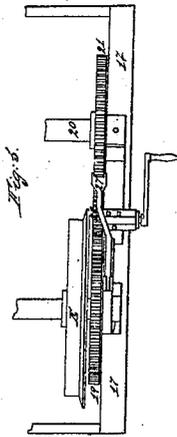
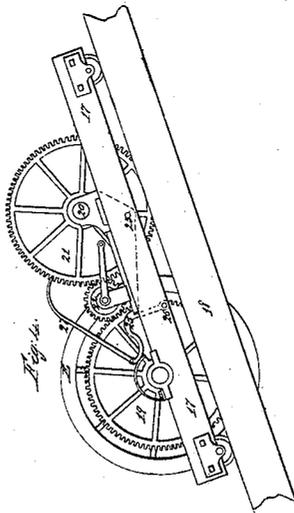
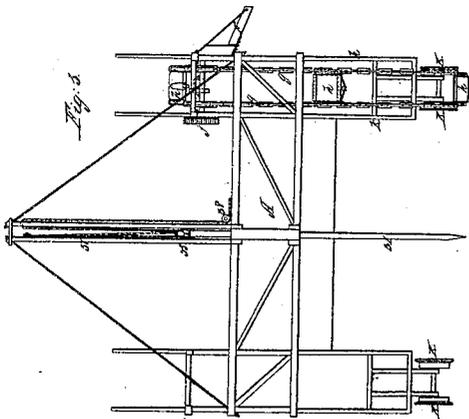
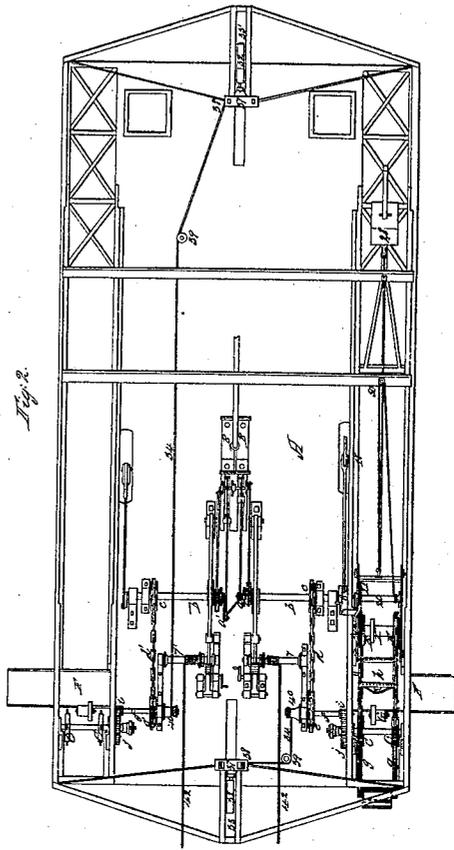
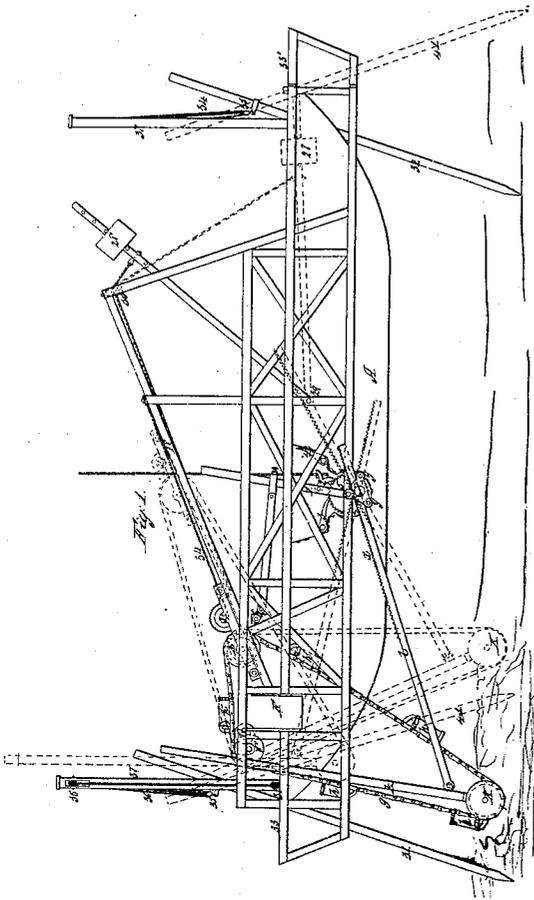


D. S. HOWARD.  
DREDGING MACHINE.

No. 12,201.

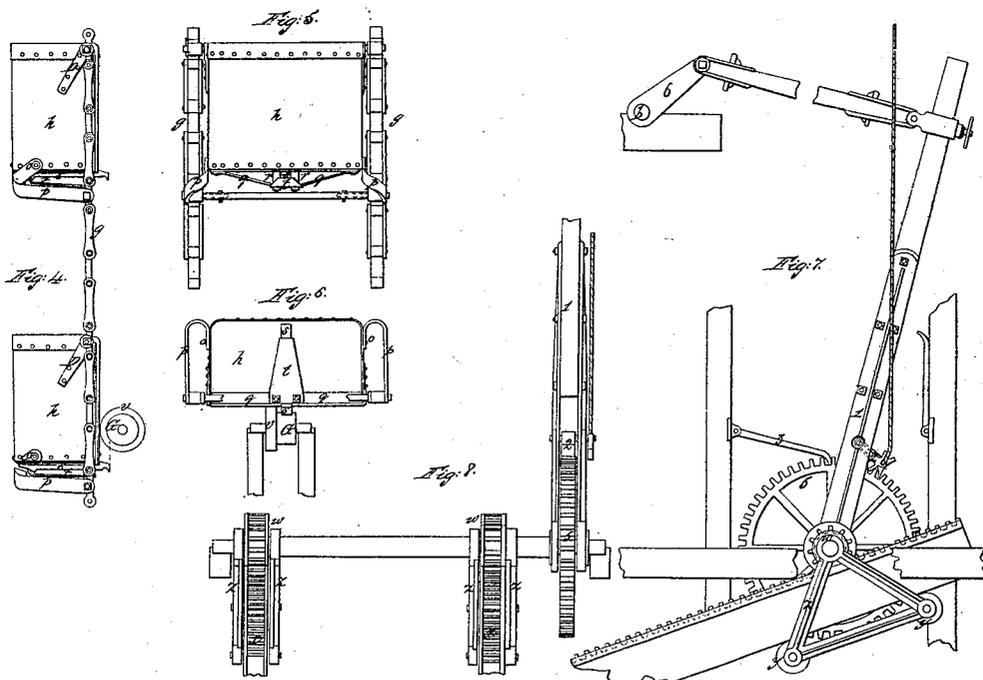
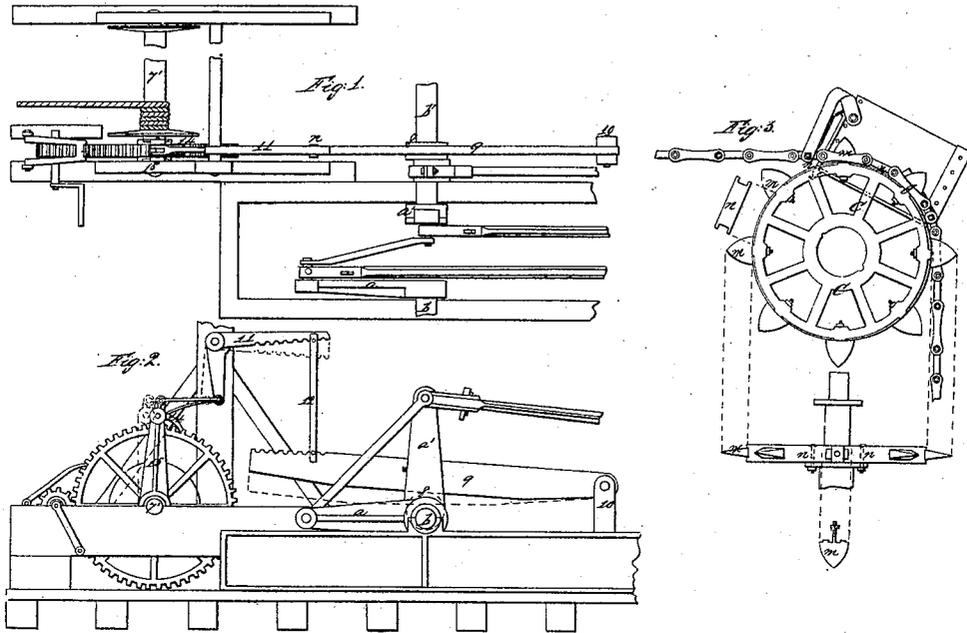
Patented Jan. 9, 1855.



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DREDGING MACHINE.

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# UNITED STATES PATENT OFFICE.

DEAN S. HOWARD, OF LYONSDALE, NEW YORK.

## IMPROVEMENT IN DREDGING-MACHINES.

Specification forming part of Letters Patent No. 12,201, dated January 9, 1855.

*To all whom it may concern:*

Be it known that I, DEAN S. HOWARD, of Lyonsdale, in the county of Lewis and State of New York, have invented certain new and useful Improvements in Dredging Machinery; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings through letters of reference marked thereon, and in which—

On Plate 1, Figure 1 represents a side elevation of the barge with the machinery attached thereto. Fig. 2 is a plan of the deck of the barge, showing the steam-engine and machinery on deck and the elevating machinery on one side of the barge, the framing only being shown on the other side. Fig. 3 is an end elevation of the same, the elevating-buckets and endless chains being represented on one side only. Fig. 4 is a side elevation of the car that carries the upper flange-wheels, with the wheel and axle-motion for raising it up the inclined ways detached and on an enlarged scale. Fig. 5 is a plan of the gearing of the same. Plate 2, Fig. 1 is a plan of the main feeding-works on deck. Fig. 2 is a side elevation of the same. Fig. 3 is a side view of the cam or chain wheels, also showing a bucket attached to the chain passing round it, with a plan or edge view of the same. Fig. 4 is a side view of two buckets, showing the manner of attaching them to the chain. Fig. 5 is a back view of the bucket. Fig. 6 is a plan of the bottom of the same. Fig. 7 is a side elevation of the side feeding-works. Fig. 8 is an end elevation of the same. All the figures on Plate 2 are on an enlarged scale.

The same letters of reference occurring in different figures indicate corresponding parts.

My invention has reference more particularly to that class of dredging-machines suited to the improvement of rivers and harbors and the excavation of channels through low lands.

About the center of the barge A, above or below deck, as may be most convenient, I erect a double-cylinder steam-engine B, which gives motion through its cranks *a a'*, at right angles to each other. To the main shaft *b b'* on this main shaft are cam or chain wheels *c c'*, which communicate their motion through the jointed endless chains *d d'* to other cam-wheels *e e'* on the pinion-shafts *f f'*.

C are cam-wheels working in the endless chains *g g*, to which the buckets *h* are attached and by which they are propelled. These cam-wheels are driven through the wheel *j* on the same shaft by the pinion *i* on the shaft *f*, either of which may be fitted to revolve on its shaft and be held by a feathered or sliding clutch when the buckets are to be put in motion. Thus they can be stopped or started at pleasure without affecting any other part of the machinery. These endless chains to which the buckets *h* are attached are further supported by passing over the upper flange-wheels E, which, with the cam-wheels C, keep them in a horizontal position, while the buckets discharge their contents into the spout F through doors which form the entire underside of the bucket. These doors are unlatched by passing over the latch-wheel G, the latch coming in contact therewith. The buckets, after discharging their contents, successively pass over the upper flange-wheels E, on the shaft of which and between them is situated a loose wheel I, which bears up and latches the doors as they pass around it. They then pass down under the lower flange-wheels K, which are hung and revolve at the lower end of the upright ways *l*, which, together with the feeding-ways *l*, hold the buckets to their work at the bottom of the water, where, in passing round, they scoop up their fill of mud, sand, &c., and pass up over the cam-wheels C again and discharge, as before described.

The cam or chain wheel C, as well as those marked *c* and *c'*, are cased on their periphery with steel plates or segments *n*, as shown more clearly in Plate 2, Fig. 3. These segments are held in their place by the cams *m*, which are cast separate from the wheel, on or around a wrought-iron screw-bolt in their center, which, when in place in the wheel, points radially to its center, so that the cams when they become worn on one side may be turned round the other way or replaced with new ones in case of fracture or their being entirely worn out on both sides. The periphery of the wheel being cased with steel and the cams renewable, the wheel is rendered much more durable and less expensive to repair than if cast in one entire piece, as heretofore. These cams are cast with projections and depressions on their under side, corresponding with others on the periphery of the wheel, which preserve their position under

heavy strain and serve as a fastening to the segments *n*, which, it will be seen, are held down by the cams biting on their end at the center of their width and sidewise by their ends spanning the projection on the under side of the cams.

The buckets *h* are constructed with their entire flat or inner side hinged at the mouth end of the bucket and latched at the bottom, so that the contents may be discharged freely by the opening of this door as the bucket passes over the spout *F*. The same bolt which secures the upper end of the bucket to the endless chains *g* by passing through the links between the joints thereof and through the ears *D* of the bucket also forms the hinge-pin of the door, while the lower end of the bucket is fastened to the chains by links or clay-cutters *p*, as the case may require, one end of which is bolted to the lower end of the bucket near its front, as shown at *o*, Figs. 4 and 6, Plate 2, one on either side of the bucket, and the other end is bolted to the links of the chain between the joints, by which arrangement the chain is allowed to conform to the curve of the wheels in passing round them while the bucket is suspended between them, and the buckets can readily be detached from the chains in case of injury and others substituted with very little delay. The bottom of the bucket is constructed with a truss-bar *q*, Plate 2, Figs. 5 and 6, across it from side to side and near the edge at which the door opens, which stiffens said edge by having pillar-braces *r*, attaching it thereto. These pillar-braces also act as guides to the latch *s*, which is secured to the bucket at its other end by a lip entering an aperture of corresponding size in the bottom of the bucket and is held to its place by a spring *t*, bearing on it between its fulcrum and catch. The root of this spring is fast to the truss *q* or is held by the bolts of the pillar-braces *r*. It is cut out of sheet-steel, and its strength is equalized by increasing its width, instead of its thickness, toward the root or fast end, thus saving the expense of forging, is simpler of construction, and less liable to get out of place. When the bucket has passed over the cam-wheels *C* and is over the discharge-spout *F*, the end of the latch *s* comes in contact with the latch wheel or roller *G*, which releases it from its hold on the door of the bucket, which, as it passes on and gets clear of the larger roller *v* on the same shaft, falls and discharges the contents of the buckets, as before described. The links *p*, by which the lower ends of the buckets are attached to the chains, are curved outward from the buckets on either side and then continue parallel with the side of the bucket to their junction with the chain, as represented in Figs. 4, 5, and 6, Plate 2, and serve to cut a way through clay or any substance that will not cave in to form a free passage for the chains, thus saving much wear on them.

The lower end of the ways *k*, which bear

the lower flange-wheels *K*, are fed up to their work through the feeding-ways *l*, which are operated by pinions *w*, gearing into racks *x* at their rear ends. These racks are supported and held in gear with said pinions by friction-rollers *y*, suspended between two triangular hangers *z*, having their center of suspension on the axis of the pinions. These pinions are operated by a lever *1*, having its center of motion on the axle of the pinions and pawls 2, 3, and 4, taking into a ratchet-wheel 5 on the same shaft and inside of the barge. Motion is communicated to this lever by a crank 6, which can be thrown in or out of gear with the main shaft *b* at its end. When it is desired to draw the feeding-ways back or up, the pawl 3 is raised out of the ratchet-wheel, the pawl 2 on the lever thrown over to the opposite side, and the pawl 4 lowered into gear; when the action of the pinions on the racks will be reversed. This manner of feeding is only intended to be used when the nature and situation of the work and other circumstances render it inconvenient to draw the machine ahead by means of other feeding-works on deck, which will next be described.

The method adopted by me ordinarily for working the machine ahead is by casting an anchor at some convenient distance when no land, fastening can be obtained to attach a block to through which a rope or cable may render freely while the ends are winding on the axles 7 7', which are operated by two distinct apparatus, so that they may both take up at the same time or either one separately, in order to move the machine faster or slower, as the case will admit. The mode of operating this winlass is as follows: On the main shaft *b*, Plate 1, Fig. 2, and Plate 2, Figs. 1 and 2, outside of the pillow-block, near the crank, is an eccentric 8, on which rests a lever 9, having its fulcrum a short distance in rear of the main shaft at 10. As the main shaft revolves this lever will receive a rising and falling motion from the eccentric on which it rests, which motion is communicated to the elbow-lever 11 through the upright 12, which rests in a notch on the lever 9 and supports the horizontal arm of the lever 11. A series of notches are made along each of these levers for the insertion of this upright at varying distances from their centers of motion, whereby to regulate the extent of motion given to the elbow-lever. It will thus be perceived that a vibrating motion is given to the vertical arm of the elbow-lever 11, which is conveyed through the connecting-rod 13 to the pawl 14. The pawl 14 is hung between vibrating arms 15, one on each side of the ratchet-wheel 16 and having their center of motion on the axle of said ratchet-wheel. This pawl moves on its own center between the vibrating arms 15. In receding for another hold upon the wheel the power applied through the vibrating arm of the elbow-lever 11 has a tendency to lessen the pressure of

the pawl on the cogs of the ratchet-wheel by bearing it back on its own center and thus raising the end that takes into the wheel. While in its progressive motion the pawl is held firm to its work, thereby avoiding friction and wear in receding and the possibility of a slip in advancing.

The buckets are raised into a position convenient for the transportation of the machine from place to place by means of a pulley-purchase combined with the wheel and axle fixed upon the car 17, as will be more clearly seen by reference to Figs. 4 and 5 in Plate 1. This car carries the upper flange-wheels E, over which the buckets and chains work, up an inclined plane 18, Fig. 1, Plate 1. On the same shaft with and outside of one of these flange-wheels is a spur-wheel 19, and parallel to this shaft is an axle 20, on one end of which and in line with the spur-wheel 19 is another spur-wheel 21, of similar diameter. This spur-wheel has a pinion 22 gearing into it. The pillow-block of the pinion 22 and that of the spur-wheel 21 are so situated and arranged on the same foundation as to have a center of motion common to both, as seen at 23, Fig. 4, by which they may be thrown in or out of gear with the wheel 19 without affecting their relative positions toward each other. A rope or chain 24 is attached at one end to the car 17 and passes around a block or pulley at the end of the inclined ways 18, down again, and is made fast at the other end to the axle 20, so that when the pinion 22 is turned by a crank on its axis operated by hand the rope 24 is wound upon the axle 20, and consequently draws the car up the inclined plane as far as desired; or this may be accomplished by throwing the pinion into gear with the wheel 19 when in motion, which motion will then be communicated to the axle 20 and the rope wound up, drawing the car up the inclined ways, as before described, by the motive power of the machine instead of hand-power. There is also a catch 25, which holds onto the foundation of the pillow-block of the pinion 22 to retain it in gear with the wheel 19. Its center of motion is seen at 26, Fig. 4, Plate 1, and to this catch is attached a pawl 27, which takes into the wheel 21 to prevent the axle from turning back, and which, in case of backward motion of the machinery, either by accident or otherwise, presses upon the catch 25 and liberates the pinion 22 from its confinement in gear with the wheel 19 and throws it out, thereby preventing the consequences of a conflict between the opposing power of the pawl and the backward motion of the machinery. I also attach a balance-weight 28 at or near the end of an arm working on a center at 29, Plate 1, Fig. 1, with a rope or chain over the pulley 30, attaching it to the car 17, so situated as to increase the purchase as the car ascends, and the weight to be raised increases by being

raised out of the water, by which means, in combination with the wheel and axle and pulley-purchase before described, the endless chain and buckets are readily raised for the transportation of the machine.

The anchors 31 and 32 are so constructed and working in vertical longitudinal slots or framing in each end of the barge as to admit of moving the machine about fifteen feet (more or less) in a longitudinal direction, and at the same time to prevent any lateral movement, and are consequently used with great convenience and effect in a side wind or current. The anchors are raised by hand with levers 33 33', Plate 1, Fig. 1, working in a ratchet-rack on or attached to the anchor, said lever having a hinged fulcrum to accommodate the position of the lever to the movement of the anchor, or by the ropes 34, which are attached to thimbles in the blocks 35 and pass over the sheaves 36 in the upper part of the gallows-frame 37, thence down through the blocks 35 and up over other sheaves in the other side of the gallows-frames, thence down under the sheaves 38 at the deck and around the guide-sheaves 39 to the winding-heads 40 on the end of the pinion-shafts *f*, by which means they are raised by the motive power of the machine. When the anchors are first set, they are dropped in the position shown in Plate 1, Fig. 1. The machine is then worked ahead by the feeding-works on deck before described until the anchors assume the position shown by the dotted lines 41 in same figure. They are then raised and shifted to the opposite inclination again and dropped, as before.

Having thus fully described my improvements in dredging machinery, what I claim therein as new, and desire to secure by Letters Patent, is—

1. Constructing the bucket with a truss-bar across its bottom, which, in addition to stiffening the bottom of the bucket, serves as a guide to the latch and a fastening to the spring.

2. Fastening or attaching the latch to the bucket by a lip on the rear end of the latch entering an aperture of corresponding size in the bottom of the bucket, the latch being held in its place by a spring bearing on it at any point between the lip which forms its hinge or fulcrum and the catch.

3. Fastening the buckets to the chains by a bolt passing through the links of the chain between the joints and through the ears and hinges of the doors of the buckets at the upper end, and at the lower end by links or clay-cutters, as the case may require, one end of which is fastened to the buckets, one on either side, the other end being secured to the chain by a bolt passing through the links between the joints thereof, whereby the chains are allowed to conform to the curve of the wheel while the buckets are suspended between them without conforming to that curve, and

whereby the buckets may be readily disengaged from the chains when out of order and replaced with others.

4. The side or clay cutters, as and for the purposes herein described.

5. The manner of raising the buckets and chains into their rest position for transportation from place to place by the combination of the pulley-purchase with the wheel and axle when attached to a car that carries the upper flange-wheels over which the bucket-chains work, operated as herein described.

6. The self-acting pawl 27 and catch 25, in combination, as described, by which the pinion is thrown out of gear when the machinery from any cause is turned back.

7. The manner herein described of feeding by the feeding-ways *l*.

8. The manner of feeding or winding the vessel ahead by an eccentric on the main or any other revolving shaft operating the levers and pawls, in combination with the windlass, and the combination of the pawl 14 with

the vibrating arms 15, as herein described, whether in connection with the other parts of this feed apparatus or not.

9. The construction and arrangement of the anchors, as herein described, in combination with the winding-head 40 on the counter-shaft *f*, whereby the vessel may be worked ahead whether the elevating machinery is in operation or not or during the time that the feeding-ways *l* are being drawn back preparatory to taking a fresh cut.

10. The manner herein described of constructing the cam or chain wheels, the face-plates on the periphery of the wheel being of steel and the cams removable, so that they may be turned or renewed at pleasure.

In testimony whereof I have hereunto subscribed my name this 26th day of July, 1854.

D. S. HOWARD.

Witnesses:

J. W. PHILLIPS,  
LYMAN HOWARD.