(No Model.)

3 Sheets—Sheet 1.

J. N. S. WILLIAMS.

DREDGER.

No. 331,929. Patented Dec. 8, 1885.

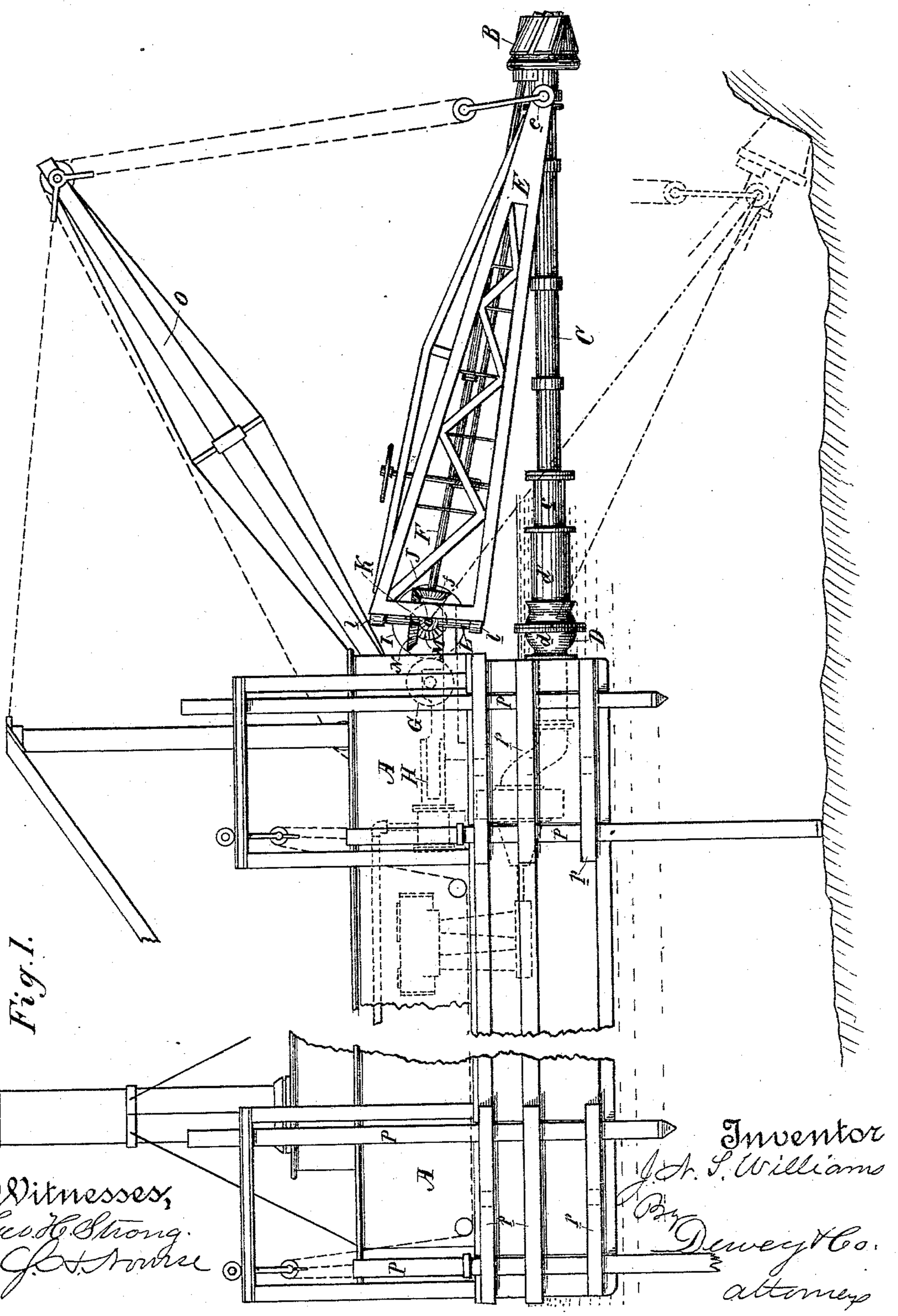

Fig. 1.

(No Model.)

3 Sheets—Sheet 2.

J. N. S. WILLIAMS.

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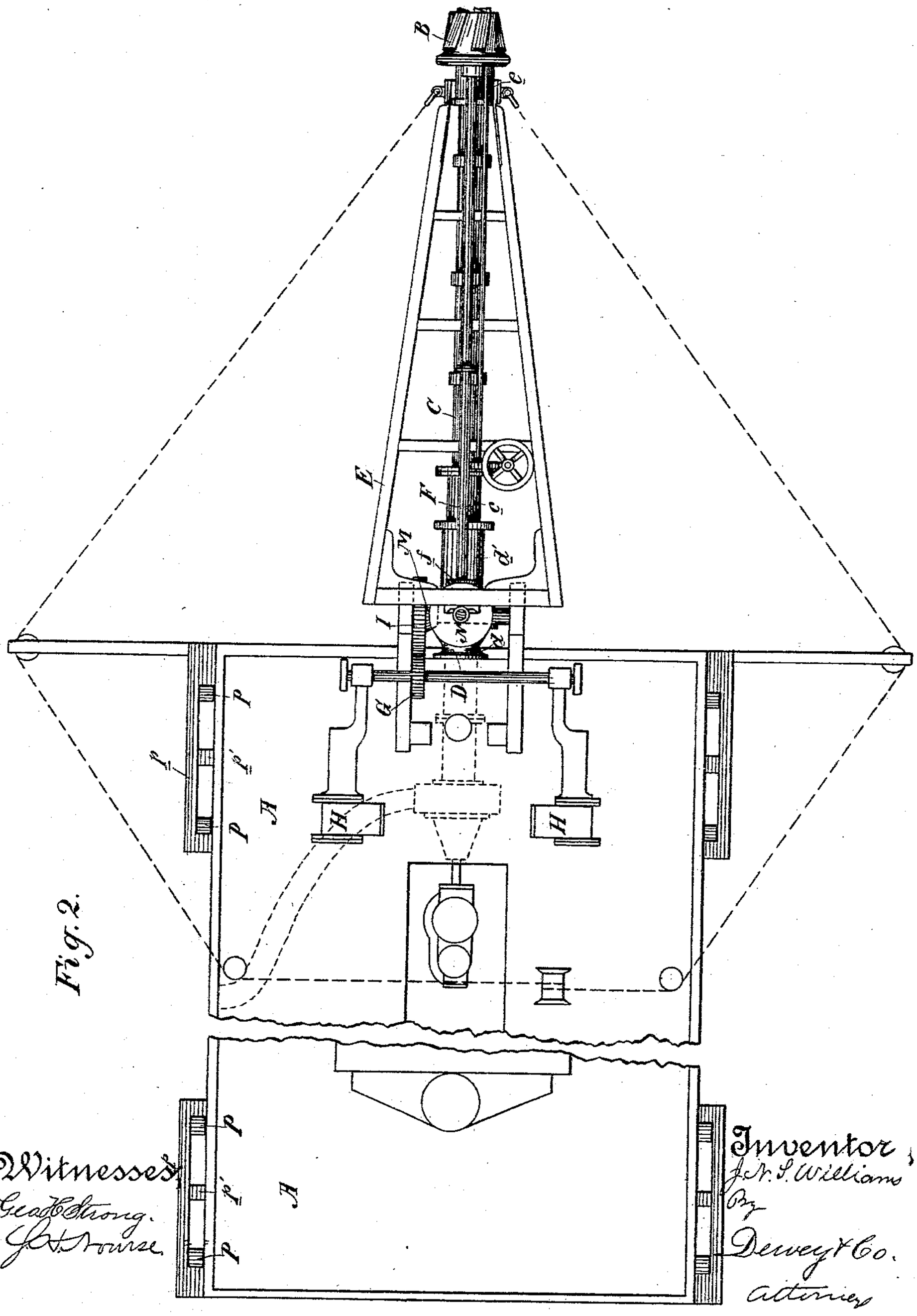

Fig. 2.

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(No Model.) 3 Sheets—Sheet 3.

J. N. S. WILLIAMS.

DREDGER.

No. 331,929. Patented Dec. 8, 1885.

Fig. 3.

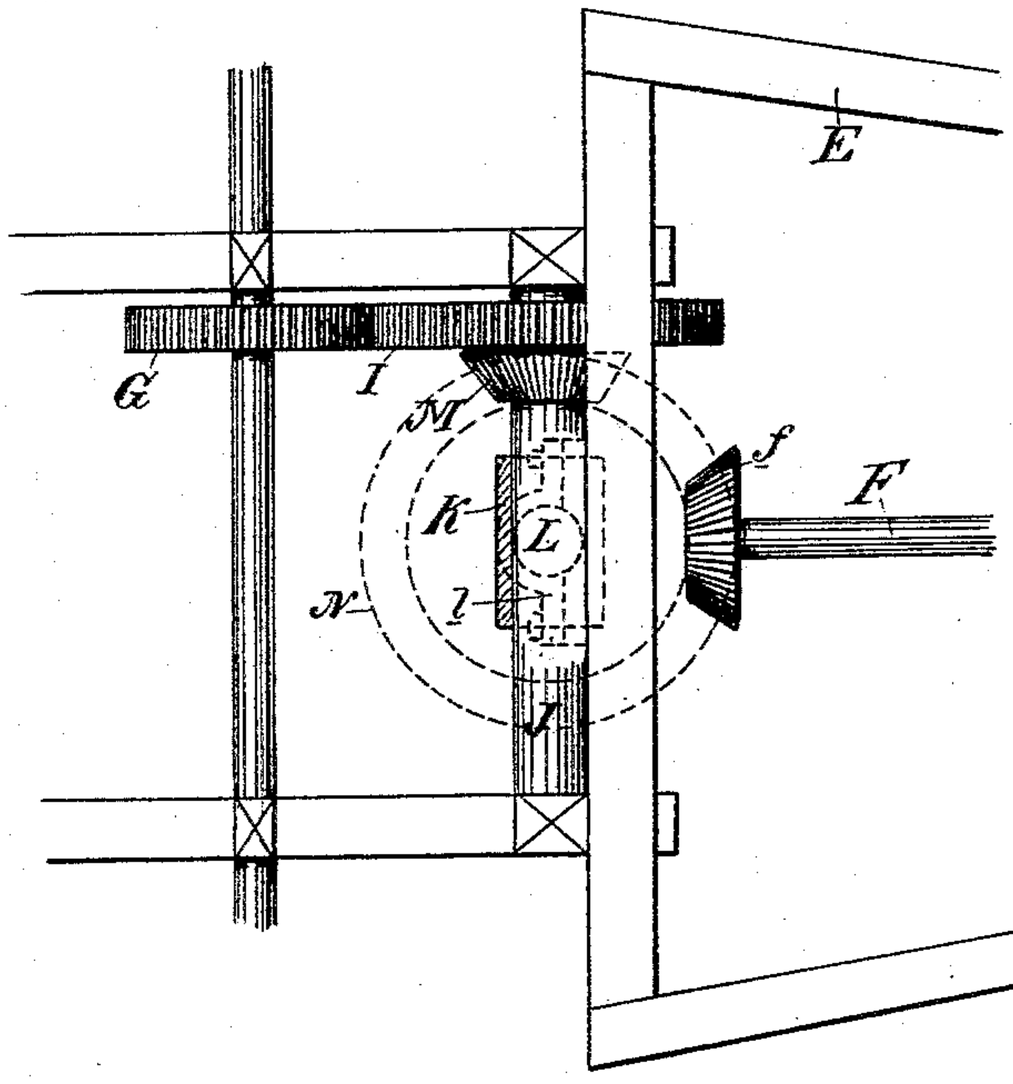

Fig. 5

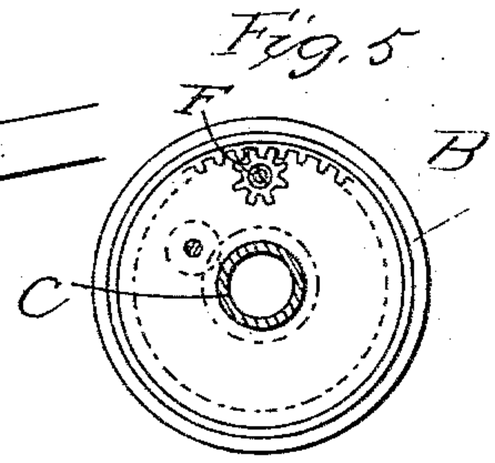

Fig. 4.

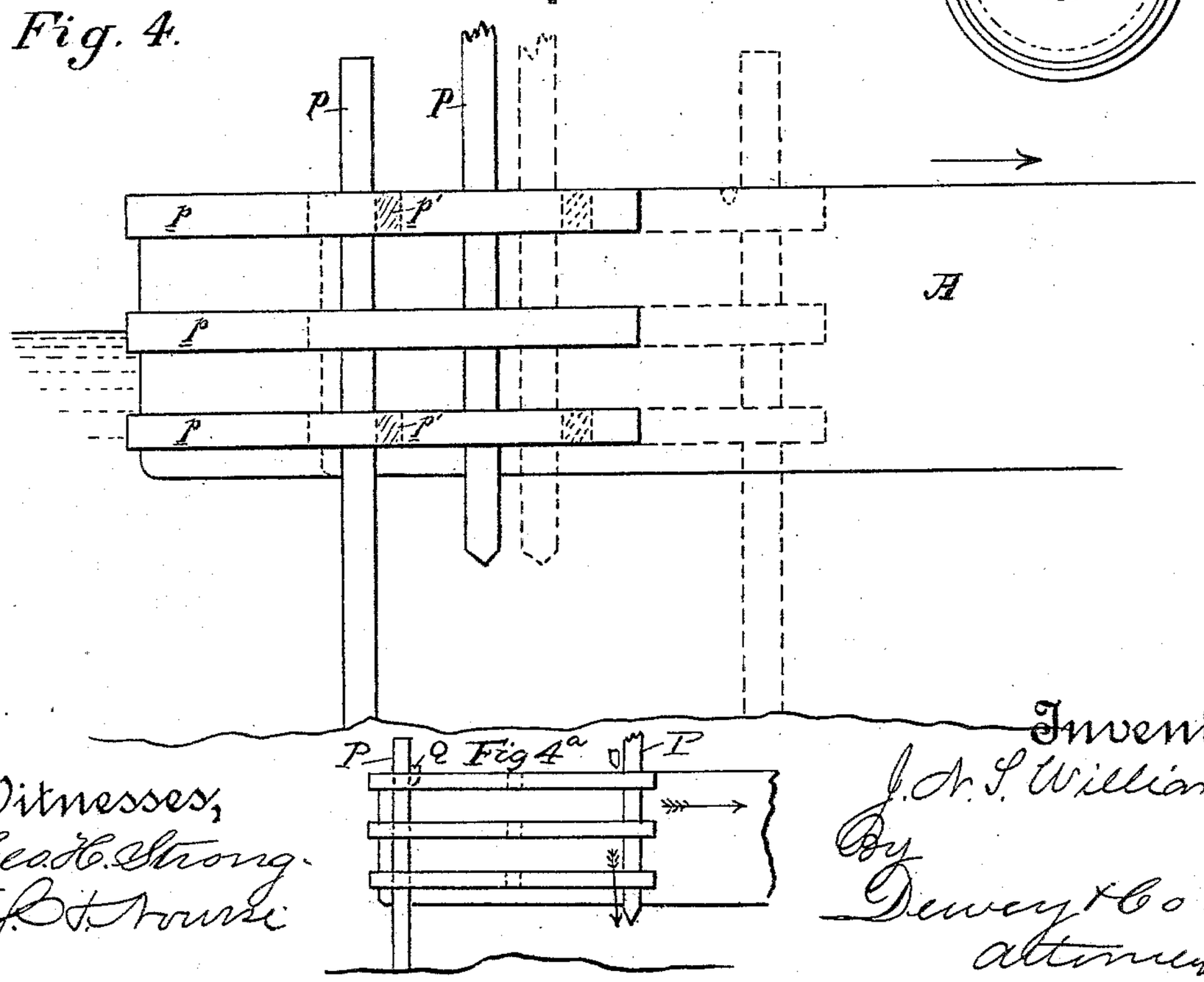

Fig 4a

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UNITED STATES PATENT OFFICE.

JOHN N. S. WILLIAMS, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR OF TWO-THIRDS TO JOHN H. BOLLES, OF SAME PLACE.

DREDGER.

SPECIFICATION forming part of Letters Patent No. 331,929, dated December 8, 1885.

Application filed July 29, 1885. Serial No. 172,994. (No model.)

To all whom it may concern:

Be it known that I, JOHN N. S. WILLIAMS, of the city and county of San Francisco, State of California, have invented an Improvement in Dredgers; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to the class of dredging-machines of that type known as suction-dredgers, in which the material is disintegrated by suitable machinery and the spoil, together with quantities of water, is carried up through a centrifugal pump and deposited at varying distances, as may be required.

My invention consists, in connection with a rotary cutter of suitable form adapted to be adjusted through arcs in horizontal and vertical planes, of a suction-pipe from the cutter having a ball-and-socket joint and a telescopic joint, whereby said pipe may move radially and axially, conforming to the adjustments of the cutter, and a peculiar system of gearing by which power is transmitted from the engine to the lay-shaft driving the cutter, the gears of said system being adapted to maintain their mesh throughout all the adjustments of the cutter.

My invention consists, further, in a novel arrangement and method of using a system of spuds by which the boat or scow is held.

The object of my invention is to provide a means adapting the cutter to be adjusted to any position, and to be driven during its various adjustments, and, furthermore, to provide means by which no time is lost in the handling of the retaining-spuds.

Referring to the accompanying drawings, Figure 1 is a side elevation of my dredger. Fig. 2 is a plan of the same with parts removed. Fig. 3 is a detail of the gearing for driving the lay-shaft. Fig. 4 is a detail view showing the method of using the spuds. Fig. 4^a is a detail view showing the spuds in a different position from that shown in Fig. 4. Fig. 5 is a detail view of the cutter and suction-pipe, showing the gearing for rotating the cutter.

A is the boat or scow, which should be provided with the various accessories of such a craft, but which it is unnecessary herein to show.

B is the cutter, of a type known as a "rotary cutter," which said type is specifically described and illustrated in the application for a patent of John H. Bolles, No. 145,718, filed October 16, 1884. The cutter which I use is the same as described in said application, and as my invention has no relation to it, it will need no further description.

C is the suction-pipe, the outer end of which is connected with the cutter and communicates with its reservoir. The inboard end of the suction-pipe is connected with the scow by a ball-and-socket joint, D, which may be formed in any suitable manner, as here indicated, by the cap or casing *d*, inclosing a ball on the end of a short section of pipe, *d'*. Upon the suction-pipe is rigidly fixed a sleeve, *c*, which telescopes in the short section of pipe *d'*, whereby the suction-pipe may have a longitudinal adjustment. The object of the ball-and-socket joint is to allow freedom of motion radially in all directions within certain limits, and the object of the telescopic joint is to allow of a certain freedom axially.

E is a trussed boom, the outer end of which is connected with the cutter by a joint at *e*, and allows of a little motion to the suction-pipe directly in the rear of the cutter, as shown. The trussed boom serves as a support for the lay-shaft F, by which the cutter is driven, and also directs the movements of the cutter. The inner end of the trussed boom is supported, and the lay-shaft is driven, by a system of shafts and gearing which will permit the various adjustments of the boom.

The following is the mechanism: The pinion G on the driving-shaft of the engine H meshes with a spur-gear wheel, I, loosely mounted on a fixed intermediate or counter shaft, J. On this counter-shaft is pivoted a sleeve, K, from which a shaft, L, extends at right angles to the shaft J. On the spur-gear I is rigidly secured a beveled pinion, M, which gears into the idle beveled wheel N, which is loosely mounted on the shaft L. This beveled wheel drives the beveled pinion *f* on the lay-shaft F, which actuates the cutter. The trussed boom

is pivoted on the shaft L at *l*. It will thus be seen that this combination of wheels and shafts allows the cutter to be moved in all directions, radiating from the center of the system. The fewest parts are secured with the greatest strength and accessibility. The outer end of the lay-shaft drives the outer drum of the cutter by means of gears and pinions, which are unnecessary herein to show, as they form no part of my invention. The trussed boom, the suction-pipe, and the cutter are swung from a derrick, O, on the deck of the scow or boat, and by suitable hoisting apparatus are lowered into position for working, or raised for adjustment or repairs. The necessity for the radial and axial or longitudinal movements of the suction-pipe will be readily perceived by observing the lowermost position of the cutter, as shown by the dotted lines in Fig. 1. The trussed boom and lay-shaft moving on a center distinct from the center of movement of the suction-pipe renders it necessary that said pipe should have an axial or longitudinal adjustment, while the lateral adjustment or movement in a horizontal plane of the trussed boom necessitates the radial movement of the suction-pipe in order to accompany the cutter. On the sides of the scow I have at each corner, both forward and back, a system of spuds, P, as shown. These pass through slotted guides *p*, which guides are divided transversely and centrally by a piece, *p'*, so that a slot defining the limits of motion of the boat or scow is made for each spud. There are, therefore, two spuds, P, at each corner, and the object in view is to save time in operating the dredger. It will be readily perceived that if the whole of the machinery has to wait for a spud to be hoisted, the scow moved, and the spud dropped again, considerable time will be lost; but with my system or method there is no loss of time, as one spud of each set is operated during the progress of the cut. The method is as follows, and is shown particularly in Fig. 4: Let us suppose that the boat has just completed a cut and is ready to make a forward movement; the forward spud of each set has just been hoisted, as shown in Fig. 4, and the boat will now pull ahead the distance from one end of the back slot to the other, guided by the spuds still in place, which not only serve to steady the boat when cutting, but also guide it in a straight line on some given point as an anchorage. When the boat has reached that point, (indicated by dotted lines, Fig. 4,) the rearmost spud of each set will be wedged, as shown at Q, Fig. 4ª, to prevent the scow from moving back, and the operation of cutting the material proceeds, during which the front spud of each set will be carried forward to the extreme end of its guide-slot, and will be there dropped into position, as indicated in Fig. 4ª by the arrow, and wedged to hold the scow, while the other spud is hoisted and carried into a position ready to drop as soon as the boat has taken up a new position after the forward spud is released from its wedge. The object sought will thus be gained, as one spud will always be in position and wedged without having to stop the cutting operations more than is necessary to move the boat or scow.

I am aware of the patent of Call, No. 301,209, and I do not claim a single spud working in a slot.

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

1. In a dredger having a rotary cutter and a suction-pipe communicating therewith, the means by which the cutter is driven and its adjustments directed, consisting of the trussed boom E, pivoted at its outer end to the suction-pipe, the lay-shaft F, supported by the trussed boom and connected at its outer end by suitable gearing with the cutter, whereby it is adapted to drive said cutter, and the system of gears and shafts at the inboard end of the boom and lay-shaft, comprising the fixed intermediate shaft, J, the sleeve K, pivoted on said shaft and having a shaft, L, at right angles on which the boom is pivoted, the pinion G on the engine-shaft, the spur-gear wheel I, loose on the intermediate shaft and having beveled pinion M, the idler beveled wheel N, loose on the shaft L and meshing with the pinion M, and the beveled pinion *f* on the rear end of the lay-shaft, all arranged and adapted to operate substantially as herein described.

2. In a dredger, the rotary cutter adapted to be adjusted through arcs in vertical and horizontal planes, in combination with a suction-pipe communicating with the cutter and having a telescopic or sliding joint adapting it to move axially and longitudinally and a ball-and-socket joint adapting it to move radially to accommodate itself to the movements or adjustments of the cutter, substantially as herein described.

3. In a dredger, the combination of a rotary cutter and a pivoted trussed boom directing said cutter and adapted to be adjusted in arcs in horizontal and vertical planes, as described, with the suction-pipe C, communicating with the cutter and having a telescopic joint, whereby it may move axially or longitudinally, and a ball-and-socket joint adapting it to move radially to accommodate itself to the movements of the cutter, substantially as herein described.

4. In a dredger having a rotary cutter, the trussed boom E, pivoted to the cutter and to the scow and adapted to be adjusted through arcs in vertical and horizontal planes to direct the cutter, and the lay-shaft F on the boom, connected at its outer end and driving the cutter through suitable gears, and a system of gears by which power is transmitted from the engine to the inner end of the lay-shaft, as described, in combination with the suction-pipe C, communicating with the cutter, said pipe having a telescopic joint and a ball-and-socket

joint adapting it to accommodate itself to the adjustments of the cutter, substantially as herein described.

5. In a dredger having a rotary cutter, the means by which the cutter is driven and its adjustments directed, consisting of the trussed boom E, the lay-shaft F thereon and connected at its outer end by suitable gearing with the cutter, and the system of shafts and gears at the inboard end of the boom and lay-shaft, comprising the fixed intermediate shaft, J, the sleeve K, pivoted thereon and having shaft L, on which the boom is pivoted, the pinion G, on the engine-shaft, the spur-gear wheel I, loose on the intermediate shaft and having beveled pinion M, the idler beveled wheel N, loose on shaft L and meshing with pinion M, and the beveled pinion *f* on the rear end of the lay-shaft, all as described, in combination with the suction-pipe C, communicating with the cutter, said pipe having a telescope joint and a ball-and-socket joint adapting it to accommodate itself to the adjustments of the cutter, substantially as herein described.

6. In a dredger, a double set of spuds, P, located in pairs, each in a slot, whereby one of the pair may be hoisted and moved to a fresh position in readiness to be dropped, while the other holds the boat or scow, substantially as and for the purpose herein described.

7. In a dredger, the transversely-divided or double guide-slots *p* at the corners of the boat or scow, in combination with the spuds P, one in each portion of each guide-slot, substantially as herein described.

In witness whereof I have hereunto set my hand.

JOHN N. S. WILLIAMS.

Witnesses:

S. H. NOURSE,

H. C. LEE.