operation, being returned along the railway when full by reversing the motion of the band or chain until it reaches the back of the frame when the bottom is caused to fall or open and discharge the dirt.

To enable others skilled in the art to make and use my invention I will describe more fully its construction and operation.

A, A, represent a carriage or truck constructed of strong longitudinal and transverse timbers carrying rails or trams B, B; it is mounted upon wheels C, C.

D, D, D, is a frame consisting of a platform or bed and vertical posts held together by transverse timbers, it is mounted upon wheels E, E, which run on the trams B, B; it is secured to the truck by a king bolt or pin F, upon which it may be turned easily in either direction, (the trams B. B, forming parts of circles concentric to the axis of the pin F,). Stops may be placed upon the trams to prevent the frame D, D, D, swinging beyond the ends of the trams and being thrown off the truck (in Fig. 3, the frame is represented as being swung as far as possible to the left hand side of the frame).

G, G, is a frame constructed of two longitudinal timbers held together by cross pieces; at its front end it carries diagonal arms H, H; it is hung upon a shaft or axle K, running through the front uprights of the frame D, D, D, and its front end is capable of being lowered to any required position in the manner shown in Fig. 2, which will be hereinafter described; when it is horizontal the back end rests on projections *a*, *a*, within the back uprights of the frame D, D, D, (see in Fig. 4). Iron rails L, L, are secured on the under side of the longitudinal timbers of the frame G, G, and project a short distance beyond the front end of it; their edges also project beyond the inner sides of the said timbers and form a railway for the bucket or scoop to run upon.

I is a large cylinder or drum which is constructed of wood, its shaft or axis J, is hung in bearings in the arms H, H; it has a recess *b*, *b*, all around each edge of its periphery.

M, is a shaft working in bearings on the back end of the frame G; it carries the pulley N which has a recess turned on its periphery for bands or chains.

O, is the bucket or scoop which consists of a square box of sheet iron open in front and having its upper side edges cut out to fit the periphery of the cylinder or drum I; its bottom or trap P, is also of curved form and is suspended by pivots or hinges *c*, *c*, fitting in bearings in the front part of the box; the front part of the bottom or trap projecting in front of the box is steeled or is made of cast iron chilled, and is formed in a suitable manner to dig into the earth; a small lever *d*, is attached by a fulcrum joint *e*, to the back part of the box; the lower end of this lever has a tongue *i*, which fits into a notch of corresponding form in a block of metal *f*, attached to the back edge of the bottom or trap P; the upper end of the lever *d* has a spring *g*, attached between it and the box, which throws it back and keeps the tongue *i*, tight in the notch in the bottom (when shut as represented in Fig. 2); the bucket or scoop O, is provided with four flanged wheels *h*, *h*, mounted on suitable axes fixed to its sides; these wheels run on the rails L, L, and support it when it is not in contact with the cylinder or drum I.

Q, is a band passing around the drum or cylinder I, and around the pulley N. One end of this band is secured to a link or yoke *j* attached to the front end of the bucket and the other to another link or yoke attached to the back end of the bucket.

R is a toothed sector having its arc described from the axis K, it is firmly secured to the frame G, G′, its arc is slotted and both the top and bottom of the slot are provided with teeth or cogs; the outside of the arc is also provided with a double ratchet *k*, *k*, the teeth of the ratchets being inclined in opposite directions.

S, is the main driving shaft which is hung in suitable bearings on the frame D, D, D, and may receive motion from a steam engine carried on the platform or by any other convenient means; it carries a small toothed pinion *l*.

T, is a shaft hung in bearings on the frame D, D, D, and carrying a toothed pinion *m*, gearing into *l*, (as shown by dotted lines in Figs. 1, and 2;) upon this shaft is also mounted a lever frame U, having a handle *n*, the shaft forming the fulcrum (see Fig. 7); this frame or lever carries a spindle *o*, hung in suitable bearings and having the toothed pinions *p* and *q* fast upon it the larger pinions *p* being of equal diameter with the pinion *m*, and always in gear with it.

V, is a shaft running entirely across the frame D, D, D and fitting in bearings in it; it carries the wheel *r*, having teeth within its periphery, and the toothed wheel *s*, which is placed within the wheel *r*, and has its teeth opposite those of the said wheel, the small pinion *q* before mentioned is also within the wheel and by raising or lowering the handle *n*, may be brought to gear either with the wheel *r*, or with that *s;* the shaft V also carries another toothed wheel *t*, (see Figs. 2 and 4).

W, is a shaft fitting in bearings in the frame D, D, D, it carries a toothed wheel *u*, equal in diameter to the wheel *t* and gearing with it.

v, is a toothed wheel, equal in size to *t* and *u*, with the latter of which it gears, it runs loosely on the shaft K, and has a chain pulley *w*, secured fast to it.

x is a chain running on the pulleys *w* and N, it transmits motion to the pulley N, and that (by means of the band Q,) gives motion to the drum or cylinder I, and to the bucket or scoop O.

X, is a shaft hung in bearings in the frame D, D, D; it carries a toothed pinion *y*, gearing into the pinion *l* and another toothed pinion *z*, of equal size; upon this shaft is hung a double lever frame 1, the shaft forming the fulcrum, this lever or frame carries a spindle 2, on which toothed pinions 3 and 4, are firmly secured (see Fig. 2) the larger pinion 3 gearing into the pinion Z, on the shaft X, and the smaller one 4, being within the slot in the toothed sector and between the two toothed arcs, a rod 5, is attached by a pin to the lever or frame 1, and also to the end of a lever 6, having its fulcrum in the frame, and its other end provided with a handle (7), close to the handle *n*.

Y, is a bar hung upon a pin, 8, attached to the upper part of the frame; a spring 9 is also secured to the frame in such a manner as to bear upon and press down the bar Y; 10, 10, are two screws passing through female screws in the bar Y, and bearing one upon each end of the lever frame 1, these screws are so adjusted that they keep the lever frame in such a position on the shaft X, as to hold the small toothed wheel 4, out of gear with both the toothed arcs of the sector; 11, 11, are pawls hung on pivots on the end of the bar Y, taking into the ratchet *k*, *k*, to hold the sector in any position and steady the frame G, G, the pawls are kept in their places by springs.

Z, is a platform or stage, upon which the attendant who controls the operation of the machine by means of the handles *n*, and 7, stands.

12, (see Fig. 1,) is a standard secured to the above described platform having holes 13, 14, 15, in which a fixed stud on the side of the handle *n* is inserted, to hold the gearing in proper position for moving the bucket or scoop forward or backward, or for stopping it.

A crank 16, is shown on the driving shaft S, for the purpose of rotating it.

17, is a curved spring having a friction roller 18 at its end, this is for closing the bottom or trap of the bucket or scoop.

19, is a spring or guard for the trap to fall upon when it opens.

The operation of this machinery is as follows. In Fig. 1, the bucket is represented as having emptied itself and now proceeding forward for another operation. The machinery is brought with the front of the cylinder close, or nearly close to the bank or earth to be excavated. The handle *n*, is raised with its fixed studs inserted in the highest hole (13,) on the standard 12, this brings the small pinion 9 (which is hung in the lever frame U,) in gear with the teeth of the wheel *r*. Rotary motion given to the driving shaft S, in the direction of the arrow shown near it in Fig. 1, will be communicated through the pinions *l*, *m*, *p*, and *q* to the wheel *r*, and shaft V; the wheel *t* on the shaft V, will through the wheel *u* and *v*, give motion to the chain pulley *w*, which through the chain *x*, will be transmitted to the pulley N, and thence by the band Q, to the cylinder or drum I, (the direction in which the several shafts and wheels rotate are indi-

cated by arrows in Fig. 1). As the bucket is drawn forward the bottom P will pass over the spring 17, and be raised until the catch or block *f*, reaches the tongue *i* on the end of the lever *d*, and throws it back, when it will be closed by the spring *g*. The bucket continues traveling forward (the motion being very gradual) and when it arrives at the drum or cylinder, the upper edges of the sides fit closely to the cylinder, the flanges of the wheels *h*, *h*, lying in the recess *b;* the bucket is then only open at its front or mouth and as the front or cutting edge cuts out the earth it will be received within it.

When the bucket is full the handle *n*, should be lowered so as to bring its fixed stud to the lowest hole 15, in the standard 12, this will bring the pinion, *q*, in gear with the wheel *s*, and reverse the motion of the shaft V, which through the intermediate gearing will reverse the motion of band Q, and cylinder I, bringing back the bucket (the wheel S, being smaller than that *r* will cause the bucket to be returned much faster than it went forward, and it will soon reach the back part of the frame G, G, the upper end of the lever *d*, will then strike the back rail 20, of the frame and the tongue on the lower end will be released from the catch *f*, the bottom or trap P, will then fall open and discharge the dirt. If the handle *n*, be lowered to bring its fixed stud into the hole 15, on the standard 12, the bucket will again proceed forward, in the manner already described, for another operation. If it is required to stop the machinery the handle *n*, should have its stud inserted in the middle hole 14, of the standard 12, when the pinion *q*, will be out of gear with the wheels *r* and *s*, and the driving shaft may continue rotating without moving the shaft V. If it is required to raise or lower the cylinder or drum I, to cut higher or lower the handle 7 must be depressed or elevated. In Fig. 2, in the drawing the cylinder is shown depressed (this is effected) in the following manner. By raising the handle 7 of the lever 6, the rod 5, will draw down the back end of the lever frame and bring the small pinion 4, into gear with the teeth on the side of the slotted arc nearest its axis, at the same time raising the forward end of the lever frame; the screw 10 which rests on the forward end of the frame will be raised, and will lift the lever Y, releasing the pawls 11, 11, from the ratchets *k*, *k;* motion is communicated to the small pinion 4 by means of the pinions *l*, *y*, *z*, and the pinion 3, on the same shaft with it, the teeth of the said pinion 4, gearing into the arc R, will cause it to be moved in such a direction as to throw the forward end of the frame G, G, carrying the cylinder or drum; as soon as the lever 6 is left free the pinion 4, is released from gear with the arc, and the screws 10, 10, bearing on the ends of the lever frame hold it steady, the pawls 11, 11, fall into the double ratchet and hold the frame G, G, stationary. When it is required to raise the cylinder or drum, the handle 7, of the lever 6, should be pressed down to bring the pinion 4, in gear with the row of teeth farthest from the center K. The frame D, D, D, may be made to turn upon the king bolt or pin F, by means of gearing worked from the main shaft, so that the cylinder may be turned to work either to the right or left hand of the carriage A, A, on which it is supported. The axles of the wheels C, C, on which the carriage or truck rests may receive motion from the main shaft, and the whole machine may be moved by the steam engine or other motive power employed to work the machinery.

The bucket being operated in the manner described, admits of this excavator being used in many situations where an excavator having a bucket or chain of buckets receiving a continuous revolution could not be employed with equal advantage, as in excavating solid earth not more than one bucket can operate effectually in the same line, and it would very frequently happen that the bucket would be operating in such a position that when full it would be nearer to return it backward to the point where it was to be dumped, than to carry it entirely over the drum by the continuous motion of the band or chain, and consequently a saving in time would be effected.

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

1. Operating the bucket O, by giving motion to the band or chain Q, and to the drum I, in one direction to fill the bucket, and then reversing its motion so as to draw back the bucket to be emptied, in the manner substantially as herein described.

2. I claim the manner substantially as herein described of closing the bottom or trap P, of the bucket by means of the spring or incline 17, over which it passes in its forward passage.

MARTIN NEWMAN 2D.

Witnesses:

BENJAMIN COMFORT.

SILAS SQUIRES.