Carmichael & Osgood.

Dredger.

No. 4,547. Patented May 30, 1846.

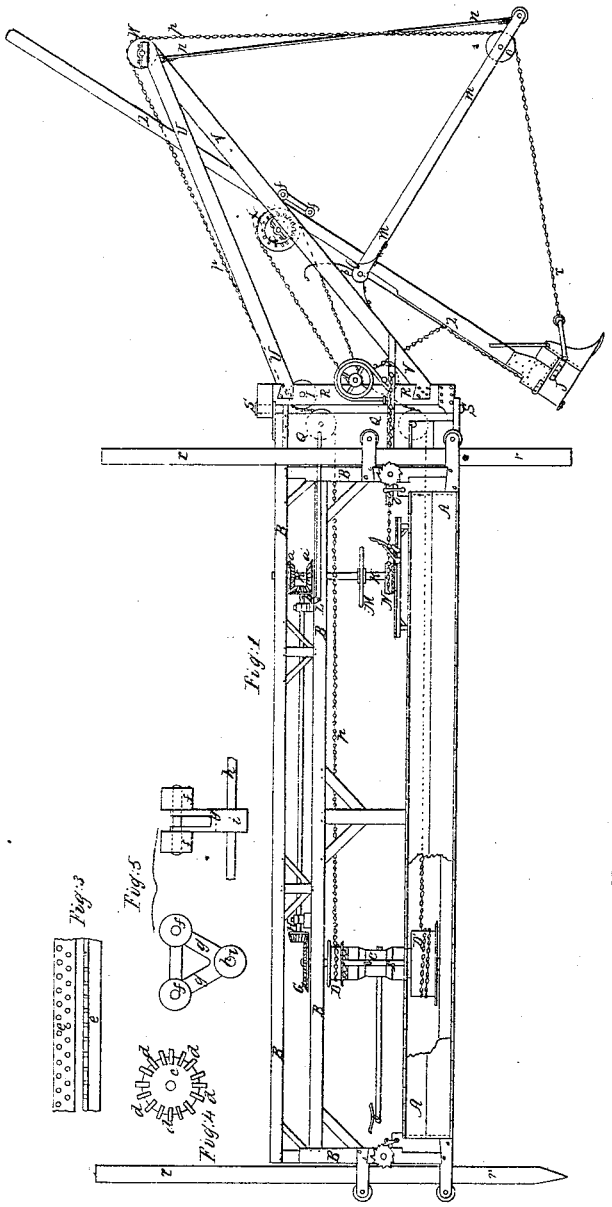

Fig. 1.

Fig. 3.

Fig. 5.

Fig. 4.

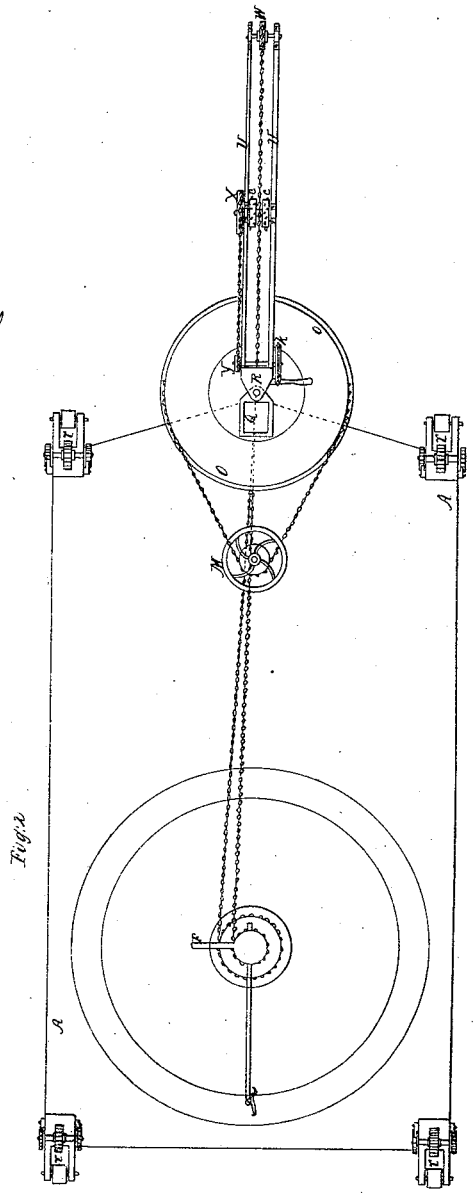

Fig. 2.

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UNITED STATES PATENT OFFICE.

DANIEL CARMICHAEL, OF BROOKLYN, AND JASON C. OSGOOD, OF CHITTENANGO, NEW YORK.

DREDGING-MACHINE.

Specification of Letters Patent No. 4,547, dated May 30, 1846.

To all whom it may concern:

Be it known that we, DANL. CARMICHAEL, of Brooklyn, in the county of Kings, and JASON C. OSGOOD, of Chittenango, in the county of Madison, State of New York, have invented certain new and useful improvements in the manner of constructing and working the machine for excavating and removing earth invented by Wm. S. Otis and patented by him on the 24th of February, 1839; and we do hereby declare that the following is a full and exact description thereof.

In most cases we intend to use the power of horses instead of that of steam, but either power may be used and we have, therefore, in the accompanying drawings shown an arrangement for the employment of steam. We have, also, represented the apparatus as being employed on board a boat for the purpose of deepening channels, or of excavating under water for any other purpose. It will be manifest, however, that it will be equally applicable to the digging of canals, and to other excavations on land.

In the accompanying drawings, Figure 1, represents a side view of a two-horse-power boat, designed to work in harbors, and other places where it is not exposed to heavy swells. Fig. 2, is a plan of the same machine.

Where the same letters are used, they designate like parts of the machine.

The principal objects that we have in view are the following: first, a convenient mode of substituting horse power for that of steam; secondly, the use of posts and hinges instead of the hollow mast of "Otis"; thirdly, an improvement in the manner of moving the scraper by means of a rack and pinion or spur wheel, and of plates fastened to the rear sides of the scraper shaft, or arm; which plates constitute racks, and are used instead of the chains and gearing of Otis; fourthly, in the employment of what we call an extension-bar, which causes the chains to draw the scraper directly into the earth.

A, A, represents a boat which we will suppose to be 50 feet long, 24 feet wide and 3 feet high to the floor; it is flat-bottomed and has perpendicular sides. To this is fastened a frame work of wood, B, B, B, for the purpose of supporting the machinery.

C, is the upright shaft, or first mover, to which the horses are hitched, as is usual in horse mills.

D, D′, are upper and lower drums, both of which are loose on said shaft. This shaft may be about 10 feet long and 18 inches in diameter, turned down at the ends to about 10 inches to receive the drums, through both of which it passes. In each end of the shaft square wing gudgeons are secured by bands, the shaft is then banded at its larger diameter. A groove is made on the side of the shaft to receive the sliding bar, E, which is about 4 by 5 inches, and nearly as long as the body of the shaft. This sliding bar has a mortise in it, near its center, to admit the lever, F, for raising it (E) into the ratchets on the under side of the upper or of dropping into those of the upper side of the lower drums, D, D′. This lever may move on a pin, or fulcrum, in the body of the shaft C. The ratchets are formed by fastening cast-iron plates, one on each drum, adapted to receive the ends of the sliding bar, E, and are for the purpose of making either drum fast to the shaft, as the desired motion of the scraper may require. A plate of iron, say one inch thick and 14 inches in diameter, should be made fast to the outer ends of the drums (one to each) and have holes through their centers of about 5 inches in diameter, for the passing of the gudgeons; these plates form the upper and the lower surfaces of the drums. Immediately above this plate (on the arbor) a journal is turned, and above the journal the arbor is made square to receive the bevel-wheel, G, which communicates motion to the crane. The bottom of the lower drum is made very much like the top of the upper one, but the arbor is made to fit in a step fastened to the bottom timbers of the boat, while the upper journal runs in boxes in the frame work, B, B. This apparatus constitutes the horse-power, and by the arrangement just described, the great object is attained of having the horses always moving in one direction, while the scraper and crane are caused to move in accordance with the will of the operator.

The bevel-wheel G, turns the bevel pinion and shaft, H, the farthest end of which has a pinion, *b*, on it, gearing into two other bevel-wheels *a*, *a*, on the upright shaft, K. This end of the shaft, H, is made to run in

boxes resting on one end of a lever, L, which by being raised, or lowered, while C, is in motion, causes the shaft, K, to turn to the right, or left, as the case may be; or if the pinion, *b*, is made to assume a middle position, it is thrown out of gear entirely.

M, is a fly to regulate the motion of the crane.

N, is a chain pulley by which, and the chain passing around it and fastened to the opposite side of a platform O, the crane to which the platform is attached, is made to turn. On the shaft, K, there should be a friction pulley, or brake, to check its motion.

Q, is the main, or king, post, which is bolted fast to the front end of the boat and frame, and is beveled on its front edge, as is also the back edge of the post, R, so that when the crane revolves on its hinges, S, S, it may move through 180° of a circle, without interfering with the king post. The crane post, R, is hung to the king post by stout hinges, or pintles, and by them the two are kept about 6 inches apart at their beveled edges, at all times, for the purpose of allowing the chain pulley, I, to revolve with the crane, and to clear the other pulleys, &c., and also to allow the chains to twist so as to conform themselves to the position of the crane, during its revolution.

The crane consists, principally, of the crane post, R, the two upper braces, U, U, and the two lower braces, V, V. These braces are each double, are thoroughly bolted together and secured by wooden cross braces between them. The respective parts of each are 12 inches apart, in order to admit the arms of the scraper to move freely between them.

The circular platform, O, is about eight feet in diameter, and, when horse-power is used, is secured to the lower part of the crane post just above the floor of the boat; it has a hole in its center sufficiently large to allow it to revolve clear of the king-post. The upper braces are about six inches thick, and are secured together at the outer end by a cross brace, just beyond which is a chain pulley, W. A shaft running in suitable boxes on the braces, V, V, of the crane is carried by a chain-wheel, X, on one of its ends at the outside of said braces; and between the braces, said shaft carries two pinion wheels, *c*, Figs. 2 and 4; these pinion-wheels we make by inserting strong iron, or steel, pins, *d*, *d*, into holes made in their peripheries for that purpose. These pins take into holes made in iron plates, *e*, *e*, Fig. 3, which plates are fixed on to the rear side of the scraper shaft Z, Z. Said pins and holes operate as racks and pinions, but are more permanent and effective than when the ordinary teeth are used.

Z, Z, is the scraper arm, which we make forty feet long; this has the scraper, J, attached to it at its lower end. The pinion-wheels, *c*, form the radius point on which the arm of the scraper turns; its fore side bears against two friction rollers, *f*, *f*, attached to a triangular piece, *g*, *g*, Fig. 5; the opening, *h*, on the angle, *i*, of the piece, receives, and turns loosely upon, the shaft of the pinions, *c;* the triangular piece, while it sustains the scraper shaft on its fore side, is thus allowed a free motion, obeying that of said shaft.

The situation of the pinions, *c*, that sustain the scraper shaft, or arm, on its rear side, is such as to allow the said arm to assume a horizontal position just above the roof of the boat, and, also, to allow the scraper to pass under the fore end of the boat, as shown in Fig. 1. The shaft of the pinion, *c*, we have made about two feet four inches in length and two inches in diameter, its boxes resting on the upper edges of the crane braces. We place two pinions, *c*, on this shaft, each six inches in diameter, and four and a half inches wide; these stand three inches apart, which space is occupied by the part *i*, of the triangular piece.

The chain pulley X, is three feet in diameter; this chain pulley is driven by a chain pulley, Y, Fig. 2, which may be eighteen inches in diameter; its shaft, *j*, has its bearing on the crane post, and on the platform, O, attached thereto. On the shaft, *j*, there is a hand-wheel, *k*, four feet in diameter, which is under the control of the crane-tender, who by turning it in one direction can raise the scraper up, and can lower it by moving it in the opposite direction. It is furnished, also, with a friction band for the purpose of checking and regulating the motion of the scraper downward, or of holding it at any required height. It is manifest that this instrument may be worked by means of wheels and pinions instead of by chain wheels and pulleys, but the latter are much to be preferred.

The scraper, J, is made of heavy boiler iron; it is three feet six inches long on the top; four feet six inches on the bottom, and about three feet six inches in diameter. The back of it consists of a door hung by hinges, and kept shut by a bolt and staple, in a manner well known. The scraper arm is double, or has a slot through it from front to back, for the greater part of its length; allowing the chain that extends over the pulley, W, to pass freely between its two cheeks. At its lower part, where it is attached to the scraper, it is, for the length of about ten feet, solid, and about one foot square; above this it is narrowed for the remaining thirty feet, to about eight inches wide; its two cheeks are about 4½ inches thick, leaving a space of about three inches between them; to the back edges of these are

attached, as before remarked, the perforated plates of iron, Fig. 3, that receive the teeth of the pinions. and constitute racks.

To the under sides of the crane braces, V, V, are hung by strong joints, at *l*, two bars of wood, *m*, *m*, which we call extension bars; these are united together near their outer ends, or the whole may be in one piece; a chain, or rope, *n*, *n*, connecting this bar with the outer end of the crane prevents its descending too low, and may be lengthened, or shortened, at pleasure. A sheave, or pulley, *o*, near the outer end of the extension bar receives the chain, *p*, *p*, which passes from the outer end of the crane to the scraper, and may be thereby made to pull in a direct line upon it, either in deep or in shallow water. The chain, *p*, *p*, it will be seen, extends from the upper drum, D, to the scraper; and when this chain is put in motion by the motive power used, it draws the scraper along the bottom of the place to be excavated, until it strikes the extension bar, when they are both raised together to the height of the pulley W; the bevel-wheel, *b*, is then thrown into gear with the wheel *a*, or *a'*, which causes the crane to turn to the right, or left, as may be required, in order to bring the scraper over the scow which is to receive the earth; the door constituting the back of the scraper is then opened, and its contents discharged. The crane is then swung back to its proper place by reversing the bevel-wheel, *b*; and it is made to descend by bringing the lower drum, D, into action; in its descent, the door at its back closes; the chain, *q*, *q*, on this drum draws the scraper back under the boat into the proper position for repeating the operation of excavating. The posts, *r*, *r*, at the corners of the boat, which are anchor posts, are raised, or lowered, by the ordinary rack and pinion movement, and are kept in place by pawls and ratchets.

When steam is substituted for hose power, the crane and its appendages remain unchanged in their general arrangement and operation; but instead of the vertical shaft, C, which operates on the respective drums and chains, a horizontal shaft, crossing the boat, is made to revolve by steam power, and the drums which carry the respective chains are clutched and unclutched by the engineer, at the proper time.

Fig. 6, is a side view of the apparatus when actuated by steam, and Fig. 7, a top view thereof. The platform O, O, under this arrangement, is placed at the upper end of the crane post. D, D', are the drums that correspond with those similarly marked in Figs. 1 and 2; *s*, *s*, are drums to which the chains, *t*, *t*, that revolve the platform O, may be connected; these chains may be made to pass over the pulleys, *u*, *u*, Fig. 6; *v*, *v*, are springs to give an elastic action to the chains *t*, *t*, and thus to enable them to operate advantageously in communicating the first impulse to the crane; *w*, *w*, is a friction band that embraces a wheel made fast on the upper end of the king post Q, constituting a brake which regulates the lateral motion of the crane.

The station of the engineer will be just in the rear of the shaft C', C', which may be kept in continuous motion by the steam engine operating on the crank pins, *x*, *x*. The drums on the shaft C', are each to be thrown in, or out, of gear by its appropriate lever, which the situation of the engineer will enable him to control at pleasure, as well as to attend to the engines on each side of the boat, immediately in rear of the main shaft.

We have shown the general arrangement of the guide pulleys over which the chains that operate on the scraper pass; these, however, may admit of some variation, but we have shown that which we have uesd, and prefer, and which will be readily understood on inspection.

Having thus fully described the manner in which we construct and operate our improved excavating machine, what we claim therein as new, and desire to secure by Letters Patent, is—

The manner, herein described, in which we have connected and combined the scraper staff, or arm, with the machine, so that it may be raised, or lowered, by means of the racks and pinions (by the aid of the triangular piece) arranged and operating as set forth; thereby dispensing entirely with the hollow mast, and with the toothed gearing and chains combined with said mast, as used for that purpose in the original machine of Otis.

DANIEL CARMICHAEL.
JASON C. OSGOOD.

Witnesses:
GEORGE DIKE,
B. STARBUCK.