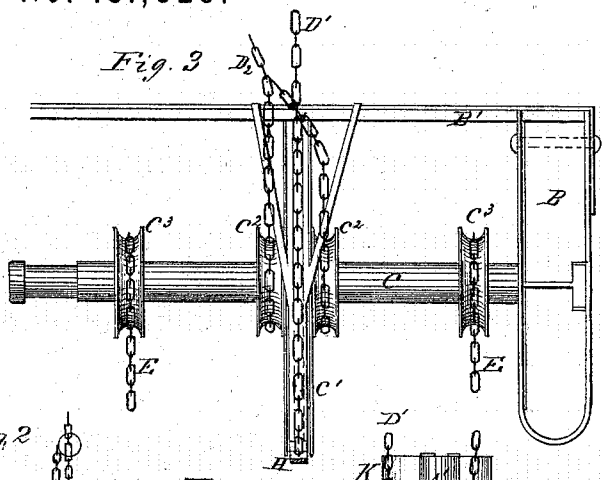
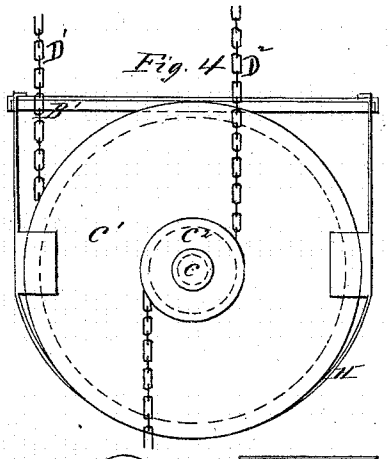
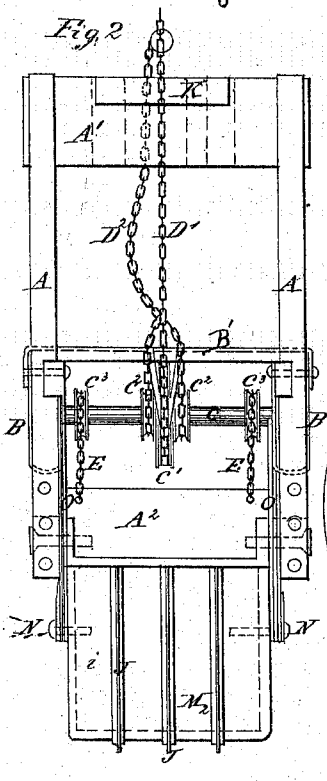
R. G. PACKARD.

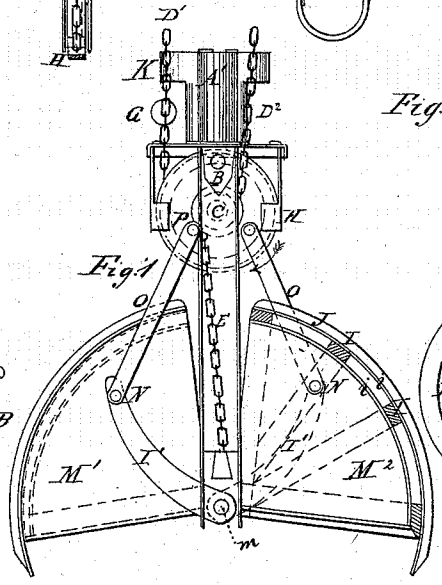
Improvement in Dredging-Machines.

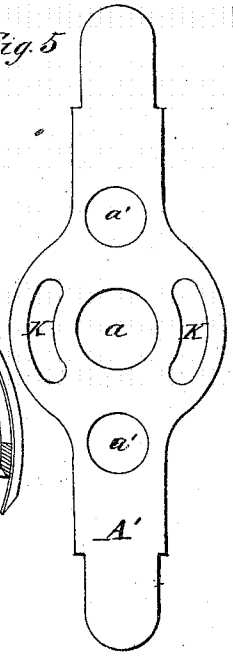
No. 131,825. Patented Oct. 1, 1872.

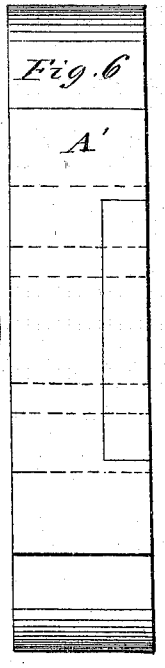


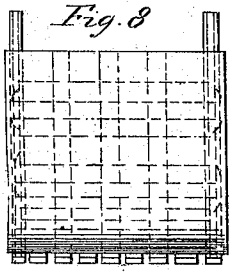


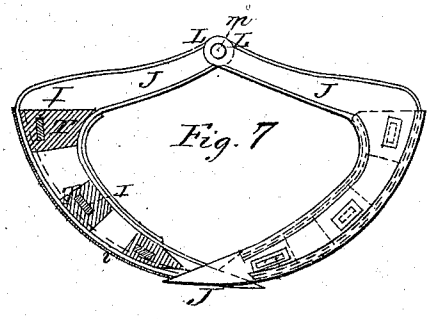












Witnesses

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UNITED STATES PATENT OFFICE.

RALPH G. PACKARD, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN DREDGING-MACHINES.

Specification forming part of Letters Patent No. **131,825**, dated October 1, 1872.

To all whom it may concern:

Be it known that I, RALPH G. PACKARD, of Brooklyn, in the county of Kings, State of New York, have invented certain new and useful Improvements in Dredging-Machines, of which the following is a specification:

The improvement is intended to apply to all the varieties of the form of dredging-machine, in which a pair of partially-cylindrical scoops are attached together and suspended from a suitable crane or swinging derrick, and, being lowered in an open condition, are closed by a powerful purchase to take hold of the mud or earth and inclose it and lift it between the scoops. This style of dredger is very extensively used and is familiar to all engaged in the business. My improvement consists in important modifications of the construction and arrangement of the scoops and operating mechanism attached to or adjacent to the same; it allows a stronger and lighter construction of the scoops themselves; it provides for a more elevated position of the shaft and its connections by which the scoops are opened and closed; provides additional safeguards against the liability of the opening and closing chains to become displaced or foul; makes the parts stiffer, stronger, and more manageable with less weight and complication.

The following is a description of what I consider the best means of carrying out the invention. The accompanying drawing forms a part of this specification.

Figure 1 is an end elevation of the scoops and the adjacent parts with the scoops open. Fig. 2 is a front elevation with the scoops closed. Figs. 3 to 6, inclusive, represent details, detached, shown on a larger scale. Fig. 3 represents the opening and closing shaft with its pulleys, chain-guard, &c., and one side of the sliding frame-work which supports the bearings of the shaft and travels up and down in the main framing. Fig. 4 is an end elevation of the same shaft and pulleys with the chain-guard in position. Fig. 5 is a top view of the cross-piece or bridge-tree, which forms the top of the main frame, and which receives and rigidly connects to a vertical pole to aid in supporting the mechanism in a vertical position, when it is allowed to descend rapidly. Fig. 6 is a side view of the same part. Figs. 7 and 8 represent modifications in some of the details. Fig. 7 is an end elevation, partly in section. This modification is intended to apply to both open-ended and close-ended scoops. Fig. 8 is a face view.

Similar letters of reference indicate corresponding parts in all the figures.

A A are the uprights of the main frames. A^1 is the upper cross-piece or bridge-tree, and A^2 the lower rigid connection. These constitute a rectangular rigid framing, and the presence of the lower connection A^2 gives it a stiffness which is not found in the corresponding parts of the ordinary framing for this species of work. In the ordinary frames the operating-shaft is so near the lower end of the frame that there is not the proper room for any rigid connection corresponding to the cross-piece A^2. Within suitable spaces provided in the upright parts A of the main frame runs a sliding frame, B B′, (see Fig. 3,) composed of two uprights, B, and a cross-piece, B′, and carrying in suitable bearings the operating-shaft C. This shaft performs the important functions of opening and closing the scoops. The chains by which this operation, as also the raising and lowering of the entire structure, is performed, are received upon pulleys C^1 and C^2, the pulley C^1 being much larger than the pulleys C^2. There are other pulleys, C^3, upon which other chains are received. The closing chain D′ winding upon the large pulley C^1 closes the scoops and raises the entire structure. It acts with great leverage, and, in the act of lifting the loaded scoops, pinches them together with great force. This is closely analogous to the operation of the corresponding parts in the ordinary dredger; but the arrangement of this part and the connections by which the operations are effected have important points of difference. The shaft C and its connections rise and sink within the main frame at each operation. The scoops M^1 M^2 turn on a single pivot or axis, *m*, which, being above the center of their cylindrical form, gives the scoops an eccentric motion, so as to open clear of the cross-bar and also clear of the chains. It also causes them to cut themselves clear in moving through the mud, by so moving that the backs or general curved surface does not forcibly press against the earth which is left. Their front edges alone press

tightly against the mud or sand. The arrangement allows them to hang on a single axis, and they are strongly connected by the straps represented. The operating rods or links O O lead from proper points or pins N N on the ends of the scoops M^1 M^2, and connect to pins P on the sliding frames B, as represented; or, if preferred, can connect directly to the shaft C. When the shaft C with the sliding frame B is elevated it opens the scoops. This movement is effected by receiving the weight on the opening-chain D^2. In this condition the structure is lowered until the scoops rest on the bottom. Then, by slackening the opening-chain D^2 and causing the steam-engine or other operating force (not represented) to take up the closing-chain D^1, the haul on the closing-chain turns the shaft C forcibly in the direction indicated by the arrow. This movement takes up the chains E, which are wound on the sheaves C^3, and which are fast to the fixed cross-bar A^2, and this movement hauls down the shaft C and its connections, and thus the scoops are closed. This compound movement for closing the scoops, being peculiar, may merit a further explanation. The pull of the closing-chain D^1 itself tends, so far as its direct force is concerned, to lift the shaft C and its connections. But the leverage being on the large pulley C^1, this direct effect is slight, compared to the ultimate effect by winding the chains E on the pulley C^3, which is the result of the turning motion of the shaft C. In other words, the closing-chain D^1, pulling upward with a force of one ton, acting at the periphery of the large pulley C^1, turns the shaft C with such force as to take up the chains E on the small pulley C^2 with a force of three or four tons, and the preponderance of this latter over the former force causes the operating-shaft C and its connections, including the links O, to be forcibly depressed and close the scoops. On the opening motion of the scoops the pull of the opening-chain D^2 acts directly to both turn and raise the shaft C and its connections, and the chains E being entirely relaxed by the turning of the shaft C in the proper direction, there is no force resisting the rise of the shaft C and entire connected mechanism B, O, O, &c. The peculiar structure of the scoops with a double skin is clearly shown in the drawing. The inner and outer skins *i i* may be of boiler-iron, secured by riveting upon the stout straps I, which connect together at each end and are strongly connected by rivets through them and the ears. The outer ribs J may be also riveted, and, by projecting past each other at the meeting edges of the scoops, perform the usual function of strongly clinging to any rock or other solid object which may be encountered. They extend from the top of scoop downward, and serve to give additional strength and stiffness to them. These points or teeth are analogous to the corresponding parts of the ordinary dredgers, but the extension of their roots along the whole extent of the curve surface greatly increases their strength. The drawing shows how they are reconcilable with the double-skin construction of the scoops. The operating-chains D^1 D^2 are led up through holes K in the upper cross-bar or bridge-tree A^1. These holes are prolonged in the direction of the length of the bridge-tree so as to allow the chains to traverse freely within reasonable limits in winding upon the sheaves, but they are of such limited length that the chains can move but a little way longitudinally of the bridge-tree A^1, and the fact of the chain being strongly guided in these holes tends to maintain the structure in an upright position by the tension of the chains, so that it may be operated with success without the necessity for any guiding-pole. It will be understood that the central hole *a* in the bridge-tree A^1 is adapted to receive a pole, which may be of any length, and serves to steady and stiffen the structure, and also to hold the scoop down when excavating hard material. The side holes *a' a'* are introduced mainly to lighten the bridge-tree, but they may be made to receive guide-poles, if it shall be necessary in any case to employ two. The opening-chain D^2 is branched near its lower end, forming two equal opening-chains. These parts are wound upon two similar small pulleys, C^2 C^2, mounted one on each side of the large closing-pulley C^1. This arrangement insures a uniformity in the tension and avoids any tendency to tilt or incline the structure either way when in operation. In other words, the pull on the closing-chain D^1 is directly central, and does not incline or tilt the structure, and the pull on the opening-chain D^2 is also directly central, and equally avoids any tendency to tilt or incline the structure.

It is important to the rapid opening of the scoops that the closing-chain D^1 shall be liberated and run out very freely. In order to avoid entanglement and prevent the chain D^1 from dropping out of the groove of the large wheel C^1, and thus lose its leverage in closing the scoop, it is important that its further running out shall be arrested at exactly the right point, so that all that is let out shall be wound snugly upon the pulley or sheave C^1. I accomplish this by attaching a weight, G, to the closing-chain D^1, taking care to fix it at exactly the right point, so that it shall be arrested by striking on the cross-bar B^1 of the sliding-frame B at the moment when a sufficient amount of the closing-chain has been hauled down and wound upon the sheave C^1. This piece of metal G should be of considerable weight, so as to assist in hauling down the chain D^1. It thus performs the double function of a weight to overhaul the chain D^1 and of a stop to prevent its being overhauled too far. When the closing-chain is hauled up this weight runs freely through the fair-leader K, which must be of sufficient size to allow its passage. So soon as the closing-chain is slackened, the mass G assists by its weight to haul down the chain, and thus assists in the opening of the scoops. But so soon as a sufficient

amount of the closing-chain D^1 has been hauled down to allow the scoops to open to their full extent the weight G acts as a stop by striking on the cross-piece B^1 and preventing any more chain from running down. In case the chain D^1 is further slackened the slack all remains above, and is not liable to induce any serious mischief. Even with this precaution against the accumulation of slack closing-chain there is still a possibility that the closing-chain may get off of the large pulley C^1 and commence to wind upon the shaft C or upon one of the small sheaves C^2, instead of maintaining its proper place on the large sheave C^1. I guard against this by means of the chain-guard H, which is in the form of a wide strap, encircling all the lower portion of the sheave C^1, with lips folded inward against the faces of the sheave to prevent the guard from getting displaced. The chain-guard H is fastened by each of its ends to the cross-piece B^1, and is divided and braced at and near the points of attachment, as shown in Fig. 3. It affords ample space in the deep groove within the sheave C^1 for a complete turn of the closing-chain. It may hold two or more turns, if necessary. The groove in the sheave C^1 should be made deep, for the double purpose of storing freely a sufficient quantity of chain and of diminishing the chance of the chain getting out of the groove. With regard to the opening-chain the intention is to make the pulley C^2 of such diameter as to overhaul the closing-chain D^1 and turn the shaft C against the friction of its journals. There are cases when the winding of the chain D^2 on the pulley C^2 may be objectionable, because, in opening the bucket, it is lowered by their unwinding. In those cases the pulleys C^2 should be omitted and the chains should be attached directly to the shaft or to rings which encircle the shaft, so as not to wind upon it.

Referring to the modifications shown in Figs. 7 and 8, it will be observed that the end elevation, Fig. 7, shows the ends of the scoops entirely open and the two skins of the curved sides fixed further apart and inclosing between them thicker and heavier framing than in the ordinary form. This is poorly adapted to dredge up mud, but serves admirably, by its immense strength, to take up rocks and other heavy masses. In this form there are, as before, both longitudinal strengthening-pieces and pieces extending up and down the scoops, and the up-and-down pieces are extended, as before, to form teeth, which match past each other as the scoops close; but in this form the longitudinal pieces do not, of themselves, fill the whole space between the skins, but only by the aid of filling-pieces or stout blocks T, and the up-and-down pieces are between the skins, instead of outside. I have marked these parts with the same letters of reference as before, and consider them equivalents in their relations to each other and to the skins, although arranged with special reference to dredge hard solids instead of soft mud or sand.

Fig. 8 gives another view of the scoops, substantially shown in Fig. 7, but slightly modified.

Among the marked advantages due to my arrangement for causing the operating-shaft C to rise and sink, as shown, are the following: My arrangement allows the scoops to open wide, even so as to touch each other with their backs, which is not possible when the shaft is mounted in fixed bearings. Again, the shaft-bearings are high up and out of the mud and grit when the scoops are lowered. Again, the elevation of the shaft saves it from breakage in case the structure strikes on a rock in being lowered rapidly. Furthermore, it allows a larger closing-wheel, so as to give any amount of purchase desired from this source. Also, it avoids the risk of the cutting of the backs of the scoops by the contact of the closing-chain therewith; and, finally, it causes a partial balancing of the strain, very important in practice, on the several pulleys. In my arrangement the chain from the large opening-sheave C^1 pulls in one direction, and the strains on the two smaller pulleys C^2 C^2 are in the opposite direction, while those with the shaft in fixed bearings have the strains on all in the same direction.

I claim as my invention—

1. The rising-and-sinking shaft C, carrying the pulleys and connections for opening and closing the scoops, and connected to the scoops M by the links O, or their equivalents, as and for the purposes specified.

2. The scoops M^1 M^2, constructed with the double skin *i i* and with stiffening and strengthening parts I J, forming the cellular construction, as specified.

3. The heavy stop G fixed in the right position on the closing-chain D^1 and adapted to serve relatively thereto, to perform the double functions of a weight and stop, as herein specified.

In testimony whereof I have hereunto set my name in presence of two subscribing witnesses.

RALPH G. PACKARD.

Witnesses:

C. C. LIVINGS,

A. HOERMANN.