No. 640,762. Patented Jan. 9, 1900.

J. H. GRAY.

BUCKET DREDGING MACHINE.

(Application filed Aug. 22, 1899.)

(No Model.) 2 Sheets—Sheet 1.

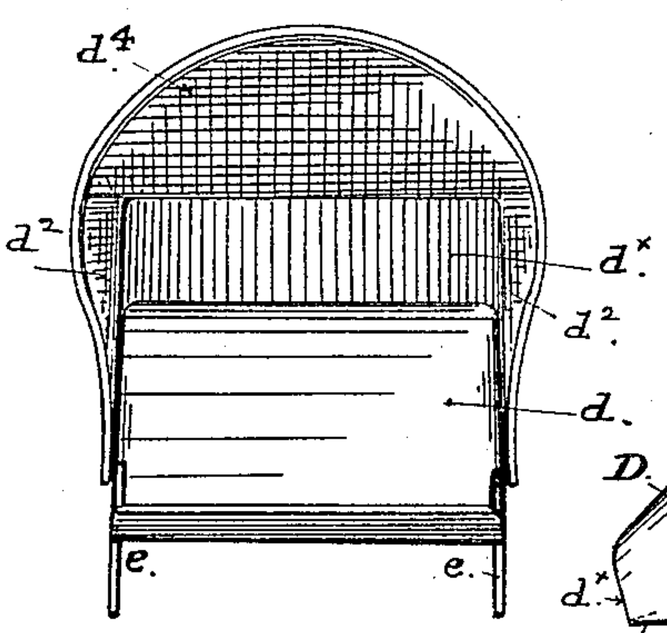

Fig. 3.

Fig. 1.

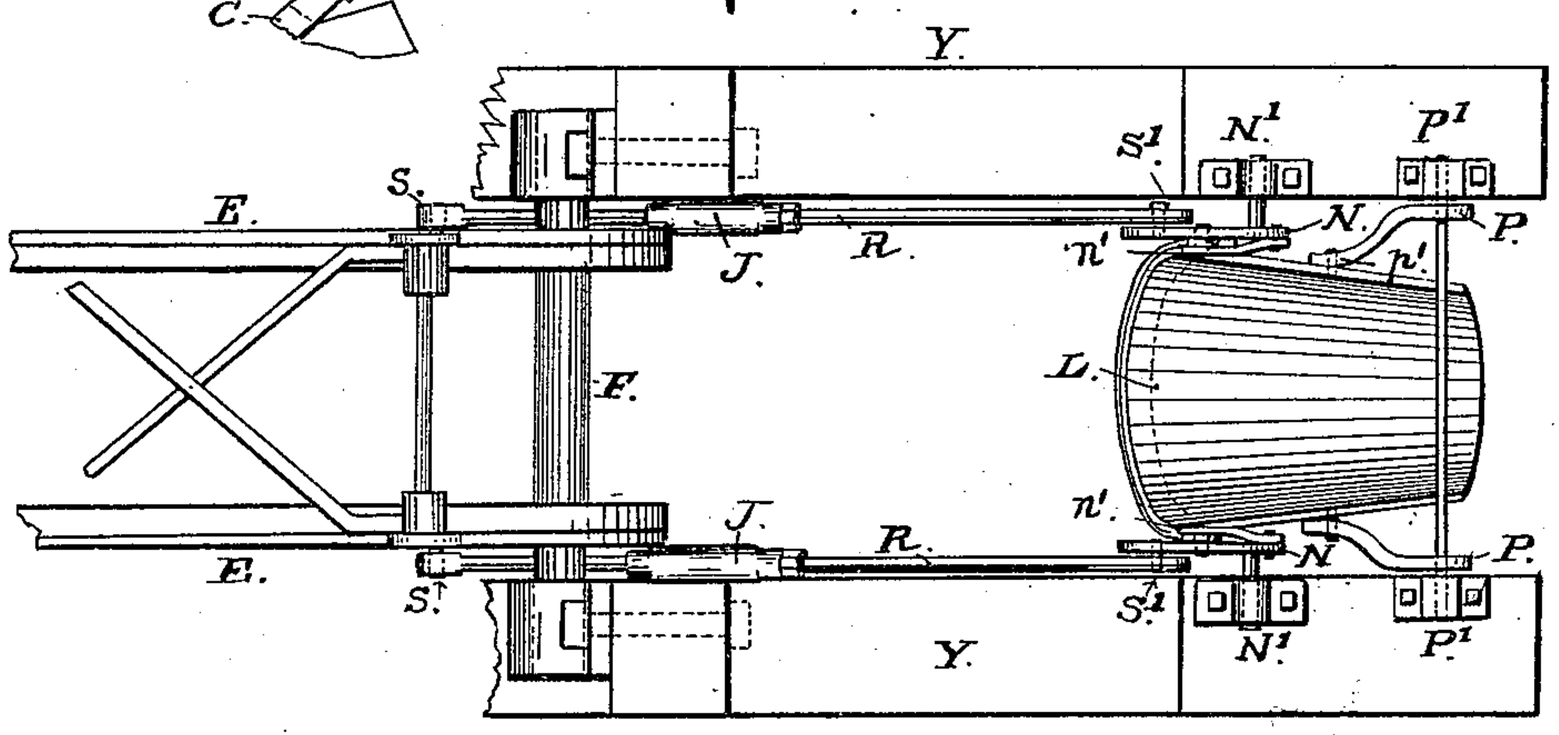

Fig. 2.

Witnesses:

F. Sedgwick

M. Regnier

Inventor:

James Hammond Gray

By Smith & Osborn Attys.

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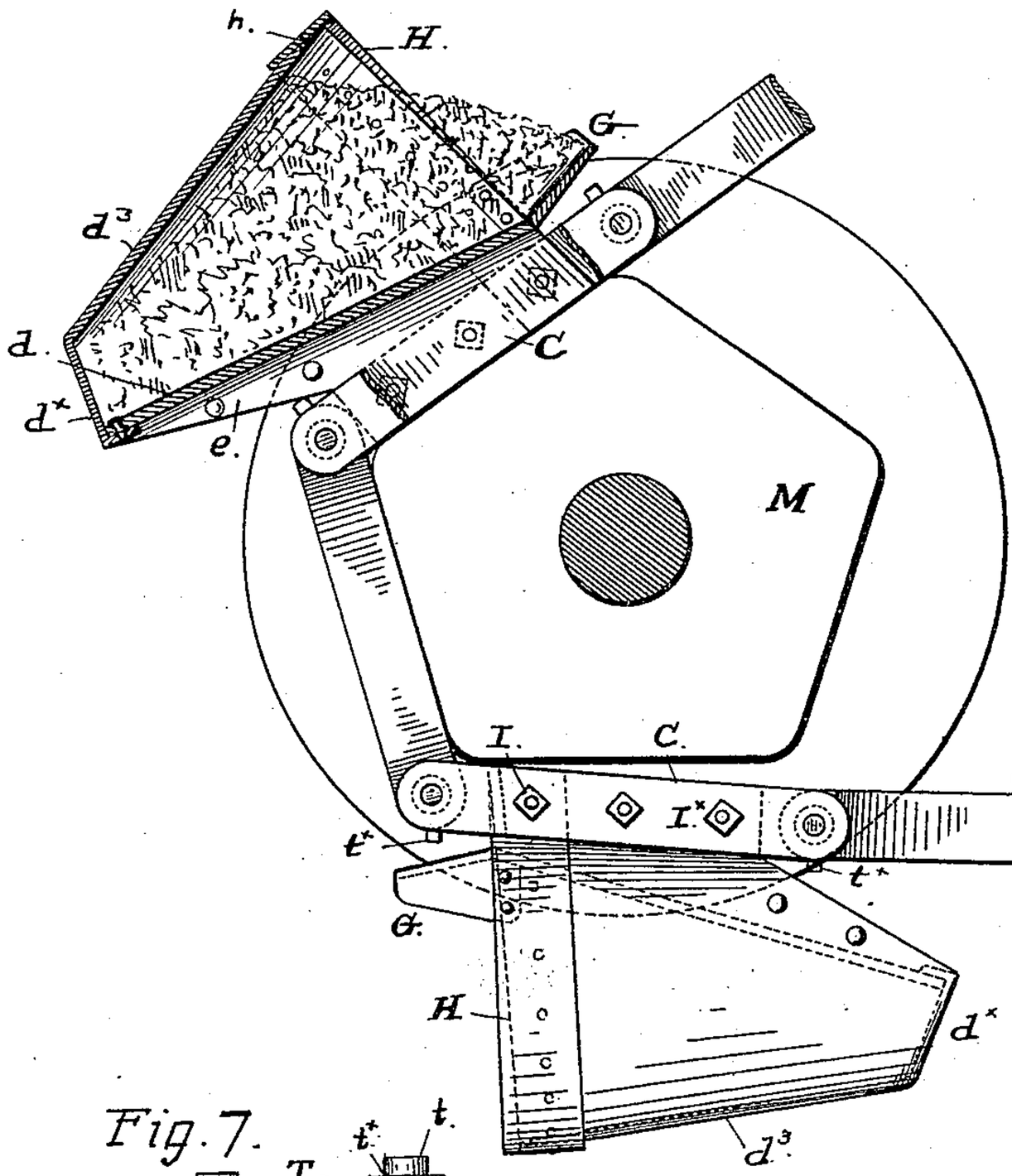

Fig. 4.

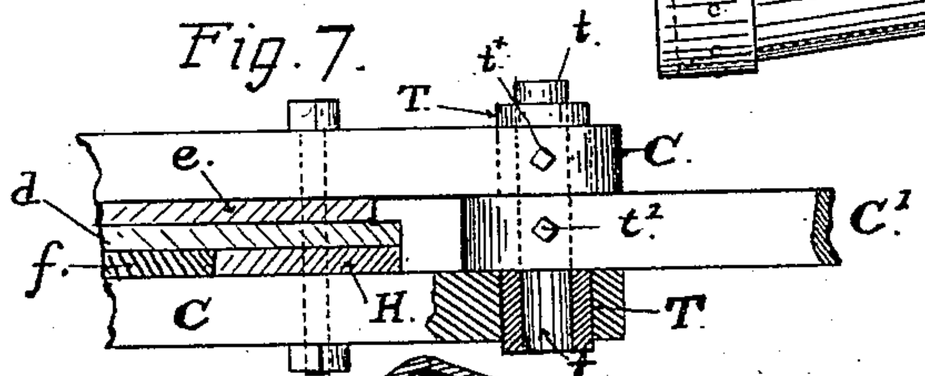

Fig. 7.

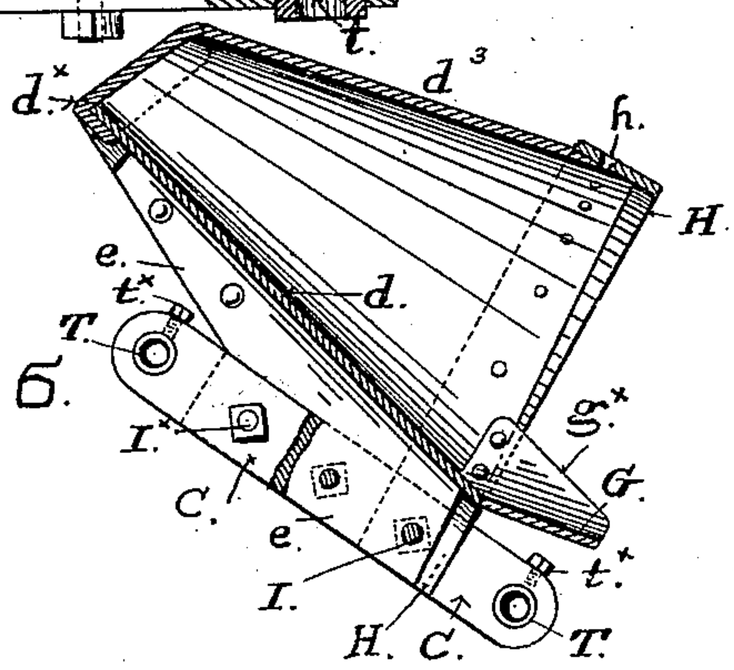

Fig. 6.

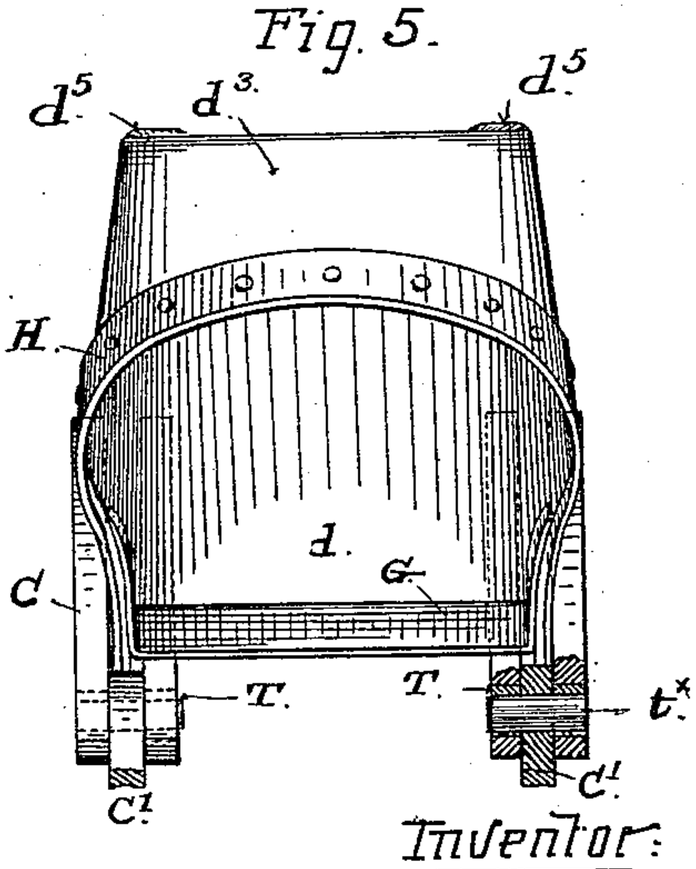

Fig. 5.

Witnesses

F. Sedgwick

M. Regnier

Inventor:

James Hammond Gray

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UNITED STATES PATENT OFFICE.

JAMES HAMMOND GRAY, OF SAN FRANCISCO, CALIFORNIA.

BUCKET DREDGING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 640,762, dated January 9, 1900.

Application filed August 22, 1899. Serial No. 728,088. (No model.)

To all whom it may concern:

Be it known that I, JAMES HAMMOND GRAY, a citizen of the United States of America, residing in the city and county of San Francisco, in the State of California, have invented new and useful Improvements in Bucket Dredging-Machines, of which the following is a specification.

These improvements in endless-chain bucket dredgers are applicable more particularly to machines or apparatus of the class that are employed in gold-dredging operations.

The improvements embraced in and comprising this invention relate to novel features of construction in the dredger-bucket and the links by which they are connected together in an endless chain in this class of machine; also, to a means of regulating automatically, by or from the vertical movement of the pivoted frame or ladder in its adjustment from one angle to another, the position of the receiving chute or trough into which the contents of the buckets are discharged as they are inverted over the top tumbler, whereby the receiving end of the chute is kept as closely as possible to the path of the buckets without striking the rim of the buckets and the position thereof is maintained under all conditions of change in the line of travel due to the movement of the lower end of the ladder in a vertical arc.

The following description explains at length the nature of these improvements and the manner in which I proceed to construct, produce, and carry out the same, reference being had to the accompanying drawings, forming a part thereof.

Figure 1 of the drawings is a side elevation, partly in longitudinal section, of the upper portion of the endless-chain and dredger buckets, the pivoted ladder, the upper tumbler with its shaft and gearing, and one side of the supporting-framework, together with the receiving-chute and its regulating or adjusting device. Fig. 2 is a plan or top view of the receiving-chute and the adjusting device connecting it with the hinged ladder. Figs. 3 and 3ª show the parts of the bucket-body before they are riveted together. Fig. 4 is a side elevation, on an enlarged scale, of the lower tumbler and its shaft, showing one bucket in side elevation inverted and another bucket in longitudinal section loaded and on the upward travel. Fig. 5 is a front view of a bucket. Fig. 6 is a longitudinal section of a bucket in position of discharge when on the top tumbler. Fig. 7 is a detail, partly in section, of the links and the joint uniting them.

Referring to Fig. 1, A indicates the top tumbler, and *a* its shaft. B *b* are the gears that give motion to that shaft. C C′ are the links on the buckets D that secure the parts of the bucket-body together and also connect the buckets in an endless chain. E is the pivoted ladder that supports and guides the endless chain of buckets in this class of machine, and F is the pivot on which it is movable in a vertical arc.

Figs. 1 and 2 illustrate the means by which the chute L, receiving the material from the buckets, is set in as close relation as possible to the path of the buckets in the different adjustments of the ladder E on its pivot. The chute L is suspended by two sets of bars or links N P from points of oscillation N′ P′ on the timbers Y of the stationary frame and are loosely attached at the points *n′ p′* to the sides of the chute. To the outer bars N at the receiving end of the chute the connecting-rods R are joined at S′, several holes being made in these bars for the purpose of adjusting the points of attachment up or down to vary the extent of throw or movement of the chute, and from the pivoted ladder the connecting-rods R are carried rearwardly to the bars N, on which the chute hangs, and are loosely attached by pivot-bolts to the side bars of the ladder E at S. These rods have turnbuckles J for regulating the length of the rods. The result of this construction is that as the lower end of the ladder is raised or lowered the receiving end of the chute under the mouths of the buckets is set backward or forward to a proportionate extent or degree, following the change in the path of the buckets that is due to such movement of the ladder. The working position of the chute is thus controlled and regulated from the movements of the ladder from one angle or degree of inclination to another that the ladder is required to assume as the work goes on.

Another important feature in this invention is the construction of the buckets and their position relative to the links and line of their movement of travel. The body portion of the bucket is constructed of a single piece and the bottom and upwardly-inclined lip of a single piece of sheet metal, with flanges by which the two parts are firmly secured together and fastened to the links. That part of the bucket which is uppermost when it is traveling upward with a load is bent at its front end in a curve, as seen at d^4, Fig. 3, changing gradually into a flattened shape at the rear end, as seen at d^3, Fig. 5. It is then bent downward, forming the back end of the bucket, and the edge is folded under the bottom, as shown at $d^\times$, Fig. 6. The sides are folded around upon the back, as shown at d^5, Fig. 5, and the sides, extending downward between the links, are secured together and to the links by bolts and nuts.

Referring to Fig. 3, the flat bottom *d* has its sides *e* bent downward, and these flanges, together with the sides of the body *d*, are clamped firmly between the links. The front end of the bottom portion extends beyond the body of the bucket and forms a lip G, Fig. 6, the sides of this portion being bent upward to form sides $g^\times$ to the lip G and the rear portion of these sides being lengthened by drawing out the metal and riveted to the inside of the bucket, thus strengthening and supporting the lip. As shown in Figs. 1, 4, and 6, the flat bottom *d* of the bucket is elevated at the back end at an angle with the links C C or the line of movement of the bucket, and the lip G is elevated at a reflex angle. The mouth of the bucket is strengthened by a strong steel rim H, that also forms the cutting edge. This part is attached to the body, so that it may be removed and reversed to turn the worn edge to the rear and present the fresh edge in working position to the front. The ends of this rim extend down between the links and are confined by bolts I, that pass through the links and the three thicknesses of metal clamped between the links, consisting of the ends of the rim, the flange of the bottom portion, and the side pieces of the body portion. This same thickness of metal is carried out behind the rim by inserting a shim *f* between the outer link and the flange or side of the body, as indicated at Fig. 7, so that the space between the two members composing the double link is filled in solidly for the entire length of the flanges, thereby preventing particles of rock or gravel from lodging between the double links. These are all important features in my invention, and the operation resulting from such construction is as follows: Referring to Fig. 1, it will be seen that each loaded bucket in passing over the tumbler reaches its position of discharge earlier than it would if the bottom of the bucket were in the same plane with the links, and at a time when the front corner of the tumbler is at its most advanced position forward over the chute the rear end of the bucket travels in a larger circle by virtue of its upward inclination. This causes the material to be projected forward with greater momentum, while the lip G by its reflex inclination causes the last portions of the material sliding off the bottom to be projected forward over the open space between the bucket and the receiving-chute and to fall with certainty into the chute.

It will be seen by referring to Fig. 4 that the lip G also forms a shelf or support to carry a considerable quantity of material, causing the bucket to carry a much larger load, and, again, by the elevation of the rear end the bucket is made to fill more readily in passing under the bottom tumblers M. In that position, as seen in Fig. 4, the curved body, which is undermost when cutting and scooping up a load, will be nearly in a plane with the direction of travel of the bucket, the result of which is to produce a smooth entrance of the bucket into the material on the lines of least resistance with as little disturbance as possible of the material before it enters the bucket, as such disturbance causes much gold to settle through the material and be lost. The elevation of the rear end of the bucket, however, is not so great as to project beyond the line of travel of the front or cutting portion as it moves around the lower tumbler.

The joint between the double links and the single link, uniting two buckets together, is composed of a pin *t*, which is made fast from turning in the link and from moving endwise by a set-screw t' entering the pin. The pin-holes in the links C are lined with bushings T to take the wear from the links, and these bushings are held by set-screws $t^\times$ to prevent them from turning in the links or from slipping out. As the wear is mostly on one side of these bushings, they are made to project beyond the outer face of the links sufficiently to turn them with a wrench, so as to present a fresh wearing-surface, and the pin *t* also projects at one end beyond the face of the bushing, so it can be turned to present a fresh wearing-surface. It is seen by this construction that the wear is confined to the pin *t* and the bushings T, and these are easily changed to present fresh wearing-surfaces as the parts become worn.

Another advantage of having single links to join together those to which the buckets are attached is that there are no open spaces for rocks to lodge in the link's travel around the lower tumbler, as in case of double connecting-links, it being observed that the space between the double links to which the buckets are attached is closed by the parts of the bucket *e d*, cutting-rim H, and shim *f*.

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

1. A dredging-bucket having a flaring body of curved outline in cross-section at the front

end and tapering to a flattened back end, a flat bottom inclined from back to front, and a projecting front end standing at a reflexed angle beyond the mouth of the bucket, as described.

2. A dredging-bucket having a flat bottom inclined from back to front and a projecting lip or front portion standing outward beyond the mouth of the bucket at a reflexed angle and provided with upwardly-turned sides which are united to the sides of the bucket, as described.

3. A dredging-bucket composed of the arched and flaring body portion having straight side pieces, the flat bottom portion having downwardly-bent side flanges, a closed back formed from the top of the body portion, the side bars securing the parts together and adapted to form double links for uniting a number of buckets in a chain, said bars projecting beyond the front end of the bucket and having eyes near the ends, and the removable cutting-rim detachably secured to the bucket-body and secured by bolts between the side bars of each link, as described.

4. In a dredging-machine a dredger-bucket having double links secured to the bucket-body, eyes in the ends of the bars of said links, and removable bushings secured in said holes, in combination with single links having removable cross-pins fitted to work in the bushings and set-screws securing said bushings and cross-pins in their respective links.

5. In a dredging-machine, the combination with a pivoted bucket-carrying frame, adjustable in a vertical arc, a tumbler above said pivot, and an endless chain of buckets; of a suspended chute set with relation to the path of the buckets to receive the material therefrom, and means connecting the chute below its points of suspension with the bucket-carrying frame below its pivot, for operation as set forth.

6. The combination, with a bucket-carrying frame adjustable in a vertical arc upon a pivot at the upper end, a tumbler above said pivot and an endless chain of buckets; of a chute suspended from points of oscillation beneath the mouths of the buckets and with relation to the path in which they travel to receive the material from the buckets, and means connecting the chute with the pivoted frame, consisting of the rods pivotally attached to the chute and to the frame below their pivots, and having means for adjusting the length of the rods.

In testimony that I claim the foregoing I have hereunto set my hand and seal.

JAMES HAMMOND GRAY. [L. S.]

Witnesses:

EDWARD E. OSBORN,

M. REGNER.