(No Model.) 8 Sheets—Sheet 1.

T. Z. COLE.

DREDGING MACHINE.

No. 342,732. Patented May 25, 1886.

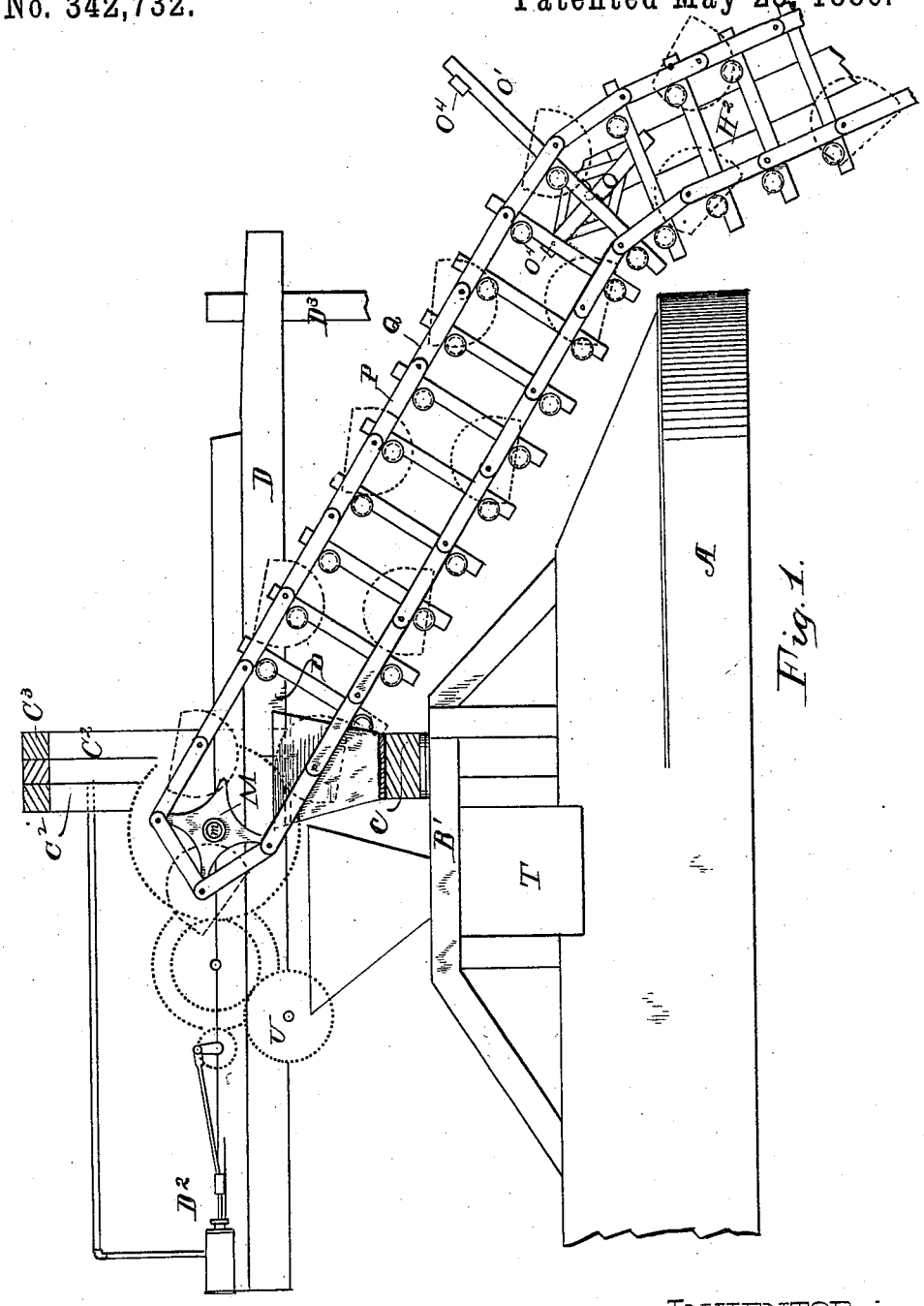

Fig. 1.

WITNESSES:

R. D. Girk

H. Wilson

INVENTOR:

T. Z. Cole

By D. D. Girk

Attorney.

(No Model.) 8 Sheets—Sheet 2.

T. Z. COLE.

DREDGING MACHINE.

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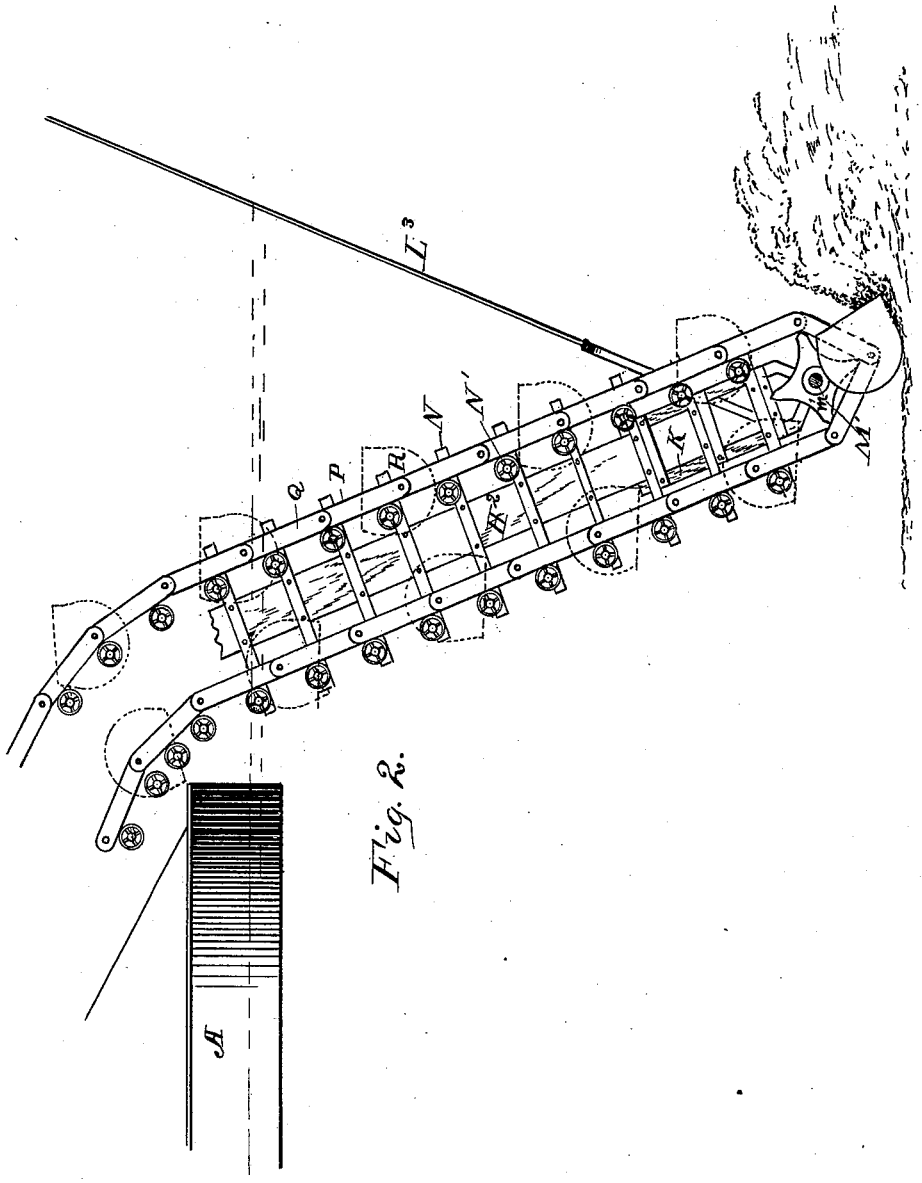

Fig. 2.

WITNESSES:

R. D. Gerhardt

Henry Wilson

INVENTOR:

T. Z. Cole

By L. S. Gerhardt

Attorney.

(No Model.) 8 Sheets—Sheet 3.

T. Z. COLE.

DREDGING MACHINE.

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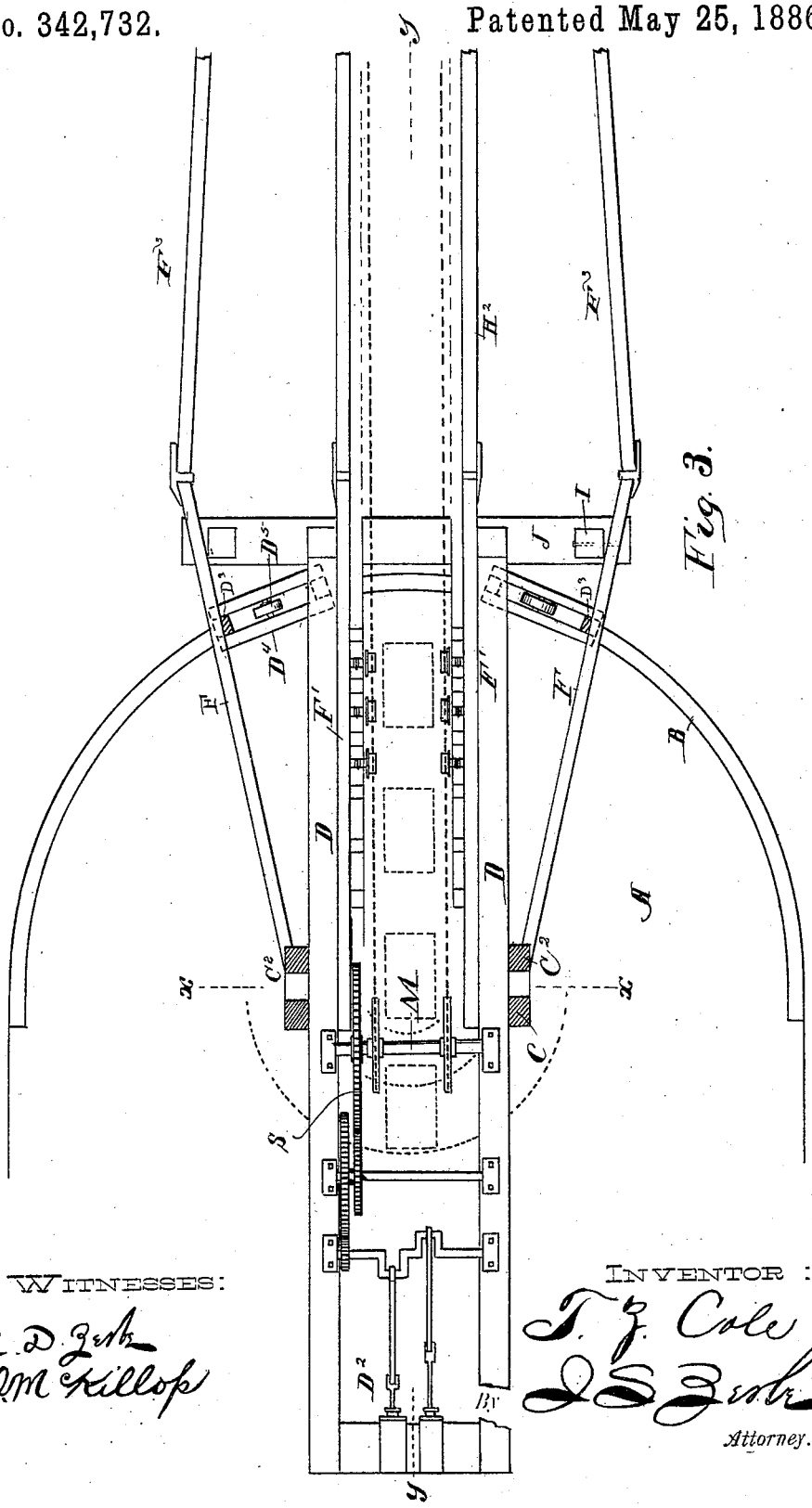

Fig. 3.

WITNESSES:

C. D. Zerbe
D. M. Killop

INVENTOR:

T. Z. Cole
D. S. Zerbe
Attorney.

(No Model.) 8 Sheets—Sheet 4.

T. Z. COLE.

DREDGING MACHINE.

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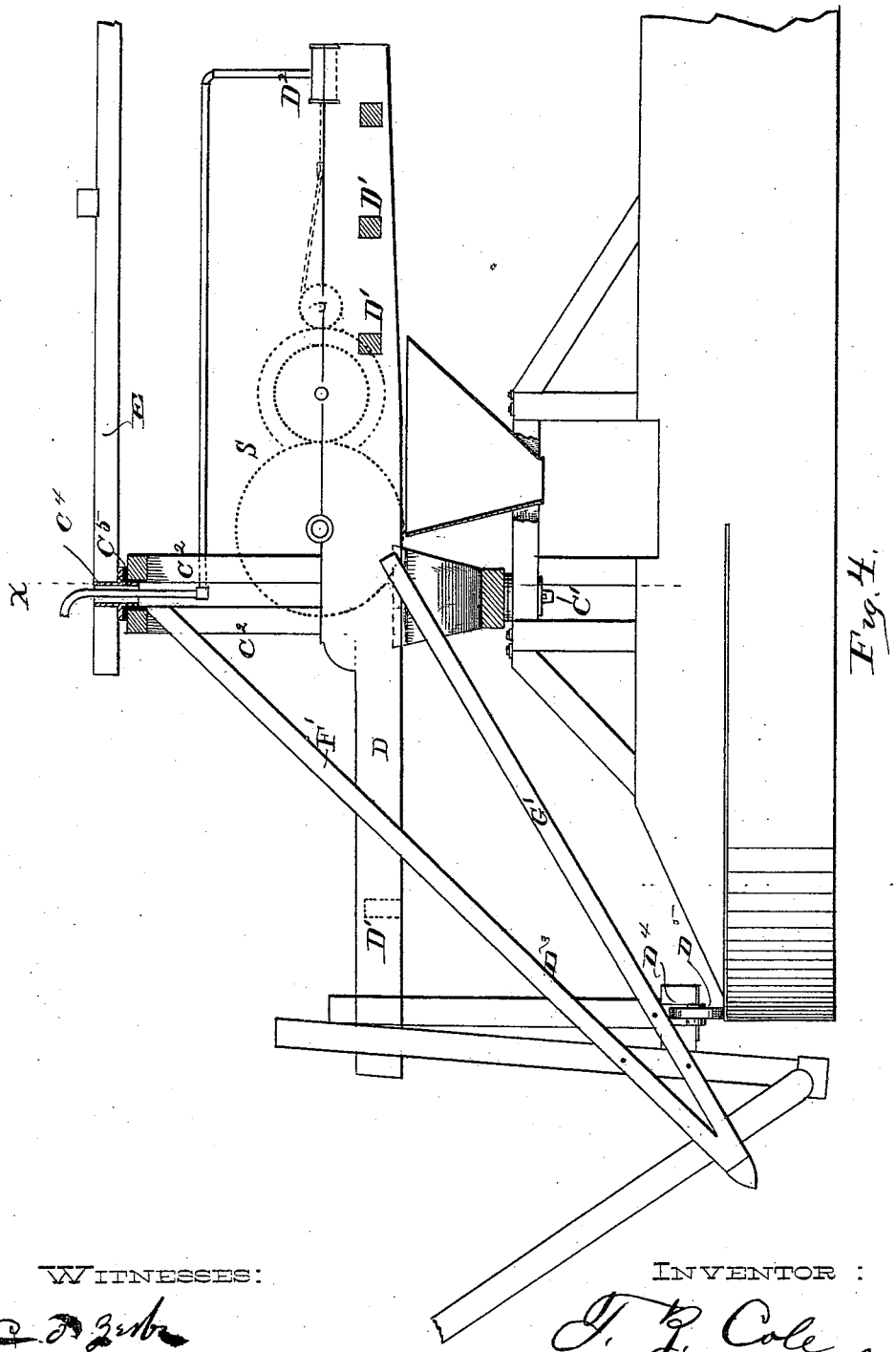

Fig. 4.

WITNESSES:

C. F. Zerbe

D. McKillop

INVENTOR:

T. Z. Cole

By D. F. Zerbe

Attorney.

(No Model.)

8 Sheets—Sheet 5.

T. Z. COLE.

DREDGING MACHINE.

No. 342,732. Patented May 25, 1886.

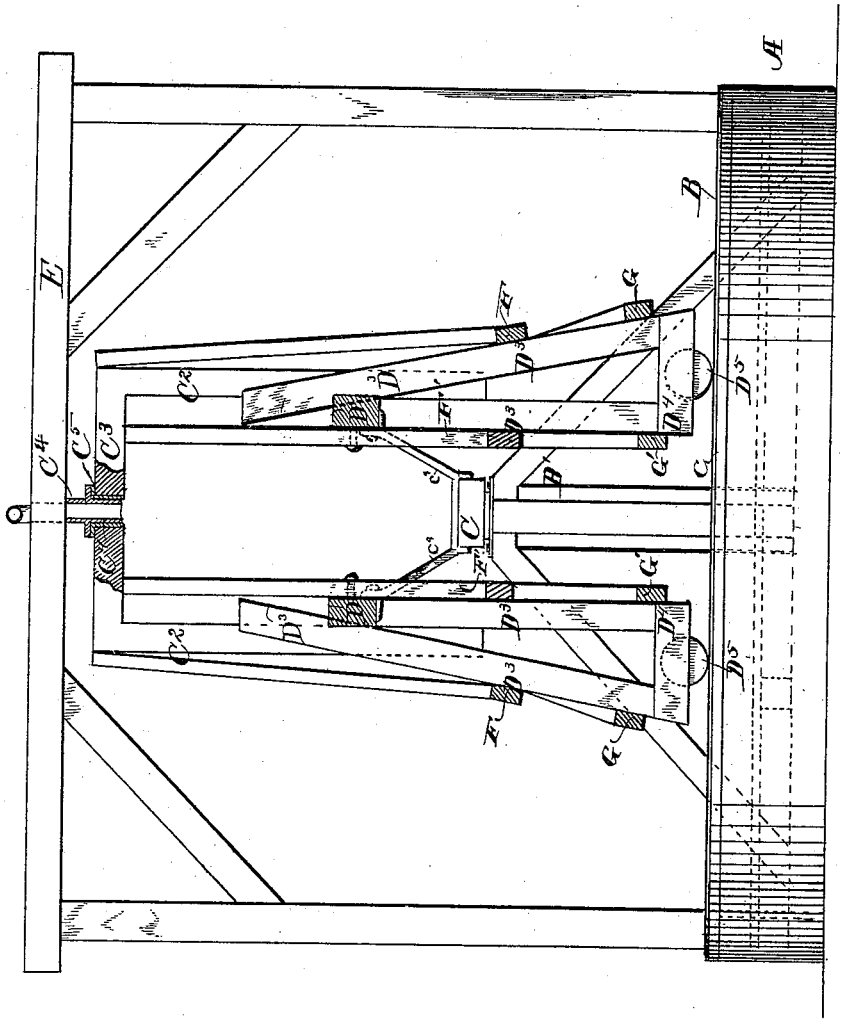

Fig. 5.

WITNESSES:

C. D. Gorlz

H. Wilson

INVENTOR:

T. Z. Cole

By D. D. Gorlz

Attorney.

(No Model.)

8 Sheets—Sheet 6.

T. Z. COLE.

DREDGING MACHINE.

No. 342,732. Patented May 25, 1886.

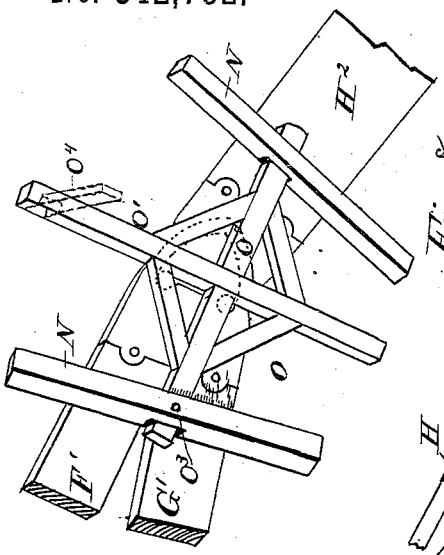

Fig. 8.

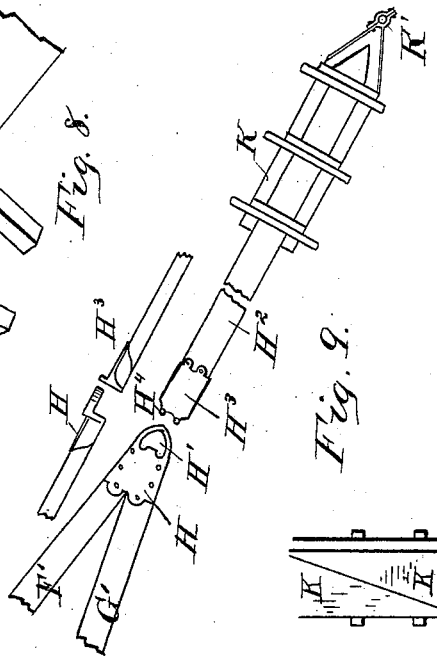

Fig. 9.

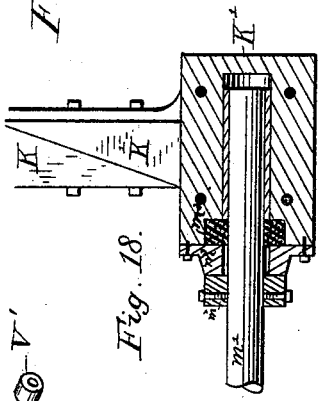

Fig. 18.

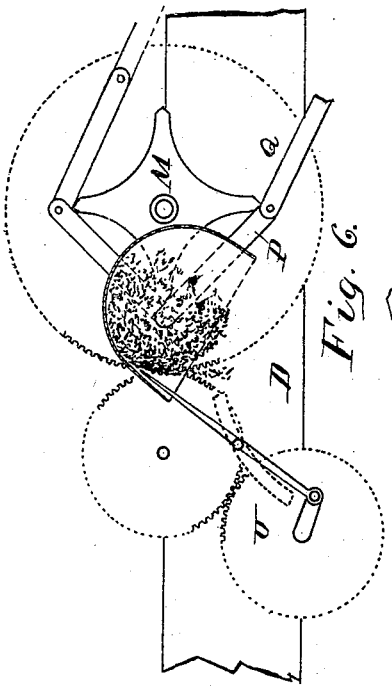

Fig. 6.

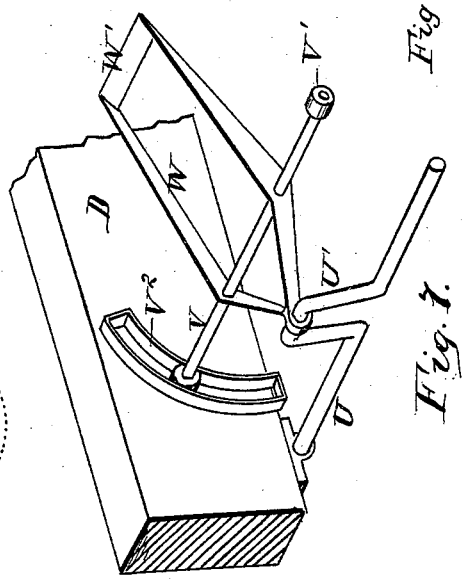

Fig. 7.

WITNESSES:

C. F. Gerlach

W. A. Gaines.

INVENTOR:

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By D. D. Gerlach

Attorney.

(No Model.) 8 Sheets—Sheet 7.

T. Z. COLE.

DREDGING MACHINE.

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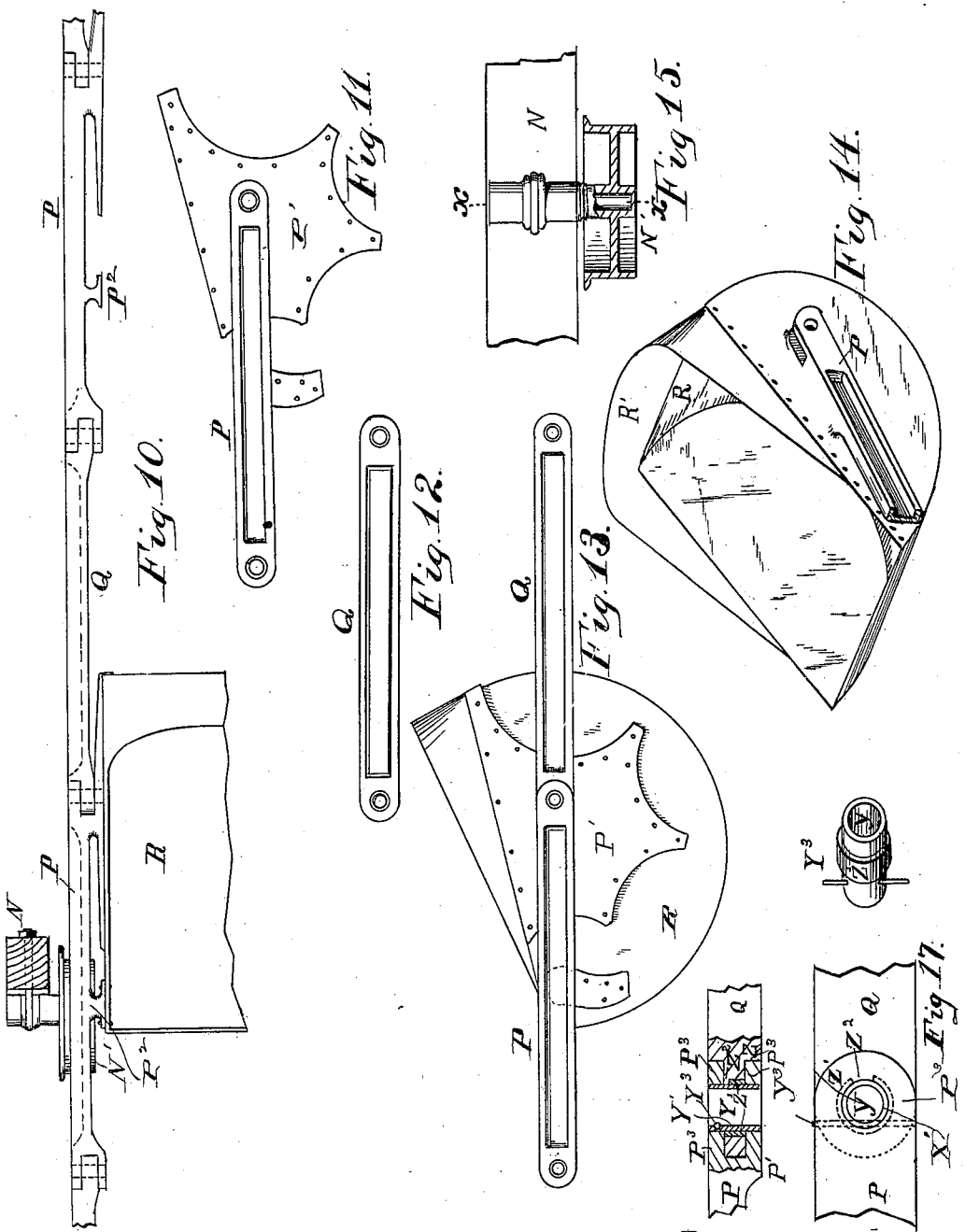

WITNESSES:

C. D. Wright
D. McKillop

INVENTOR:

T. Z. Cole
By L. S. Lorh
Attorney.

(No Model.) 8 Sheets—Sheet 8.

T. Z. COLE.

DREDGING MACHINE.

No. 342,732. Patented May 25, 1886.

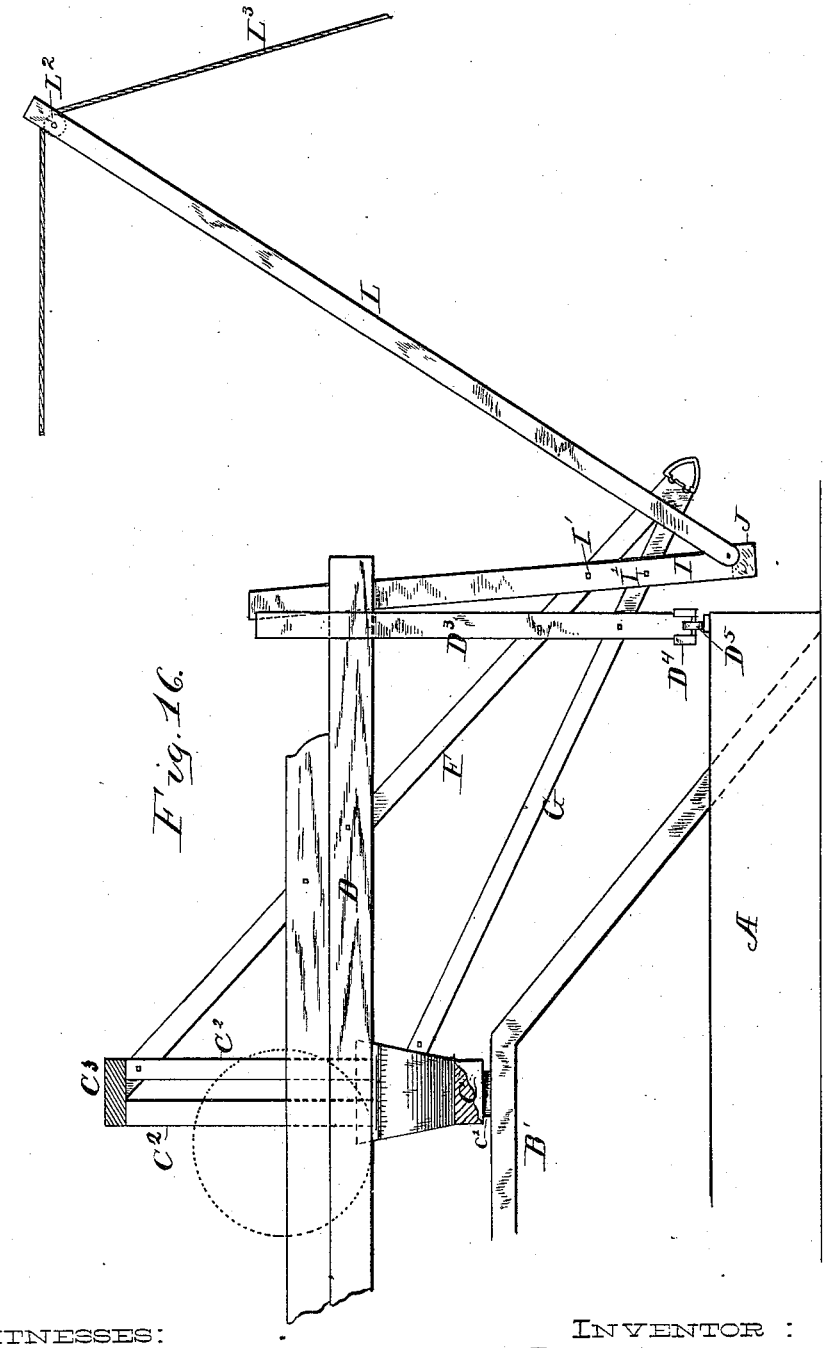

Fig. 16.

WITNESSES:

C. D. Zurk

H. Wilson

INVENTOR:

T. Z. Cole

By D. S. Zurk

Attorney.

UNITED STATES PATENT OFFICE.

THOMAS Z. COLE, OF NEW ORLEANS, LOUISIANA, ASSIGNOR OF ONE-HALF TO HENRY WILSON, OF DENVER, COLORADO.

DREDGING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 342,732, dated May 25, 1886.

Application filed May 20, 1885. Serial No. 166,082. (No model.)

To all whom it may concern:

Be it known that I, THOMAS Z. COLE, of New Orleans, in the parish of Orleans and State of Louisiana, have invented a new and useful Improvement in Dredging-Machines, which improvement is fully set forth in the following specification and accompanying drawings, in which—

Figure 1 is a sectional side elevation of the front end of the scow, showing the dredger mechanism mounted thereon. Fig. 2 is a sectional side view of the submerged end of the dredger. Fig. 3 is a top view, with parts omitted for the sake of clearness. Fig. 4 is an enlarged central vertical section, also with parts omitted. Fig. 5 is a vertical cross-sectional view on line *x x*, Fig. 3. Fig. 6 is an enlarged side view, partly in section, of the upper end of the bucket-chain, showing the scraping-plate and its relation to the bucket. Fig. 7 is a perspective view of the scraper. Fig. 8 is a side view of the brace or frame located at the connecting-joint of the bucket-carrier frame. Fig. 9 is a detailed view of the extensible frame which carries the chain and buckets. Fig. 10 is an enlarged top view of the chain or links, showing the manner of attaching the buckets thereto. Figs. 11 and 12 are side views of the links. Fig. 13 is a side elevation of a bucket attached to the links. Fig. 14 is a perspective elevation of the bucket. Fig. 15 is a top view, partly in section, of one of the wheels upon which the links travel; and Fig. 16 is a sectional view of Fig. 3 on the line *y y*. Fig. 17 shows three views of the bushing for the links and wheels. Fig. 18 is a detail in section of the lower shaft and packing for the bucket-chain tumblers.

My invention relates to machines for dredging purposes, of the class which are mounted upon scows or boats, although it is obvious that this same mechanism can be readily adjusted or adapted to be placed upon a vehicle or land conveyance of any kind, so that the machine can be operated as well upon land as on water. For the purpose, however, of fully explaining its construction and operation as at present completed, I prefer to describe it mounted upon a scow or suitable vessel. Heretofore considerable difficulty has been experienced in machines of this character, particularly in the construction of the buckets and links, in the manner in which they operate in dredging the earth and also in deposting the contents, as well as in moving the bucket-carrier frame at the proper angle to do the dredging-work, and in moving the frame laterally from side to side. My invention has special reference to these features, for all of which it provides in a simple manner; and the invention also pertains to the construction of details in the various operative parts of the machine, all of which will now be fully set forth in detail.

In the accompanying drawings, A represents a scow having its forward end circular in form, provided at a suitable elevation above the water-line with a horizontal and circular track, B, as shown more particularly in Fig. 3. Within this circular track on the scow is built a suitable frame, B′, upon which is mounted the mechanism herein to be described.

The main frame, which I will now describe, is composed of a piece, C, which carries the gudgeon C′ at its lower end socketed in the frame B′, referred to.

Projecting upwardly from the base-piece C are the arms or posts C^2—one or more on each side—and which extend up to the plate C^3 or are fastened to the beams D. A suitable distance above the gudgeon or pivotal point are two horizontally-disposed beams, D, secured by braces and bolts to the posts C^2. These beams D project forwardly and rearwardly of the posts C^2 and are united by cross-ties D′ at suitable intervals fore and aft.

Upon the rear end of the foundation thus formed by the plates D and ties D′ is mounted the steam-engine D^2 for propelling the dredger, while the forward ends of the plates or beams D carry the dredging apparatus or support and steady the same. The forward ends of the beams D project slightly beyond the end or circular part of the scow A, as shown in Figs. 1 and 4.

Centrally in the upper part of the cross-beam C^3 is a hollow pivot, C^4, which pivot is journaled in a suitable bearing, C^5, in such beams C^3 and passes up through the supporting band or frame E, which is built up from the scow. One or more of these bands may be so located as to steady the dredging appa-

ratus and give stability to the structure. The steam for supplying the engine D^2 passes through this hollow pivot and is conveyed thence to the engine by means of a suitable joint at or near the pivotal point of the frame.

Projecting downwardly from the forward ends of the beams D at each side are four posts, D^3—two on each side. These posts may either be parallel with each other or slightly spread apart at their lower ends, and be joined together by timbers D^4, so as to admit wheels D^5 between said ties D^4, as shown in Figs. 3, 4, and 16. The posts D^3 are of such a length and so located that the wheels D^5 revolve upon and traverse the circular track B of the scow. The posts D^3 are located outside of the beams D, and to steady and support these posts braces G, secured to the lower ends of the posts C^2, project downward and forwardly alongside of the lower end of the posts D^3, terminating at the point directly forward of or in a horizontal line with the track B on the scow. Two braces, G, branch outwardly, and two inner ones, G′, are parallel with each other, being placed on the inside of the beams D.

F represents the upper braces on the outside of the beams D, the upper ends of which are secured to the upper ends of the posts C^2, the lower ends passing the posts D^3, so as to form a V with the lower ends of the braces G, by means of a coupling similar to that connecting F′ and G′, and which will be hereinafter described, which connects with pieces F^3 F^3. It will be observed that the two inner braces, F′, are parallel with each other on the inside of the beams D, and are each fastened to the parallel beams G′ at their lower ends in like manner as the beams F and G are fastened to each other, and this connection also forms the joint with the frame H^2, which serves as a support for the conveyer-links or chain and buckets.

Projecting downwardly from the forward end of the beams D are posts I, which pass the braces F and G, and are bolted thereto at I′. These posts I extend down to the water-line, and are united at their lower ends by a horizontal cross-beam, J.

Hinged either to the horizontal beam J or to the posts I is the lower end or end pieces of the posts of the derrick-frame L, for purposes which will be hereinafter explained.

It will be observed that while the entire frame containing the operative mechanism of the dredger is located upon the pivot C′ on the scow the forward end of this frame, which carries the bucket-frame and carrier, rests upon the dependent posts D^3, which have the wheels D^5 on the lower ends rolling upon the track B. Thus the entire machinery can be turned at will, so as to present the projecting bucket-carrier frame either directly forward of the scow or to either side without interfering with the operation of the dredging-buckets or of the carrier-frame.

To understand fully the construction of the bucket-carrier frame I will refer to the detailed view in Fig. 9. It will be observed that the lower ends of the braces F′ and G′ are united by means of a V-shaped joint, H. The lower end of this joint has an extension having therein a heart-shaped aperture H′. The lower frame, H^2, which is the extensible and adjustable carrier-frame, has at its upper end a joint-plate, H^3, on the end of which are two lugs, H^4. These lugs enter the heart-shaped recess of the joint H, and are designed to provide for the taking up of the slack caused by moving the lower carrier-frame, H^2, in either direction above or below a straight line. The lower end of the frame H^2 has a spliced frame, K, secured thereto adjustably, so that it may move downwardly to lengthen the frame H^2 or move upwardly to shorten the same, as the case may be. The lower end of this spliced frame K has a suitable box, K′, to receive the shaft which carries the pulley or tumbler for the lower end of the carrier-links, and the boxing in this frame is provided with packing material, so as to prevent dirt, sand, and other extraneous matter from entering, as represented in Fig. 18, wherein m' shows the tumbler-shaft and m^2 the packing about the shaft. The box that the bucket-shaft m' runs in is closed at the outer end of the said shaft, as shown in Fig. 18. At the inside end of the box there is a recess for the packing m^2, said packing being properly held in place by a packing-box, m^3, and next to this is an adjustable collar, m^4, which can be regulated according to the wear.

It will be noticed that the derrick-frame L has at its upper end a pulley, L^2, and a rope, L^3, secured to the stirrup projecting upwardly from the lower end of the spliced frame K, passes over this pulley L^2, and thence rearwardly to the engine. By this means the lower end of the bucket-carrier frame H^2 is moved to any angle desired for dredging purposes, so as to bring the buckets in contact with the earth to be excavated. It is the movement of the lower end of this carrier-frame that requires the double-lug joint H^4, heretofore described, by means of which the links of each of the carrier-buckets are kept sufficiently taut when the carrier-frame is moved above or below a straight line.

Fig. 6 shows the pulley M on the pivoted frame on which the bucket-links are placed, and M′, Fig. 2, shows the pulley on the lower end of the extensible carrier-frame K. It should be noted that there are two of these extensible carrier-frames H^2 K, placed side by side a suitable distance apart, so as to admit space enough to place the buckets between them, and on the inside of each of these extensible frames H^2 K, and along the inner sides of the downwardly-projecting pieces F′ G′, are placed bars N, which project above and below the frame, and these are secured to the carrier-frame at regular intervals, and at right angles to the direction of the frame and above the

joints H H^3 these bars are placed at right angles to the direction of the travel of the links which carry the buckets. On the inner side of these bars, both above and below the frame to which they are attached, are small wheels N′, (shown more fully in Fig. 15,) the upper edges of the upper pulleys being on a line with the upper faces of the pulleys M M′, and the upper faces of the pulleys on the lower ends of these bars are a sufficient distance below the lower faces of the pulleys M M′ to admit of the thickness of the links which carry the buckets, as will be hereinafter more particularly described. The wheels N′ and the bars N of the pivoted frame are therefore at all times at the same general angle down to the joint or pivot H H^3, and since the frame H^2 below the pivot will necessarily be subject to change in location by having its lower end moved up or down, it is necessary to make some provision for the gradual turn of the bucket-link over that point directly affected by the joint, and to accomplish this I have provided a swiveled compensating frame. (Shown in detail in Fig. 8.) This consists of the cross piece or frame O, wherein the vertical piece O′ is also equipped with wheels N′, above and below, and centrally has a cross-piece, O^2, one end of which is hinged at O^3 to the next cross-bar, N. The vertical bar O′ of the cross is somewhat longer than the other bars, and has a cross-piece, O^4, which passes over to a similar cross-frame on the other side, so that both of these crosses or swiveled frames will move synchronously when the lower end of the carrier-frame is moved at any different angle. This swiveled frame is located at the joint H H^3, and as the lower end of the cross-piece O^2 passes through the slot or housing in the next cross-bar below it will be seen that while the bars N N, above and below the joint, may be arranged at any angle to each other or parallel to each other the bar O′ will assume an angle midway between the angles assumed by the bars above and below the joint. A joint similar to this is further necessary, for the reason that the vertical bar O′, having the wheels N′, cannot be attached to the frame H^2 nor to the braces or bars F′ G, owing to the location of the joint heretofore described. These wheels N′ may be further described as being provided with a hub that is closed at one end to conceal the arbor upon which it is mounted, to prevent sand, dirt, water, &c., from getting into the bearings of the wheel. The action of the chain running on the wheels will serve to retain the wheels on the arbors, or there may be provided any suitable means to retain the wheel in place on the arbor.

In order to more fully understand the construction and arrangement of the links which carry the buckets over the wheels N′ and pulleys M M′, I refer to Figs. 10, 11, and 12, wherein it will be seen that the bucket is attached to each alternate link, the bucket-link P having at its rear end on its inner side a flange, P′, cast therewith. This flange may be merely a flat plate or spider, to which the side of the bucket is attached; or it may be cast in the shape and size of the side of the bucket, so that the bottom of the bucket can be attached thereto directly. In any event, however, I propose to have the side of the bucket or flange, as shown as P′, for attaching the bucket thereto cast with the link P, and about midway in the link is a lug or projection, P^2, which also projects out from the side and is riveted to the bucket. In case, however, the entire side of the bucket is cast with the link, this lug P^2 may be dispensed with, if desired. The intermediate link, Q, is hinged to the bucket-link P in any suitable manner, but preferably to one side of the center of the bucket, and may be made in any manner best adapted to perform the work. The link P is at an angle less than a right angle to the top of the bucket, in order to give the cutting-edge of the bucket a proper pitch in making the cut as it digs into the mud at the bottom of the frame which supports the endless chain carrying the bucket.

In Figs. 13 and 14 I show side and perspective views of the bucket R. The main body of the bucket R is formed semicircular in side view, with the pivotal point R′ of the bucket slightly to one side or nearest that edge of the bucket upon which the steel cutter is placed. The main body of the bucket R is riveted or bolted to the side pieces, and upon the forward side is placed a steel cutter, R′, and this steel cutter has its ends lapped along the said edges of the bucket, so as to protect the soft metal of the bucket from wearing. The links P Q, carrying the buckets, as shown in Figs. 1 and 3, ride upon the train-wheels N′, and also over and around the pulleys M M′. The adjustable frame K, on the lower end of the carrier-frame H^2, can at any time be moved downwardly, so as to compensate for the wear of the joints of the links and thus prevent sagging of the buckets. The upper pulley, M, is connected by a suitable train of mechanism with the drive-engine, so as to propel the links and buckets, and in order to provide for the positive ejectment and cleaning of the buckets, after being filled with the earth, I have constructed the device shown in Figs. 6 and 7. It will be observed that the pulley M is driven by cog-gearing S; hence the upper buckets move upwardly or toward the engine, which is located on the rear of the pivoted frame, and the buckets thereof pass with their loads over the pulley M, and deposit their contents into the space T, to the rear of the pivot of the frame and to a suitable elevator or conveyer provided below. To the rear of the pulley M and at an angle of forty-five degrees or thereabout below its shaft is placed a cross-shaft, U, and crank U′. On the inner sides of the beams D D, and on a line between the shaft U and the shaft of the pulley M, is a curved slot or guideway. Between these bars, and

resting in these curved slots or guideways, is a bar, V, having at each end friction-pulleys V′. Centrally on the bar V is a scraper which is composed of the two bars W, united at their rear ends and journaled to the crank U′. Their forward ends have a flattened cross-piece, W′, which constitutes the scraper, and this is made of such shape and size that it will fit the interior of the bucket from side to side, and thus be adapted to perform the work for which it was designed. The object of thus hinging said scraper to the crank and locating it upon the cross-bar V, capable of sliding within the curved guideways, is to compensate for the motion of the bucket in its downward descent, since it is desired to cause the end of the scraper to enter the initial or cutting point of the bucket, and as the bucket moves downwardly enable the scraper to traverse the circle of the bottom of the bucket, and then free itself from the bucket the moment the bucket has completed its circle around the pulley M. This is accomplished by causing the crank-shaft U to rotate in the same direction as the pulley M, and causing the point of scraper W′ to enter the bucket at that point of the rotation of the crank which is farthest from the pulley M, so that as the bucket moves downwardly, the scraper rapidly enters the bucket, and the curved guideway at the same time compensates for the downward movement of the rotation of the bucket on the pulley M. As soon as the crank U′ has passed to its highest point and descends to its initial point, the scraper is again in position to meet the next bucket, which in the interval has passed around the upper side of the pulley.

In the operation of the dredger the links are exposed to a great deal of wear where they are hinged together, owing to the fact that the links pass through the water or come in contact with the dirt, sand, and gravel. The links are of course much more expensive than the pins which hold them together, and therefore it is an object to so construct the link-joints that the wear will be obviated as much as possible. The three views of Fig. 17 show the manner in which I provide for this. Y represents a steel pin with its ends flush with the sides of the link P. This pin is within a metal bushing, Y′, and this bushing enters the ears P^3 of the link. A pin, Y^3, is driven through one of the ears P^3, traversing the bushing Y′ and also the pin Y, thereby holding them from turning. The tongue Z of the link Q has also a bushing, Z′, around it, and on one side of the tongue some of the metal Z^2 is left standing, so that the ends of the bushing Z′ will rest against the metal and prevent the bushing from turning independently of the tongue Z. Thus the bushings Y′ and Z′ wear against each other, and should they at any time become too much worn they can be easily and quickly replaced without necessitating the change of links or of buckets in cases where the links are cast with the buckets. I design having these bushings placed on all parts of the dredger that may be exposed to wear—such as, for instance, the wheels and the pulleys—if it should be considered advisable to do so.

What I claim as new is—

1. In a dredging-machine, the pivoted or swinging frame carrying the engine, having the downwardly-projecting stanchions or braces united at their lower ends and attached by means of a hinge or joint with the movable frame for supporting the bucket-links, said stanchions or braces having also the bars thereon to which the wheels are secured for supporting the bucket-links, substantially as herein set forth.

2. The forwardly-projecting braces or stanchions F G, having at their lower joined ends the metallic joint provided with a vertically-disposed heart-shaped aperture, in combination with the joint on the submerged carrier-frame H^2, having projecting sidewise from said joint two lugs—one on each side of the median line of said joint—substantially as herein set forth.

3. The submerged carrier-frames H^2, having on their lower ends the extensible frames K, which lap and slide on said frames H^2, and having on the lower ends of said extensible frames suitable boxing closed at one end to conceal the shaft in which the shaft of the carrier-pulley is journaled, substantially as herein set forth.

4. The submerged cross-shaft on the lower end of the extensible frame journaled to the boxing, said boxing being provided with a packed and closed end to prevent the sand from entering the boxing and coming in contact with the wearing-surface, substantially as herein set forth.

5. The combination of the lower movable carrier-frame having the caster-bars, and the caster-bars on the stanchions of the pivoted frame, with the bar O′, located at the joint of the carrier-frame, having the cross-bar O^2 hinged at one end to the adjacent caster-bar N, and the opposite end of the said cross-bar resting in a slot or housing of the opposite bar, substantially as herein set forth.

6. The two pairs of downwardly-projecting parallel braces or stanchions F′ G′ and the two pairs of downwardly-projecting braces F G, branching from each other and terminating on a line at a point directly forward of the circular track on the scow, in combination with the forwardly and downwardly projecting carrier-frame pieces H^2, which are hinged to the two inner parallel stanchions, F′ and G′, and two braces, F^3, hinged to the outer traveling stanchions, F and G, and whose lower ends are attached to the submerged end of the carrier-frame, substantially as herein set forth.

7. The combination of the pivoted frame composed of the horizontal beams D, and the pivot-posts having on the forward ends of said beams the downwardly-dependent posts D^3,

carrying the wheels, which travel on the circular track and forwardly of said posts, the posts I, joined at their lower ends by the horizontal cross-beam J, and the braces or stanchions F F′ G G′, with the hinged derrick-frame L, secured to the cross-beam J, substantially as herein set forth.

8. In a dredging-machine, an endless chain for moving the buckets, comprising links having cast therewith on one side a flange or plate for the side of the bucket, substantially as herein set forth.

9. In an endless chain for a dredging-machine, links having cast therewith one side of a bucket, substantially as herein set forth.

10. A bucket having the side made semi-circular in form, hinged to an intermediary link, Q, at a point to one side of the center of the bucket, and having an independent steel cutting-edge, the side portions of which lap along and are secured to the side edges of the bucket, substantially as herein set forth.

11. In a dredging-machine, each alternate link cast with the bucket or with the plate on the side of said bucket, said bucket having its cutting-edge elevated above the line of travel of the links.

12. A bucket-scraper for dredging-machines, consisting of the horizontal bar V, whose ends slide in suitable curved guideways, said bar carrying a scraper whose forward end enters the bucket and whose rear end is hinged to a crank, substantially as herein set forth.

13. The scraper herein shown adapted to slide in curved guideways to and from the buckets by means of a crank on the rear end of the scraper, said crank being revolved in the same direction as the travel of the bucket-pulley, substantially as herein set forth.

14. The combination of the bucket R with the scraper W W′, cross-bar V, guides V^2, and the cross-bar shaft U, having the crank U′, substantially as herein set forth.

15. The combination of the boat or car having a circular track on its forward end with the dredging-frame and with the dependent posts D^3, for carrying the supporting-wheels, the hanging posts I, having the connecting cross-beam J at their lower ends, the derrick-frame L, and derrick-rope L^3, with the braces or stanchions F F′ G G′, for supporting and steadying the pivoted frame and bucket-carrier frame, substantially as herein set forth.

16. The combination of the stanchions F F′ G G′, having at their lower ends one portion of the joints with the submerged carrier-frame H^2, having at its upper ends the copulative joints for attaching to the joints of the stanchions, the extensible frame K at the lower end of the carrier-frame, said stanchions and carrier-frames having ranged along on each side the bars N, provided with wheels, the pulleys M M′, and the bucket links or chains P Q, substantially as herein set forth.

17. The combination of the train of bars N on each side of the buckets, having thereon the upper and lower tier of wheels for supporting the bucket-links and at the joint of the frame and stanchions the hinged cross-bars O′ O^2 and the endless bucket chain or links P Q, substantially as herein set forth.

18. The combination of the compensating joint H H^3 with the pulleys M M′ and endless chain or bucket-links P Q, as and for the purpose substantially as herein set forth and described.

19. The ears of the link P, having a metal bushing held from turning by a suitable pin, which also prevents the pivot-pin from turning, and the tongue of the link Q, provided with a metal bushing, the latter also kept from turning independently of the link Q, whereby the wear of the tongue and ears is transferred directly to the said metal bushings, substantially as herein set forth.

20. The ears of the link having a rigid metal bushing extending continuously through both links and the tongue of the adjoining link having a similar rigid metal bushing, substantially as herein set forth.

21. The combination of the link-ears P^3, having the bushing Y′ and the retaining-pin Y^3, with the tongue Z, having the bushing Z′, substantially as herein set forth and described.

22. The bar N, carrying the wheel N′, provided with a hub closed at one end to conceal the arbor upon which the wheel is mounted, in combination with means to hold the said wheel on its arbor, substantially as described.

In testimony that I claim the foregoing I having hereunto set my hand, this 8th day of May, 1885, in the presence of witnesses.

THOMAS Z. COLE.

Witnesses:

EMILE C. JEUNESSE,

B. A. RODRIGUEZ.