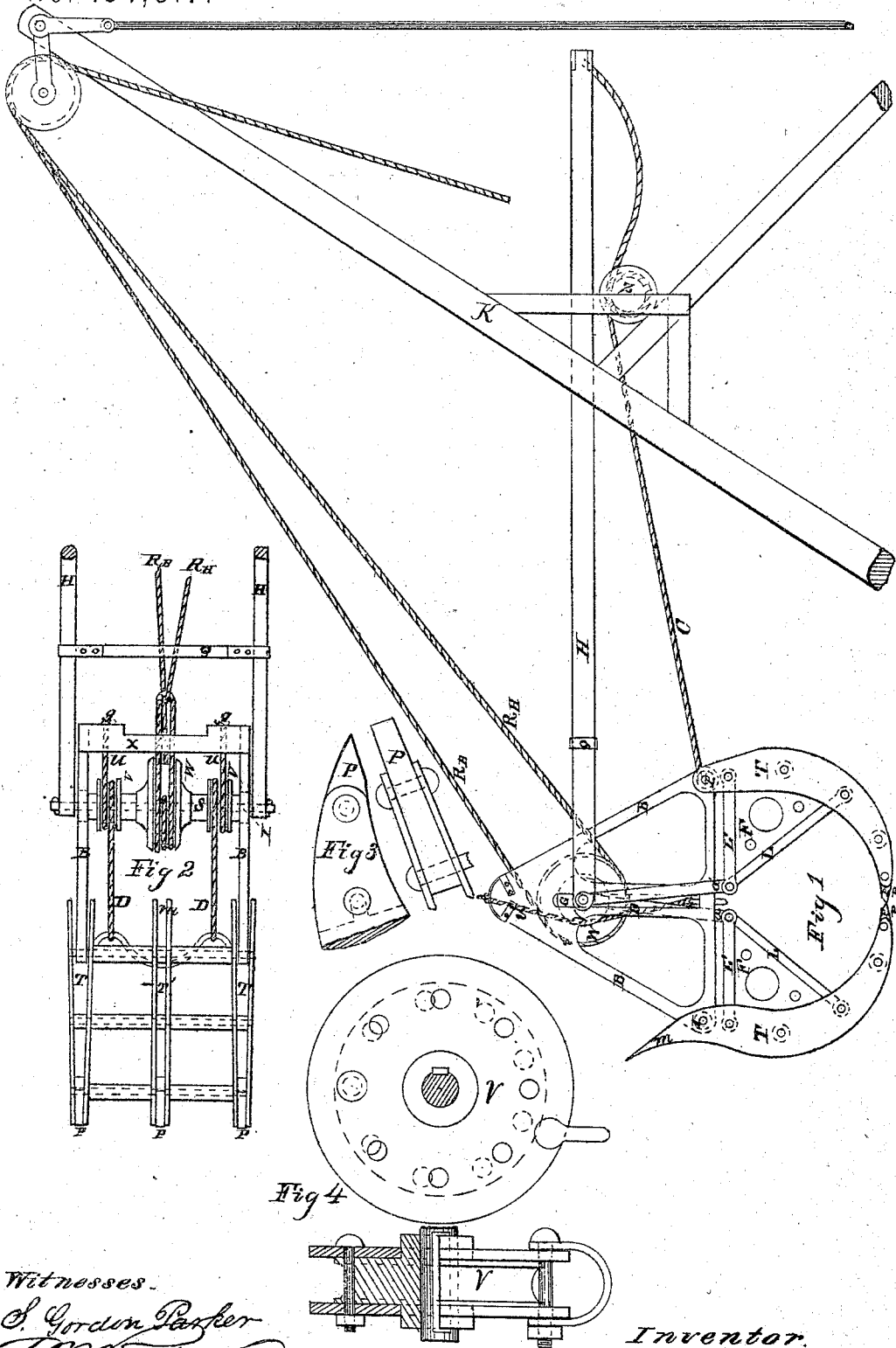


Dredgers.

No. 134,817.

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Witnesses.

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IMPROVEMENT IN DREDGERS.

Specification forming part of Letters Patent No. 134,817, dated January 14, 1873.

To all whom it may concern:

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

These improvements are intended to make dredgers having scoops which open in halves, or from a center line, more efficient in their action or working, by giving them a wider opening, and by adapting them for various kinds of excavating, and they render them stronger, and are more easily repaired.

The following description and the accompanying drawing explain my invention.

Figure 1 is an end elevation of the bucket suspended from a crane or derrick, K, and turned upon its side in order to use its outside upper edge and the points M, for cutting. Fig. 2 is a front or side elevation. Fig. 3 is an enlarged view of the cutting-points of the teeth of the scoops. Fig. 4 is an enlarged view of one of the small wheels or pulleys on the rising and sinking shaft.

Similar letters of reference indicate corresponding parts in each figure.

T T are the outside teeth of the scoops. T' is an inside or intermediate tooth. L L and L' L' are links by which the teeth T T are trussed or strengthened. P P are cutting-points, so made and fastened to the teeth T T as to be easily removed for sharpening or repairing. I I are hinges or pivots by which the scoops are attached to the frames B B. F F are blocks fitted between the links L and L', to prevent them from being bent or broken. a a' are arms or links, which connect the scoops with the rising and sinking shaft S, and which open the scoops as the shaft S sinks, and close them as it rises. B B are triangular frames, to which the scoops are hinged at I I. G is a guide or slot in the frames B B, for the shaft S to work in. X is a plate, connecting the upper ends of the frame B B to one another, and serving as a leader for the operating-chains. S is the rising and sinking shaft, before referred to, having upon it chain-wheels of different diameters, and having connected to each end arms or links a and a'. R B and R H are chains or ropes which wind upon and unwind from the large wheel W of the

shaft S. U U are chains or ropes which wind upon the small wheels V V as the scoops are closed. D D are chains or ropes which wind upon the wheels V V in opposite directions to U U, drawing the shaft S down as they wind, and by means of the arms a and a' forcing the scoops open. W is the large wheel on the shaft S, before referred to, and has grooves to receive the chains or ropes R B and R H. V V are the small wheels referred to, upon which the chains U U and D D wind, and they are constructed so as to adjust with great accuracy the length of those chains. H H are poles or guides, hinged to the bucket and serving both as guides and to keep the bucket pressed down upon the bottom when being operated, as shown in Fig. 1. C is a chain or rope attached to the upper and outside portion of the scoop, and passing up is carried several times around the drum Z on the crane or derrick K, and has its upper end fastened to the guide-poles H H. M M are cutting-points secured to the upper outside edge of the scoops, and are intended to be used as shown in Fig. 1. Q Q is a cross-piece connecting the guide-poles H H together, and also serving as a stop to prevent the bucket from turning too far when the upper outside edge and the points M are used for cutting. K is the crane or derrick, before referred to, from which the bucket is suspended and operated. Z is a drum upon the crane, by which (in connection with the chain or rope C and the guide-poles H H) the bucket is turned upon its side, lowered to the bottom, and held down while being filled.

The following description explains my invention, the methods of constructing and operating the bucket, and the advantages which it possesses. It will be seen by reference to the drawing, Figs. 1 and 2, that the scoops are composed of teeth connected by straps or bars running through them and through sleeves which are placed between the teeth, thus leaving the ends of the scoops and the spaces between the teeth and sleeves open, making what is known as skeleton or open-ended scoops. The manner of hinging the scoops at I I, the attachment of the arms to central points upon them, the arrangement of the chains upon the wheels of the rising and sinking shaft, the hinged guide-poles and the chain C, are all applica-

ble to the close scoop-bucket, and many of those named, together with the trussed outside T T, and the cutting-points P P, are equally as advantageous for buckets whose scoops are hinged at or near the center line, and with arms attached to the outside or circumference. The descriptions herein given, and the claims herein made, when not otherwise specified, are intended to apply to all of the forms of buckets named. The skeleton scoops now in use have their outside teeth made of one heavy forging, and in shape like a man's arm, but nearly at right angles at the elbow. This makes them expensive, and, having no support between the point and the place of attachment of the arms, they are constantly springing and bending when in use, which after a little time causes fracture. To avoid such results the link L is attached to the tooth T as near the point as possible and has sufficient length to grasp and hold large objects. At or near the upper end of the link L the link L' is attached, connecting it with the tooth T at or near the top. These links or braces L and L', as arranged and connected, serve as a truss for the tooth T. The filling-piece F is to prevent the links or braces L and L' from bending either laterally or edgewise. The teeth, both outside and intermediate, are made of two plates or slabs of metal secured together with sleeves or distance-pieces between them, thus making them very stiff and strong laterally, and rendering the attachment of the cutting-points P P both simple and strong. They may, however, be made with the plates drawn together at the point, and secured to one another by bolting, riveting, or welding, and these points fitted for cutting. The points P P are made of steel, or steel-tipped iron, and are inserted between the plates of the teeth, the upper end slotted or bored to receive the bar which passes entirely through all the teeth, thus securing them at that point, while the lower end is fastened by a rivet through it and the plate on either side of it. The advantage of having a point for the tooth which can be easily and quickly removed when dulled or broken is obvious, since without them the scoops must be taken entirely apart, and when that is accomplished the repointing can only be done with large fires and heavy tools.

Hinging the scoops of buckets at I I at or near the circumference, and opening and closing them by means of arms *a a'* attached at or near the center line, has advantages for working in sand, where the effectiveness depends upon the amount of surface scraped over, and enables a larger object to be grappled and raised. There is a further advantage in having, as in this case, the frame-work all above the bottom of the scoops, and being thus protected from blows and shocks experienced in lowering the bucket.

The operation of opening and closing the scoops is as follows: The rising and sinking shaft S has attached to it, at or near the ends, the arms *a* and *a'*, which are also connected

with the inner corners of the scoops and upon the shaft S, and near each end are the small wheels V V, and midway between them the large wheel W. On the large wheel W are two separate ropes or chains, RB and RH, the one winding as the other is unwound. On the wheels V V are also two sets of ropes or chains, D D and U U, acting reciprocally to each other, as well as reciprocally to RB and RH, respectively. Therefore when RB is hauled taut and RH is slackened the shaft S is rotated, and at the same time drawn down in the slots G by the winding up of the chains or ropes D D upon V V, and by means of links or arms *a a'* the scoops are forced open. The operation of opening the scoops as described has wound up the chain or rope RH and unwound U U. If, then, we reverse the operation by bringing a strain upon RH and slackening RB the shaft S is rotated in a direction opposite to that in opening and winds up the chains or ropes U U, thus drawing the shaft S up in the slots G, and by means of the arms *a* and *a'* the scoops are drawn together. If, now, we suppose the scoops to be opened, and in that condition to be lowered to the bottom to be excavated, hauling on RH will close them, and in closing they grasp their load. The bucket can then be lifted vertically, or while being lifted it and the crane K may be swung toward the place of deposit, which, being reached, it is opened and its load discharged by receiving the whole weight on the chain RB, and at the same time slackening RH, as previously described. The attachment of the chains in the manner described insures a prompt opening of the bucket, caused by the leverage which the chain or rope RB has over that on the small wheels V. It also enables the person operating the bucket to swing it in either direction when loaded by bringing a little greater strain upon the chain or rope on the side toward which he wishes to swing. He can, if desired, raise the bucket vertically by bringing an equal strain upon RB and RH.

The chains or ropes U U and D D winding and unwinding so frequently wear rapidly, and sometimes unequally. To take up their wear and adjust them accurately, I have made the wheels V V on the shaft S with a center fixed upon the shaft, and having side plates or flanges, to which the chains named are secured, bolted to that fixed center, as shown by Fig. 4.

To make the adjustment accurate there are a series of holes in the flanges and a series in the center piece, all of these holes being at the same distance from the center of the shaft. One series has one more hole than is found in the other, so that a coincidence of these holes is obtained by a very small movement of the loose plates or flanges, being similar in operation in that respect to the vernier used on mathematical instruments. Fig. 4 shows the arrangement to be such that the chains attached to V V may be tightened or slackened by moving the plates an equal distance from their position, as shown. This arrange-

ment may be varied by increasing or diminishing the number in such series equally by varying that difference, or by having other sets of series at a different distance from the center of the shaft. By this method of adjustment the wear of the chains can be accurately taken up, insuring an equal strain upon all of them, and the flanges, being of wrought-iron, make a strong fastening for the chains. The poles H H are hinged to the shaft or to any other suitable portion of the bucket, and pass through guides upon the crane or derrick K, and they are long enough to reach to the bottom which is being excavated. To their upper ends the chain or rope C is fastened, and after being passed several times around the drum Z its lower end is secured to the upper outside edge of the scoop. The drum Z, referred to, is under the control of a friction-band, and its rotations can be retarded or entirely checked, if desired. If, then, the bucket can be lowered by slackening the chains or ropes RB and RH equally, and at the same time the chain C is held from overhauling by means of the drum and its friction-band, the weight of the bucket will fall upon C, which will cause it to be turned upon its side with the points MM beneath, and to swing backward until the chain C is vertical, and in that position it is lowered to the bottom by slackening all the chains last named simultaneously. The position of the bucket at this time is shown in Fig. 1.

Filling the bucket is now effected as follows: The chain or rope C and the guide-poles H H are now used to hold the bucket from rising by means of the drum Z and its friction-band, and the chains or ropes RB and RH being hauled in the bucket is drawn up and forward, its path being nearly the arc of a circle whose center is the point of tangency of the poles H H to the drum Z. As soon as the bucket leaves the bottom it is then raised, swung, and discharged in the ordinary way, as previously described.

This method of operating the bucket has advantages for excavating in hard clayey soils,

or more especially when adopted in shallow water or for cutting into banks, such as are found in railroad cuttings. Constructing a dredger for operating in the manner last described does not in any respect unfit it for use, as first specified and described, and when so arranged and built it is capable of working in hard or soft materials, in deep or shallow water, or for cutting into banks.

I claim as my invention—

1. The scoops hinged at or near the outside, opening from a center line with links or arms attached at or near the center for opening and closing them, as described and specified.

2. The teeth of skeleton scoops which open from a center line, constructed of two plates of metal secured together, in the manner and for the purpose specified.

3. The links or braces L and L', connected to the teeth T T of skeleton scoops, in the manner and for the purpose specified.

4. The cutting-points P P secured to the teeth of skeleton scoops, in the manner and for the purpose specified.

5. The combination of the chains RB, and D D, and RH, and U U with the shaft S and its connections, in the manner and for the purpose specified.

6. The small wheels V V, constructed and arranged to adjust the chains, in the manner and for the purpose specified.

7. The adaptation of the upper edge for cutting, of buckets whose scoops open from a center line, in the manner and for the purpose specified.

8. The guide-poles H H hinged to the bucket, and used in combination with the chain C or other suitable holding-down apparatus, in the manner and for the purpose specified.

9. The chain C, in combination with the hinged guide-poles H H, when used in the manner and for the purpose specified.

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