No. 702,705.

Patented June 17, 1902.

E. CHAQUETTE.

FLOATING DREDGE.

(Application filed Nov. 26, 1901.)

(No Model.)

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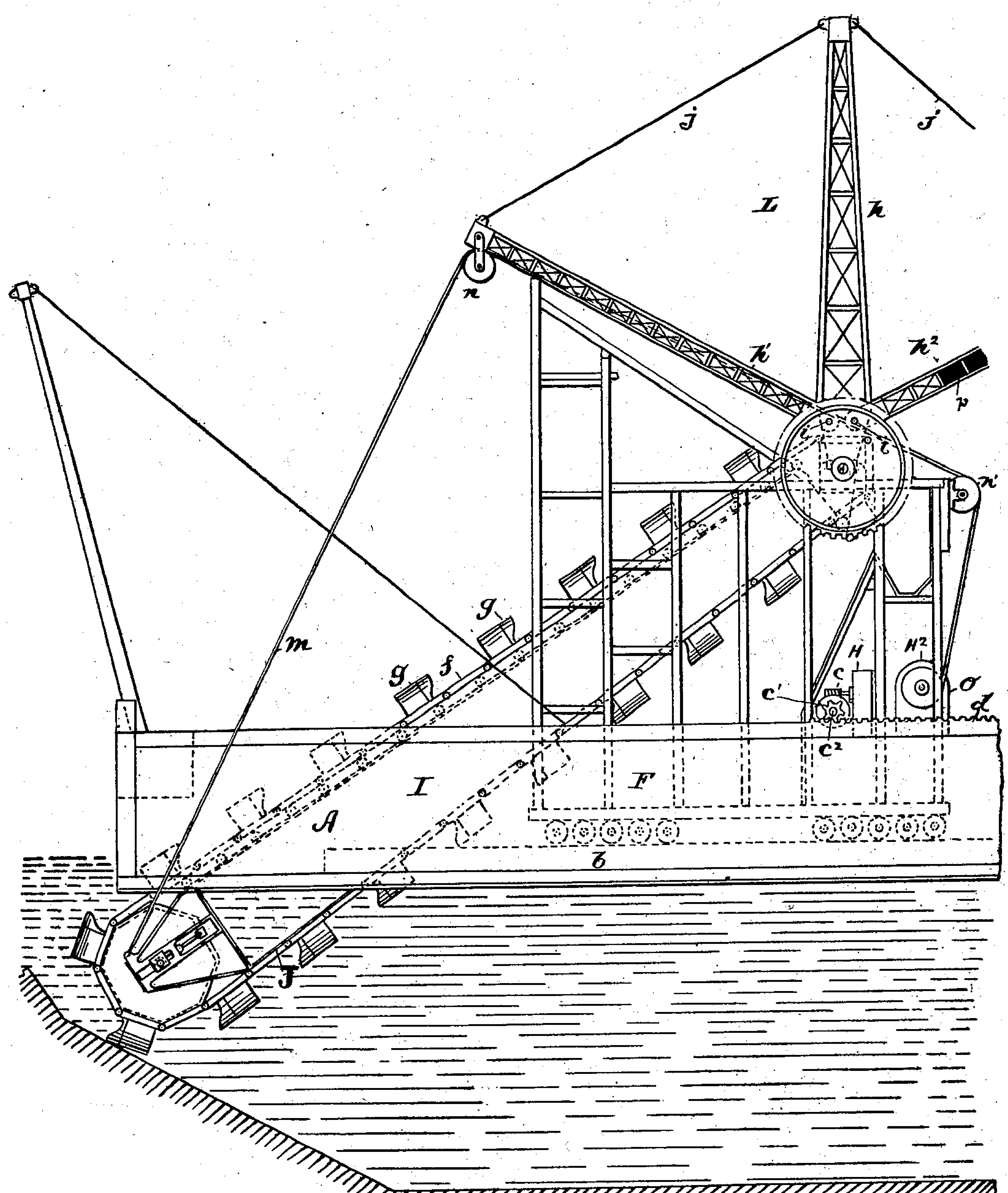

Fig. 1.

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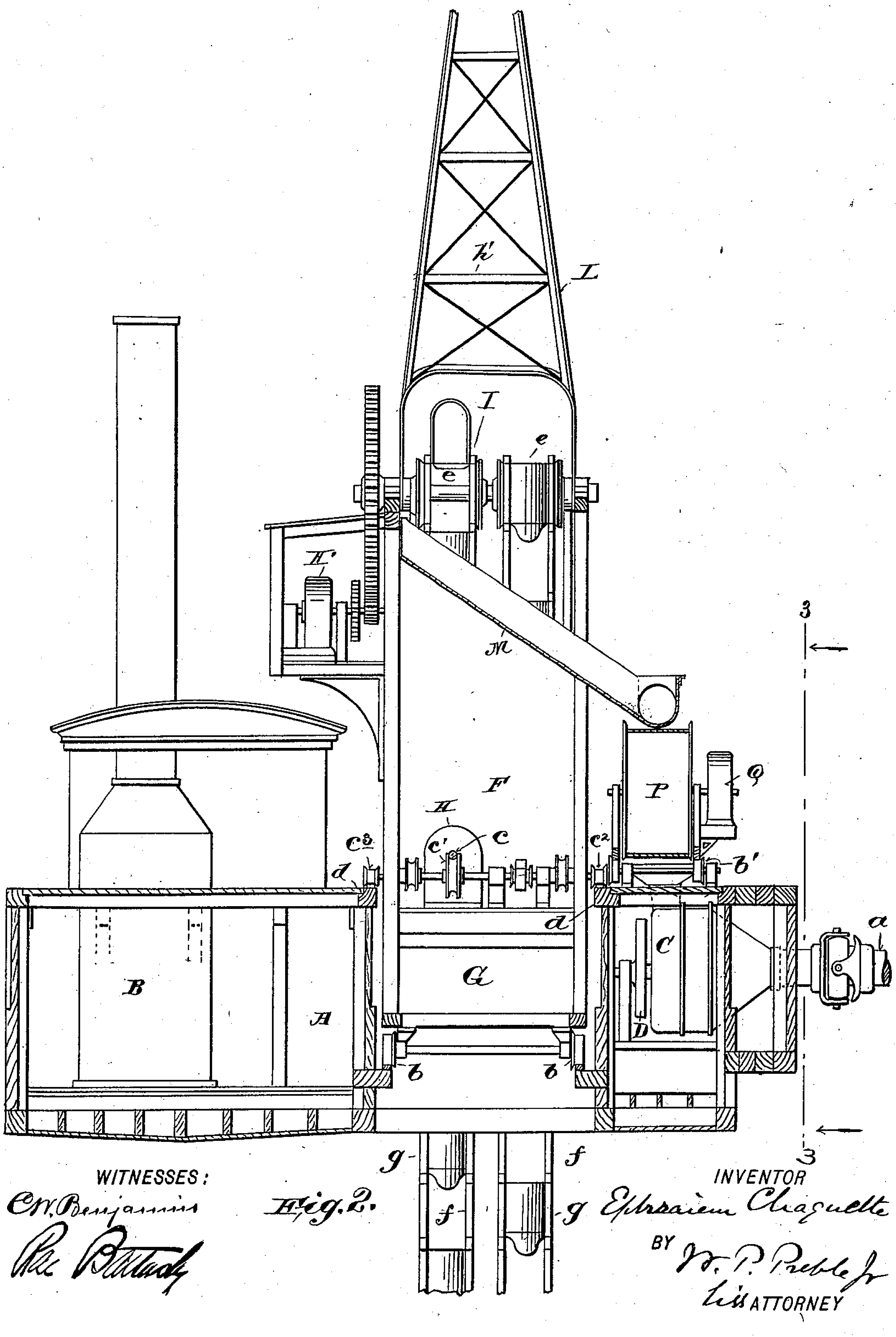

Fig. 2.

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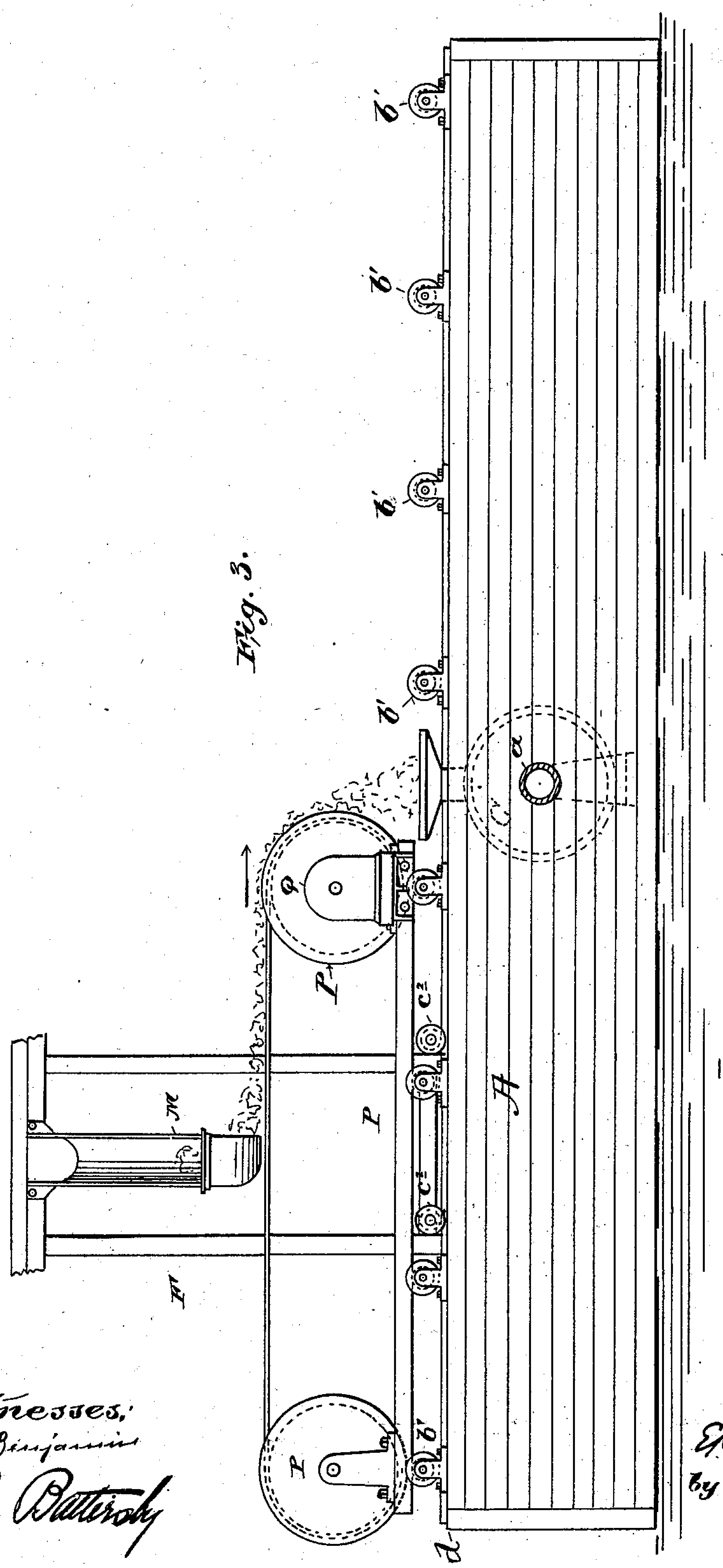
Fig. 3.



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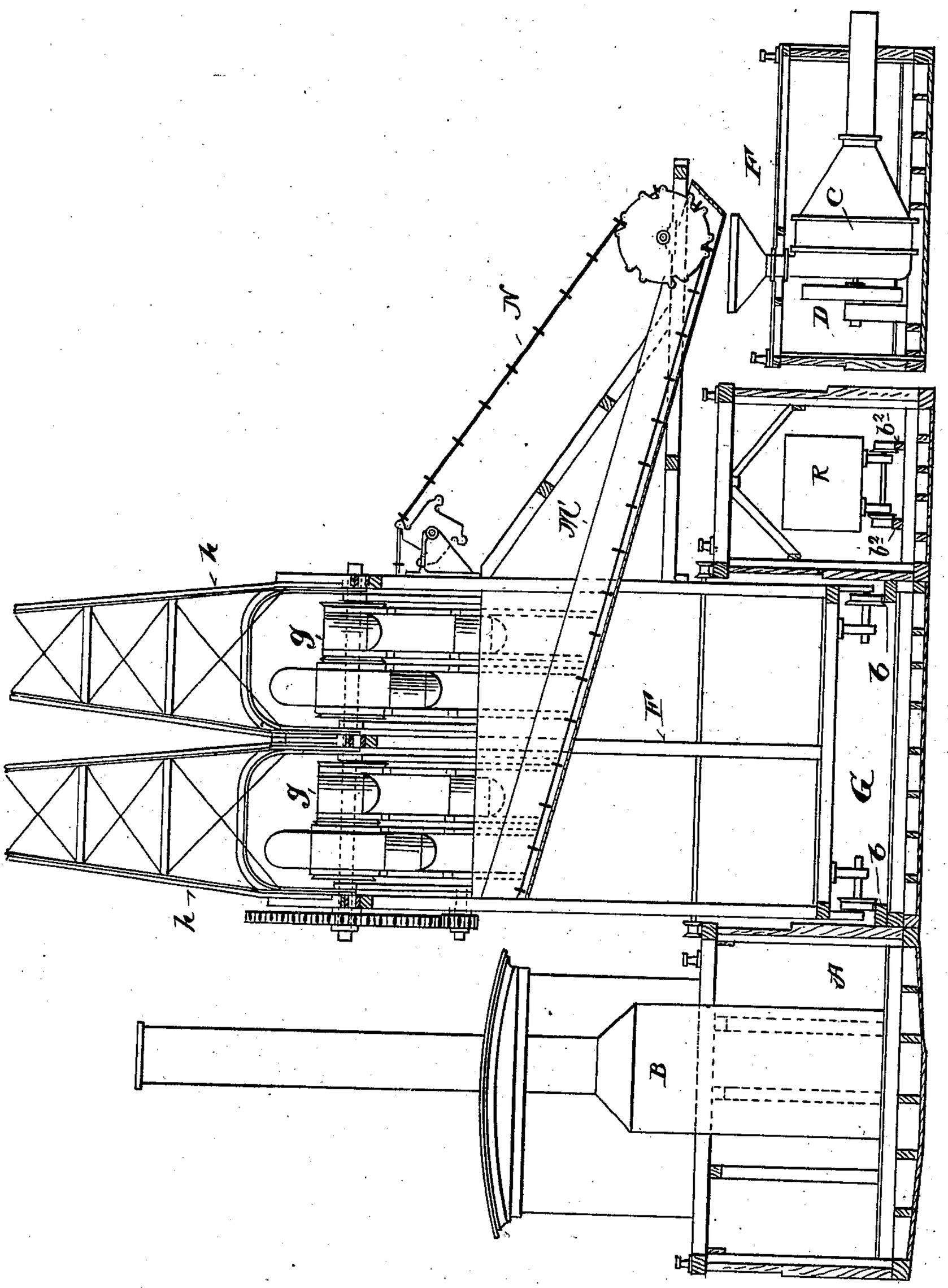

Fig. 4.

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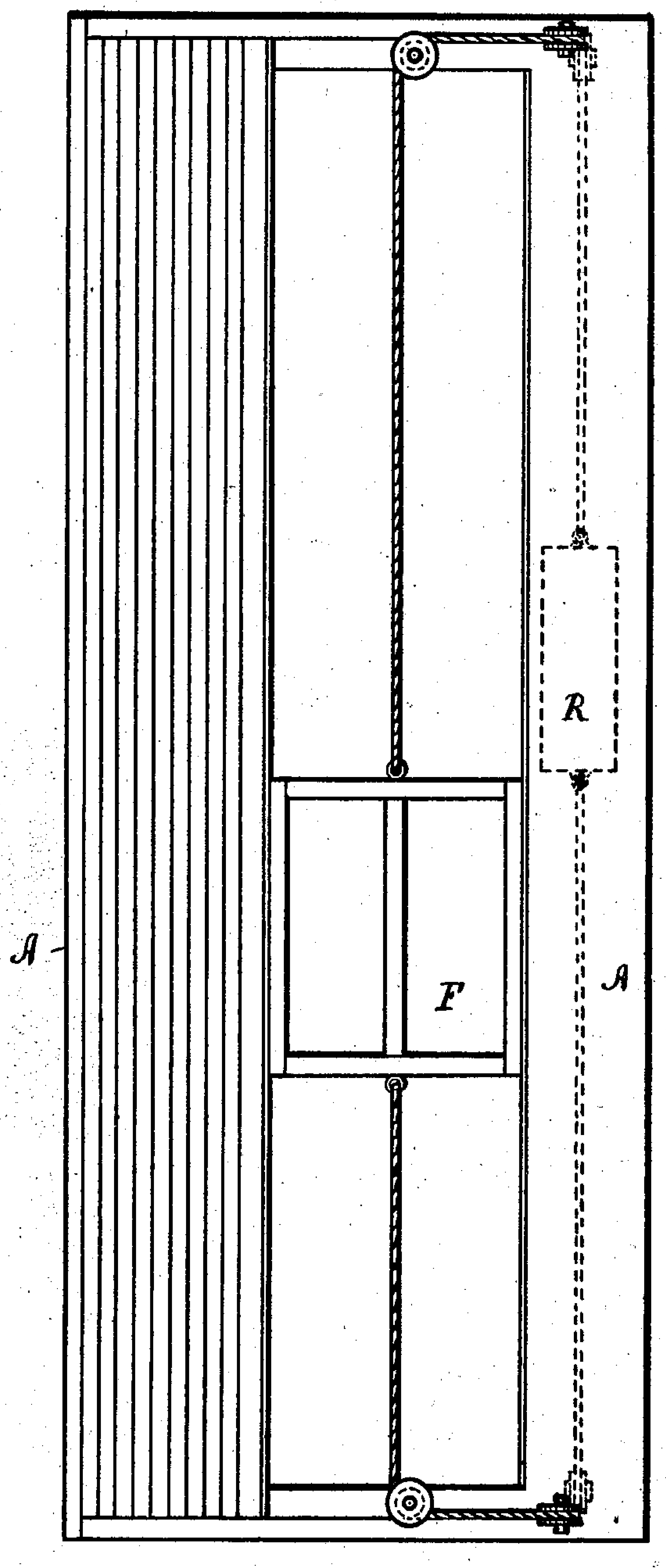

Fig. 5.

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

UNITED STATES PATENT OFFICE.

EPHRAIEM CHAQUETTE, OF NEW ROCHELLE, NEW YORK.

FLOATING DREDGE.

SPECIFICATION forming part of Letters Patent No. 702,705, dated June 17, 1902.

Application filed November 26, 1901. Serial No. 83,720. (No model.)

To all whom it may concern:

Be it known that I, EPHRAIEM CHAQUETTE, a citizen of the United States, and a resident of New Rochelle, county of Westchester, State of New York, (whose post-office address is 63 Mechanic street, New Rochelle,) have invented certain new and useful Improvements in Floating Dredges, of which the following is a specification.

The object of my invention is to provide a floating dredge by means of which material can be removed from the bottom of harbors, rivers, canals, and other bodies of water more uniformly, rapidly, economically, and effectively than has heretofore been possible. To accomplish this object, I provide a dredge by means of which a longitudinal cut of desired length and width is made by a constant advancing movement of the buckets without changing the moorings of the dredge and by which also the end of the cut is automatically shaped or banked in the form desired. The means by which I accomplish this object are, speaking generally, a traveling dredge-carriage adapted to move on a track which runs from end to end of the floating dredge considerably below the deck and as near as possible at the water-line and which supports and carries with it a chain-bucket dredging apparatus, the operating mechanism of which is automatically controlled both as to depth of cut and the angle at which the buckets are presented to the material to be removed at all times during the operation of the dredge.

Incidentally, it is necessary or advisable to provide means by which the floating dredge is always kept on an even keel whatever may be the position of the carriage and dredging apparatus longitudinally of the float. As the floating dredge may be two hundred feet or more in length, a convenient means of trimming the float during the passage of the carriage and dredging apparatus along the track is providing a parallel track on which moves a ballast-car or counterbalance, the weight of which equals the dredge-carriage and the chain-bucket dredging apparatus combined. As the carriage moves from stern to bow the ballast-car moves from bow to stern, and vice versa.

My invention therefore consists in a floating dredge provided with a dredge-carriage moving on a suitable track, means for driving said carriage, a chain-bucket dredging apparatus supported on and carried by said carriage, means for operating said chain-bucket dredging apparatus to perform the cutting operation, and means for raising and lowering said chain-bucket dredging apparatus and adjusting the same to the required depth and angle of cut.

The various operations required of the different parts of my improved dredge may be produced electrically or by the use of steam, compressed air, or other motive power, as may be found most advantageous in different localities with regard to the work to be performed; but I have illustrated in the accompanying drawings the dredge as arranged to be operated electrically, as I believe such operation to be the best.

Figure 1 is a side elevation of the bucket apparatus, part being broken away, it being understood that the dredge is nearly twice as long as the part actually shown in the drawings. Fig. 2 is an end view of the same, showing also the engines and the dumping apparatus. Fig. 3 is a side view showing the action of the dumping-car; and Fig. 4 is an end view of a modification, showing a double chain-bucket dredge discharging into an independent scow. Fig. 5 is a plan view showing the connection between the dredge-carriage and the ballast-car.

Same letters indicate similar parts in the different figures.

A is the boat or float on which the dredging apparatus is mounted and carried.

B is the boiler from which power is derived to operate the various electric motors used in the various operations of the dredge.

C is a pump driven by electric motor D and adapted to be used to expel the sand, mud, water, and other matter brought up by the dredge. This pump may either be situated in the float A, as shown in Fig. 2, in which case suitable hose is attached to the outlet-pipe *a* and carried as far ashore as may be desired, or it may be located in a separate scow E, as shown in Fig. 4.

F is the dredge-carriage, upon which are mounted the lifting-buckets and their operating mechanism constituting the chain-bucket dredging apparatus and which is

adapted to travel along the track *b*, extending nearly the full length of the float and situated as nearly as practicable at the water-line. By making a long opening or channel G, extending longitudinally of the float A and open at the bottom, the ends, however, being closed by the bow and stern of the float, and by setting the track which supports the dredge-carriage as low as possible, I accomplish the double purpose of getting great stability for the dredging apparatus and also of protecting it from the dashing of the surrounding water. The length of this channel is preferably about two hundred feet, that being a convenient length of cut to be made by one operation of the dredge; but of course this distance will vary with the size of the boat and the work required of the dredging apparatus.

It is to be understood that my dredge is designed more particularly for dredging canals, ponds, and other places where the dredge is at all times near the shore, in which case the most convenient way of getting rid of the material raised is by the pump C; but the dredge is also adapted for dredging harbors and other places where the shore is not readily accessible. In the latter case it is necessary to use dumping-scows, which are brought alongside in the usual way, in which case the pump and dumping-car would be dispensed with.

The dredge-carriage F is adapted to move bodily, under the control of the electric motor H, along the track *b* from end to end, as follows: The motor H is mounted upon the carriage F and carries upon its motor-shaft the worm *c*, which meshes with the worm-gear *c'* on a shaft journaled in the framework of the carriage and carrying at each of its outer ends a pinion c^2 c^3. These pinions engage with the racks *d d*, mounted upon the float, and by their rotation move the dredge-carriage from one end of the float to the other, as desired.

I is the chain-bucket dredging apparatus, suspended from the dredge-carriage F and driven by the electric motor H', mounted upon the upper part of said carriage. This driving consists in turning the sprocket *e*, around which the chain *f*, carrying the buckets *g*, passes. As usual in chain-bucket dredges a substantial frame or ladder J, the outer end of which is extensible, as shown, is provided for supporting chain and buckets during their operation, the inner end of the ladder being pivoted upon the dredge-carriage, while the outer end is free to rise or fall, as occasion requires. When dredging the level surface at the bottom of a canal or harbor, the chain-bucket dredging apparatus may hang about vertical. When, however, the dredging is to be done on a slope, as forming the bank of a canal, the ladder J must be held at an angle corresponding to the desired slope. The means by which I accomplish this angular suspension of the chain-bucket frame consists chiefly of the counter-balance-supporting frame L, which consists, primarily, of the three arms *h*, *h'*, and h^2. The main arm *h* is fixed to the shaft on which the inner end of the ladder J is hung. To this arm the inclined arms *h' h²* are pivoted, as shown at *i*, their outer ends being supported by the guys *j* from the main arm, the three arms constituting the frame therefore serving as a unit, and assume a position corresponding to the angle at which the ladder-frame J is to be held.

The outer end of the ladder-frame J is connected with the arm *h'* and supported therefrom by means of the rope *m*, secured to the outer end of the ladder-frame and passing over the pulleys *n n'* to the drum *o*, which is turned and controlled by the motor H^2, which is mounted upon the dredge-carriage. The drum *o* and pulley *n'* are mounted upon the dredge-carriage F, while the pulley *n* is fixed to the outer end of the carriage *h'*. Obviously, therefore, the inclination of the ladder-frame will depend upon the length of rope depending from the pulley *n*. The excess of weight acquired by the ladder-frame as its outer end approaches the horizontal is counterbalanced by the sliding weight *p*, mounted in the arm h^2, and which moves toward the outer end of the arm as the ladder-frame approaches the horizontal and moves toward the inner end of the arm h^2 as the ladder turns to the vertical, so as to maintain the balance at all times.

It will be understood that the same system of counterbalance is employed when two chain-bucket dredges are mounted upon the dredge-carriage, as shown in Fig. 4.

The material raised by the dredge is discharged either by a simple trough M, as shown in Fig. 2, or by a trough M', which is provided with a feeding-chain N, as shown in Fig. 4. When a simple trough is used, sufficient slant can be given to the bottom to have the material fall of its own weight. In this case the material is discharged upon a dumping-apron car P, which is mounted upon a track *b' b'*, running along the deck of the float from end to end. This car is substantially half as long as the dredge-carriage channel, and its traveling apron delivers the material deposited upon it from the trough M into the pump C at all times during the operation of the dredge. The pump C is situated about amidship, and the dumping-car is sometimes on one side of the pump and sometimes on the other.

In the operation of the dredge the digging begins when the dredge-carriage is farthest astern. The dredge-carriage is fed forward toward the bow steadily, so that the succeeding cuts by the buckets always take fresh material in advance of the previous cut until the dredge-carriage reaches the bow, after which the moorings of the dredge are shifted, so as to find new material to be removed. Instead of having a dumping-apron extend the full length of this path I make it, as before stated,

about half-length, and when the dredge is working abaft the dumping-car is also abaft. When the dredge-carriage has passed the center of the float moving toward the bow, the dumping-car is shifted by the engineer so as to cover the forward half of the path, the motor Q, which turns the dumping-apron, being reversed, so that the apron which previously fed the material forward from the stern to the pump now feeds it backward to the bow. When the dumping-car is dispensed with and a scow F is brought alongside, as shown in Fig. 4, the scow of course is gradually drawn forward to keep pace in advance of the dredge-carriage.

In order to keep the dredge on an even keel, and especially when the moving dredge-carriage is unusually heavy from having the double dredge arrangement shown in Fig. 4, it is advisable to provide a ballast-car R, which moves along the dredge from end to end on a track parallel to the dredge-carriage track. This ballast-car is heavy enough to counterbalance the dredge-carriage and the chain-bucket dredging apparatus and moves along the track b^2 in an opposite direction from the dredge-carriage, but simultaneously with it, so that a ballast-car is at all times as far in front of or behind the center of the dredge as the dredge-carriage is behind or in front of the center.

For the purposes of this specification the chain-bucket dredging apparatus may be regarded as of usual construction, a single dredge consisting of two sets of buckets and a double dredge four sets.

The operation of the chain-bucket dredging apparatus will be readily understood, therefore, to be as follows: The dredge being moored at such a place as to give an opportunity for a cut of the desired length—say two hundred feet—directly under the dredge longitudinally and the dredge-carriage being substantially at the stern of the dredge, the machine is started. The sprocket *e* beginning to revolve starts the four chains, with their buckets, in operation, and the lower bucket of each series cuts away the material from the bottom and dumps it in the trough M on the dredge-carriage, while the dredge-carriage, constantly moving forward, causes each succeeding bucket of the same series to begin the excavating just in advance of the point where the previous bucket began. The depth of cut made by each bucket will vary with the quality and height of the material to be excavated. It is obvious that the position of the dredging apparatus should be so related to the quantity of material to be removed that each bucket in turn should be filled during its normal operation and not have to force aside additional material after it is full. By controlling the depth of cut, therefore, to the length of material through which the bucket has to pass before it reaches clear water, so that each bucket is properly filled, the dredging process is carried on most effectually. When in this way the dredge-carriage has moved forward and cut away the material for a predetermined distance, the outer end of the ladder I is now raised to a predetermined angle. The cut is now no longer made on a level, but in an upward incline, the slope of which is determined by the previous adjustment of the device with regard to the object in view. When the top of the bank is reached, if it is desired to deepen the cut the dredge-carriage is rolled back to its initial position and the operation repeated. If, however, the cut is deep enough, the positions of the moorings of the dredge are changed and a new cut made alongside of and parallel to the first.

I claim—

1. A floating dredge provided with a longitudinal channel therethrough with its ends inclosed, a dredge-carriage moving on a suitable track extending along said channel near the water-line, a chain-bucket dredging apparatus and its operating mechanism supported on and carried by said carriage, and a dumping-apron car adapted to receive material from said chain-bucket dredge and convey it to the discharging apparatus, substantially as described.

2. A floating dredge provided with a dredge-carriage moving on a suitable track, means for driving said carriage, a chain-bucket dredging apparatus supported on and carried by said carriage, means for operating said chain-bucket dredging apparatus to perform the cutting operation, means for raising and lowering said chain-bucket dredging apparatus and adjusting the same to the acquired depth and angle of cut, and a ballast-car moving in unison with said dredge-carriage, substantially as and for the purpose set forth.

EPHRAIEM CHAQUETTE.

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