No. 710,054. Patented Sept. 30, 1902.

I. B. HAMMOND.

DREDGER AND EXCAVATOR.

(Application filed Feb. 9, 1900.)

(No Model.) 4 Sheets—Sheet 1.

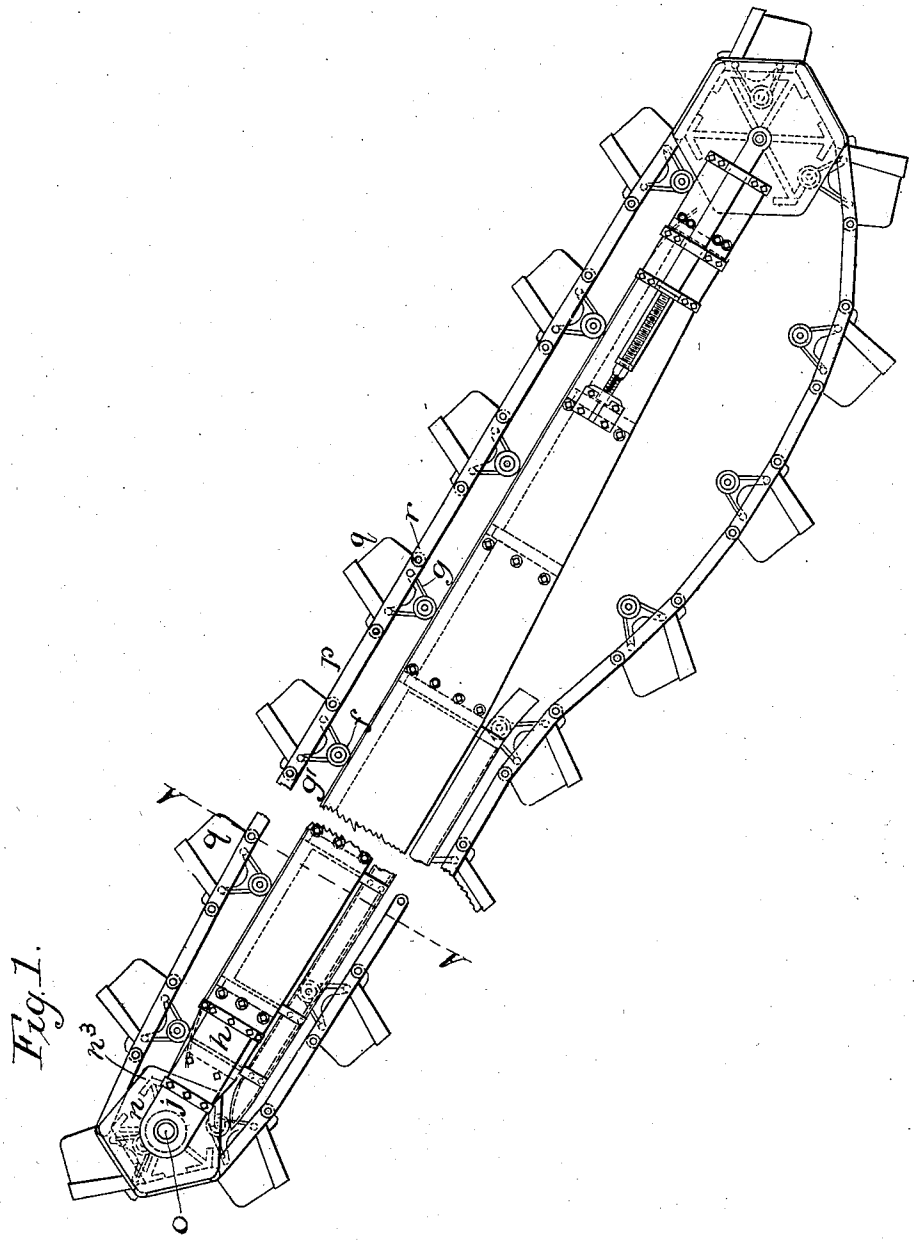


Fig. 1.

Witnesses:
L. L. Henderson
M. D. Roy

Inventor
Isaac B. Hammond
by F. J. Geisler
Atty.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 710,054. Patented Sept. 30, 1902.

I. B. HAMMOND.

DREDGER AND EXCAVATOR.

(Application filed Feb. 9, 1900.)

(No Model.) 4 Sheets—Sheet 2.

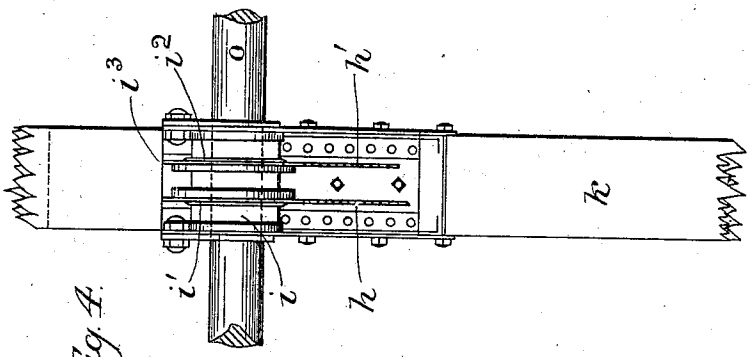


Fig. 4.

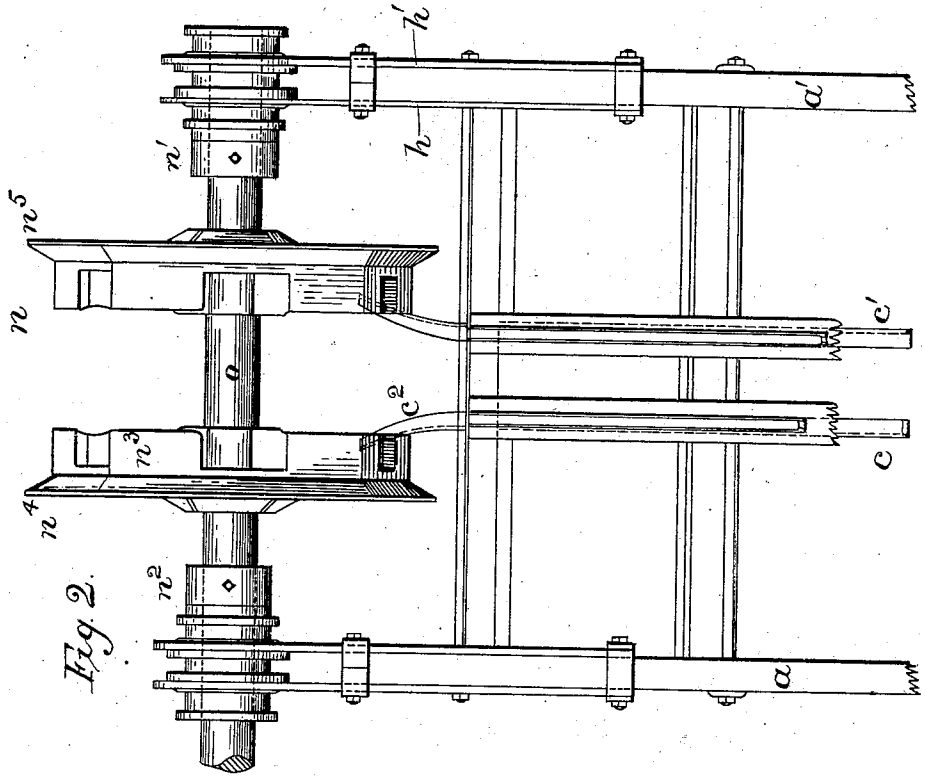


Fig. 2.

Witnesses:
L. L. Henderson
M. D. Hoyt

Inventor
Isaac B. Hammond
by J. J. Geisler
Atty.

No. 710,054. Patented Sept. 30, 1902.

I. B. HAMMOND.

DREDGER AND EXCAVATOR.

(Application filed Feb. 9, 1900.)

(No Model.) 4 Sheets—Sheet 3.

Fig. 3.

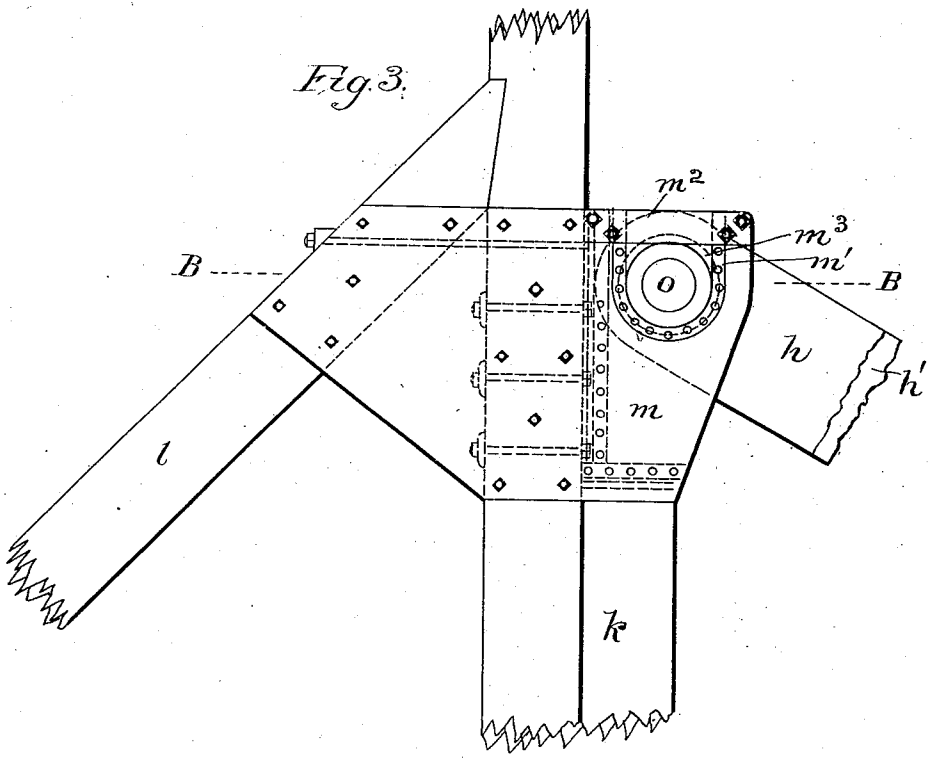
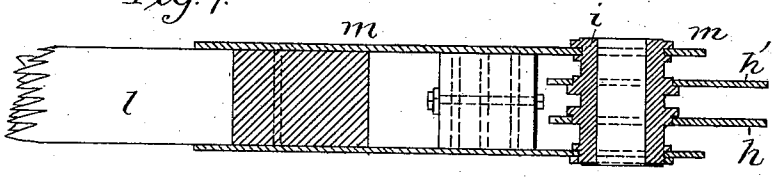


Fig. 7.



Witnesses:
L. O. Henderson
M. D. Hoyt

Inventor
Isaac B. Hammond
by J. J. Geusler
Atty.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 710,054. Patented Sept. 30, 1902.

I. B. HAMMOND.

DREDGER AND EXCAVATOR.

(Application filed Feb. 9, 1900.)

(No Model.) 4 Sheets—Sheet 4.

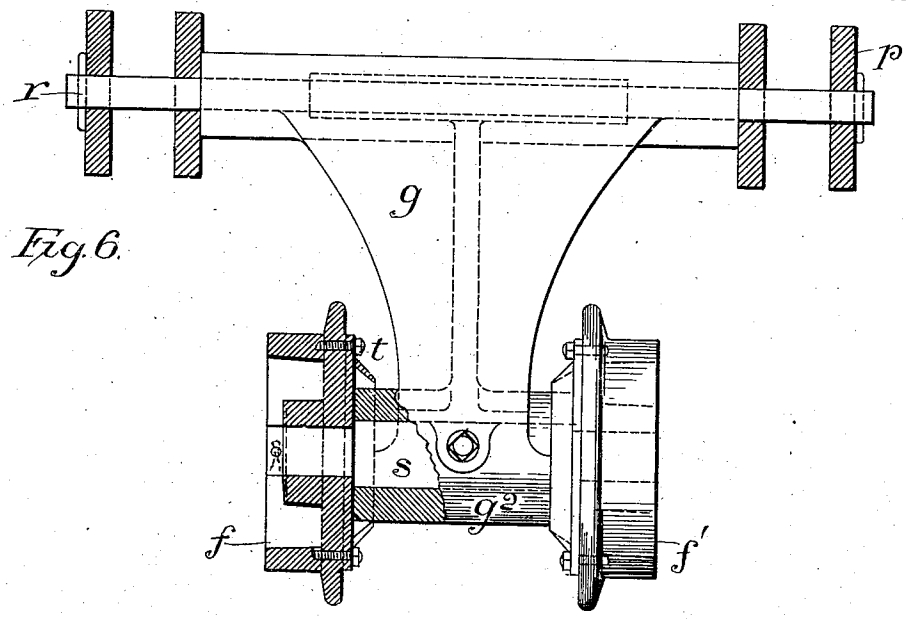


Fig. 6.

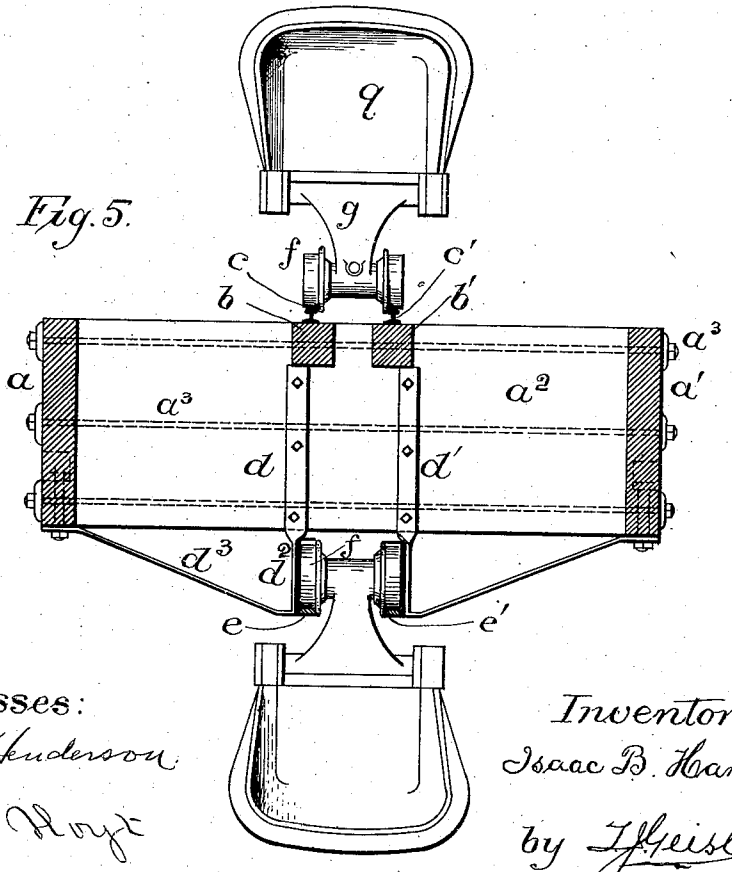


Fig. 5.

Witnesses:
L. A. Henderson
M. D. Hoyt

Inventor,
Isaac B. Hammond
by T. J. Geisler
Atty.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ISAAC B. HAMMOND, OF PORTLAND, OREGON.

DREDGER AND EXCAVATOR.

SPECIFICATION forming part of Letters Patent No. 710,054, dated September 30, 1902.

Application filed February 9, 1900. Serial No. 4,690. (No model.)

To all whom it may concern:

Be it known that I, ISAAC BARTON HAMMOND, a citizen of the United States, and a resident of Portland, in the county of Multnomah and State of Oregon, have invented a new and useful Improvement in Dredgers and Excavators, of which the following is a specification, reference being had to the accompanying drawings as a part thereof.

My invention relates to dredgers and excavators of the endless-chain-and-bucket class.

The objects of my invention are to provide suitable traveling carriers for the dredge-chain and buckets and means for supporting the greater part of the descending portion of the chain and buckets on the under side of the ladder, so as to relieve the strain of the sag in the chain and allow the same to be kept sufficiently taut regardless of the length of the ladder and at the same time avoid the interference of such supporting contrivance with the work of the buckets. To obtain a dredging-machine adapted to work at any considerable depth, the dredge-ladder must of course be made of proportionate length. If one did not have to take into consideration the sag in the chain on the under side of the ladder, this would not be a difficult matter to overcome; but the strain incidental to keeping this part of the chain sufficiently taut is found to be so great that about eighty feet is accepted as the maximum length of the dredge-ladder in dredges of the usual construction. When, however, dredging is required to be done at a depth of fifty feet or more, this length of ladder would be insufficient, for dredging can best be done when the dredge-ladder is not inclined to exceed an angle of forty-five degrees from the vertical.

I attain my object by the use of a railed way on the upper surface of the ladder, extending from end to end, and another railed way for the under side of the ladder, supporting the descending chain and buckets for a part of the length of the ladder only—that is to say, to the point where the chain must necessarily hang free—to allow the end buckets to do their work. A particular advantage gained by supporting in part the descending portion of the chain and buckets is to confine the sagging of the free end of the chain within the proper limits of curvature, bringing the end bucket only to the bed to be excavated and holding the next following buckets suspended clear above the bed until they shall in their turn have reached the point for doing their share of the excavating-work.

I am aware that dredge-ladders have heretofore been constructed with railed ways above and below the ladder and the dredge-chain provided with trolley-wheels for conveying the chain along such ways; but in such traveling contrivances the trolley-wheels project laterally beyond the dredge-chain and in so doing interfere with the work of the buckets, for in some classes of dredging-work — for example, while dredging a river-bed—it is necessary to cut and swing the buckets simultaneously from side to side to do efficient work. To meet the requirements of this kind of work, I support the dredge-chain and buckets on traveling carriers attached below the chain and narrowed toward the base, so that the carriers in their width will occupy only a portion of space equal to the span of the buckets. Such construction, which is one of the features of this invention, is more particularly shown in Fig. 2. Another feature therewith combined is to have the dredge-chain played off—that is, released—from the railed way on the under side of the ladder at the proper point and to adapt the ladder and its appurtenances to receive and guide the traveling carriers of the chain back to the upper railed way upon rounding the lower end tumbler.

It is also my object to make the general structure of my dredging-machine such as to combine strength and durability with efficiency in work. The improvements invented by me are equally usable in an excavating-machine using an endless chain of buckets, as in a dredging-machine. The mechanical construction of my invention is illustrated in the drawings above referred to, in which—

Figure 1 shows a side elevation of the dredge-ladder and the dredging appliances therewith combined, the central portion being broken away in order that the illustration might be made of lesser length. Fig. 2 shows a plan of the head end of the ladder, the endless chain being removed. Fig. 3 is a partial side elevation of one of the supporting-posts of the tower from which to hang the head end

of the ladder. Fig. 4 is a front elevation of such post, this figure also including one of the hollow trunnions with which the head ends of the ladder are provided and a section of the shaft journaled in such trunnions and carrying the upper tumblers. Fig. 5 is a vertical cross-section on the line A A′ of Fig. 1. Fig. 6 is an end view and partial section of one of the carriers or trucks for the endless chain and buckets, and Fig. 7 is a longitudinal section on line B B′ of Fig. 3.

Like letters refer to like parts throughout the several views.

The improvements invented by me relate entirely to the dredge-ladder and the means for hanging the same and for conveying the endless chain and buckets thereby carried around the same. The construction of the frame of ladder may be of any suitable form, that shown in Fig. 1 being represented as consisting of beams $a\ a'$, united at intervals by girths a^2 and through-bolts a^3. On the upper surface of this girth extend longitudinal stringers or sills $b\ b'$, on which are mounted T-rails $c\ c'$. Fastened to the girth a^2 are hangers or straps $d\ d'$, of which the lower portion d^2 is twisted at right angles and has lateral extensions d^3, connected with the beams $a\ a'$. To the inner faces of such straps $d\ d'$ are fastened channel-irons $e\ e'$, having steel bar-rails on the interior of the upper and lower flanges. Between these flanges run the wheels $f f'$ of the chain-carriers g. On the head ends of the beams $a\ a'$ of the ladder are fastened iron plates $h\ h'$, the free ends of which plates have annular openings, so that they may be inserted on the collars $i'\ i^2$ of a hollow trunnion i. When the plates $h\ h'$ have been inserted on the trunnions as described and the plates bolted to the sides of the beams $a\ a'$ of the ladder, the trunnions are held in place by the flanges i^3, and the key j holds the trunnions against slipping or turning in the plates $h\ h'$. The tower for the head end of the ladder may consist of posts k and braces l, holding vertical plates m, provided with recesses m^3, the rim of which is reinforced by U-irons m', riveted thereto, and the mouth of the recesses being covered by caps m^2, the recessed plates constituting boxes in which to journal the trunnions i, as illustrated in the longitudinal section in Fig. 7.

The object to be attained in the construction of the support for the upper end of the ladder is to hang the ladder on the same center as the shaft for the upper tumbler without hanging the ladder from such shaft. By this arrangement the pivotal point of the ladder would coincide with the axis of the tumbler and allow the chain and buckets to travel around the tumbler and head end of ladder equidistant from its axis, which must be provided for in order to allow my invention to operate as it is designed. The tumblers n are mounted on the shafts o and made fast by means of keys. Collars $n'\ n^2$ are fixed by set-screws and hold the shaft o in its proper position. The construction of the corresponding mechanism at the lower end of the ladder is like that at the upper end of the ladder. The ladder itself narrows toward its lower end. The trunnions by which the upper end of the ladder is supported in its bearings enable the ladder to be adjusted to a desired inclination. There is no strain on the shaft of the weight of the ladder, and the shaft for the upper tumbler is independent of trunnion-supports for the head of the ladder, so that in case of the tumbler mechanism being required to be taken apart for repair or adjusting it can be done without interfering with the ladder. The dredge-chain p is of the usual link construction and has attached thereto a series of buckets q. The dredge-chain is provided at intervals with carriers g, the details of construction of which are more particularly illustrated in Fig. 6. From such figure it will be seen that the frames of the carriers have radial extremities, (see Fig. 1,) provided with transverse perforations to receive bolts r, inserted in corresponding perforations in the links of the chain and whereby such carriers are attached to the chain. At the base of the carrier is a journal-box g^2, in which are journaled the flanged wheels $f f'$. The wheels of the carrier must necessarily be adapted to revolve independently of each other, because should the dredge-chain in traveling on the under side of the ladder in channel-irons $e\ e'$ be subjected to a side thrust the wheel on one side of the carrier will be pressed and run upon one of the lower rails, while the opposite wheel will be pressed and run on one of the upper rails in the channel-irons. The means employed for so adapting the wheels of the carrier to revolve independently of each other may be such as are found suitable. Those employed by me are illustrated in the sectional view comprised within the left portion of Fig. 6. From such it will be seen that the carriers are provided with journal-boxes g^2, in which are journaled axles s, having reduced ends providing shoulders for the hubs of the wheels $f f'$ to bear against. One of the wheels is keyed fast to its axle. The other is loose and held in place by means of a washer and split pin. A ring or gland t, having a beveled flange, is bolted to the inner face of each wheel and constitutes a box within which to hold packing to exclude the grit and dirt from entering between the ends of the journal-box and the wheel.

When my dredging-machine is operating, the dredge-chain and buckets will be conveyed over the upper surface of the ladder by means of the carriers g on the rails $c\ c'$. Such rails widen at the extremities to allow the wheels of the carriers to run off and on, the same as illustrated by Fig. 2 at c^2. On reaching the head end of the ladder the dredge-chain is carried around by means of the tumblers n, the carriers passing between the sides of the tumblers, and on approaching the under side of the ladder the wheels of the chain-carriers

enter the railed way provided by the channel-irons e e', which extend for about two-thirds of the length of the ladder. While the carriers are thus traveling in the channel-irons, the weight of the descending empty buckets is suspended from the under side of the ladder without exerting any strain on the chain itself. The railed way on the under side of the ladder is discontinued at some convenient point, allowing enough of the chain and buckets at the lower end of the ladder to hang free to have ample drag for efficient dredging. Such channel-irons, however, must not be discontinued until that point is reached when the sagging part of the chain will be confined within the proper limits of curvature. The tumblers n and their correspondents at the lower end of the ladder are made of two pieces, as will be seen by Fig. 2, and consist of two five-pointed plates n^4 n^5, having on their inner faces a series of ledges n^3, providing narrow, non-continuous, or interrupted rims on which to receive the dredge-chain, there being a wide space between such rimmed portions of the tumbler for the carriers to pass through and ample openings in the ledges n^3 to allow any dirt which may drop from the bucket onto the tumblers to fall through and not clog up the tumbler.

I claim—

1. The combination with the dredge-ladder and the tumblers for the dredge-chain, of an endless dredge-chain and buckets; traveling carriers therefor, attached below the chain and narrowed toward the base, so that such carriers in width occupy only a portion of the space within the span of the buckets; a railed way extending the length of the upper surface of the ladder leading from and to the tumblers; a railed way extending from the upper tumbler along the under surface of the ladder for a part of its length, being disconnected at a convenient point, allowing enough of the dredge-chain and buckets at the lower end of the ladder to hang free, to provide sufficient drag; and a guard for holding the chain-carriers traveling along the railed way on the under side of the ladder against a lateral thrust or strain, the tumblers being adapted to allow the traveling carriers to pass between their sides while the chain passes over their rims, substantially as described.

2. The combination with the dredge-ladder of the tumblers for the dredge-chain, consisting of two side plates having projecting ledges on their inner faces, providing interrupted, narrow rims on which to receive the dredge-chain, and leaving ample space between such rims for the carriers to pass through; an endless dredge-chain and buckets; traveling carriers therefor attached below the chain and narrowed toward the base, so that such carriers in width occupy only a portion of the space within the span of the buckets; a railed way extending the length of the upper surface of the ladder and leading from and to the tumblers; a railed way extending from the upper tumbler along the under surface of the ladder for a part of its length, being disconnected at a convenient point allowing enough of the dredge-chain and buckets at the lower end of the ladder to hang free, to provide sufficient drag; and a guard for holding the chain-carriers traveling along the railed way on the under side of the ladder against a lateral thrust or strain, substantially as described.

3. The combination in a dredging or excavating machine of a tower; bearings thereby supported; a dredge-ladder provided at its upper end with hollow trunnions, supported in said bearings; a shaft journaled in the trunnions; tumblers for the dredge-chain, the upper of which is mounted on said shaft; a railed way extending the length of the upper surface of the ladder and leading from and to the tumblers; a railed way extending from the upper tumbler along the under surface of the ladder for part of its length, being disconnected at a convenient point, allowing enough of the dredge-chain and buckets at the lower end of the ladder to hang free, to provide sufficient drag; and a guard for holding the chain-carriers traveling along the railed way on the under side of the ladder against a lateral thrust or strain, the tumblers being adapted to allow the traveling carriers to pass between their sides, while the chain passes over their rims, substantially as described.

4. The combination in a dredger or excavating-machine of a tower; bearings thereby supported, comprising the plates m and caps therefor; the trunnions having flanges i^3; a dredge-ladder provided at its upper end with perforated plates h h', inserted on the trunnions, and the latter being supported in the tower-bearings; a shaft journaled in the trunnions; tumblers for the dredge-chain, the upper of which is mounted on such shaft; an endless dredge-chain and buckets; traveling carriers therefor, attached below the chain and narrowed toward the base, so that such carriers in width occupy only a portion of the space within the span of the buckets; a railed way extending the length of the upper surface of the ladder and leading from and to the tumblers; a railed way extending from the upper tumbler along the under surface of the ladder for part of its length, being disconnected at a convenient point, allowing enough of the dredge-chain and buckets at the lower end of the ladder to hang free, to provide sufficient drag; and a guard for holding the chain-carriers traveling along the railed way on the under side of the ladder against a lateral thrust or strain, the tumblers being adapted to allow the traveling carriers to pass between their sides while the chain passes over their rims, substantially as described.

5. The combination with the dredge-ladder and the tumblers for the dredge-chain, of an

endless dredge-chain and buckets; traveling carriers therefor attached below the chain and narrowed toward the base, so that such carriers in width occupy only a portion of the space within the span of the buckets; a railed way extending the length of the upper surface of the ladder, leading from and to the tumblers, a railed way extending from the upper tumbler along the under surface of the ladder for a part of its length, being disconnected at a convenient point, allowing enough of the dredge-chain and buckets at the lower end of the ladder to hang free, to provide sufficient drag, such railed way consisting of the channel-irons suspended from the ladder and provided with rails on the interior of their upper and lower flanges; and a guard for holding the chain-carriers traveling along the railed way on the under side of the ladder against a lateral thrust or strain; the tumblers being adapted to allow the traveling carriers to pass between their sides while the chain passes over their rims, substantially as described.

6. The combination with the dredge-ladder and the tumblers consisting of two side plates having ledges on their inner faces, providing interrupted, narrow rims on which to receive the dredge-chain, and leaving ample space between such rims for the carriers to pass through; a railed way extending the length of the upper surface of the ladder and leading from and to the tumblers; a railed way extending from the upper tumbler along the under surface of the ladder for part of its length; the dredge-chain and buckets; and the carriers therefor attached below such buckets, the carriers comprising a body having a journal-box at its base and axle, the flanged wheels adapted to revolve independently of each other, and the beveled glands *t*, and packing therein, projecting the abutting faces of the hubs of said wheels, and the ends of the journal-boxes, substantially as described.

In testimony whereof I have hereunto affixed my signature, in the presence of two witnesses, this 19th day of December, 1899.

ISAAC B. HAMMOND.

Witnesses:
T. J. GEISLER,
L. D. HENDERSON.