

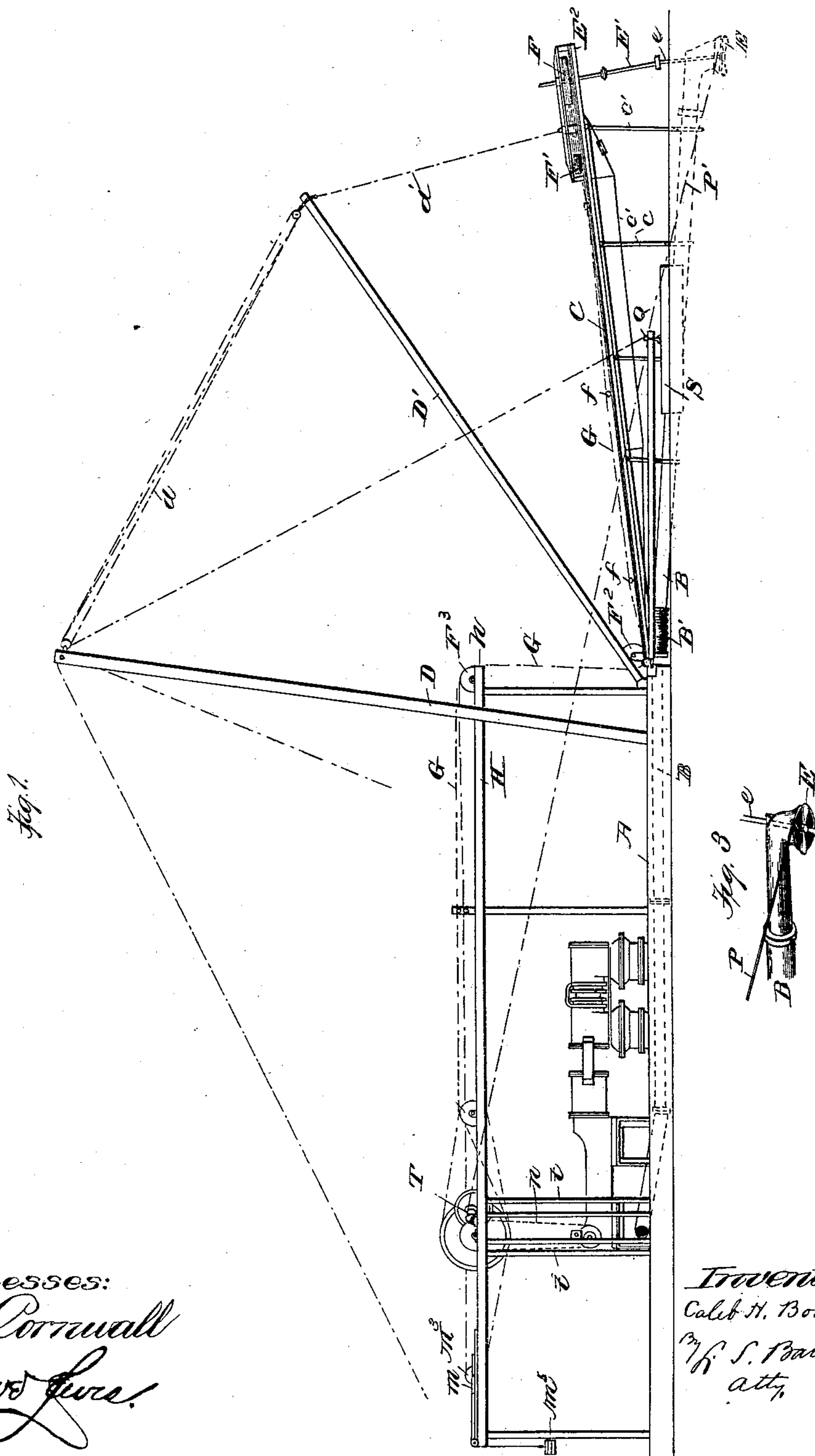
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4 Sheets—Sheet 1.

C. H. BOOTH.
HYDRAULIC DREDGE.

No. 479,486.

Patented July 26, 1892.



Witnesses:

F. P. Cornwall
Rev. Sir,

Inventor,
Calib H. Booth
By *S. Bacon*
att'y.

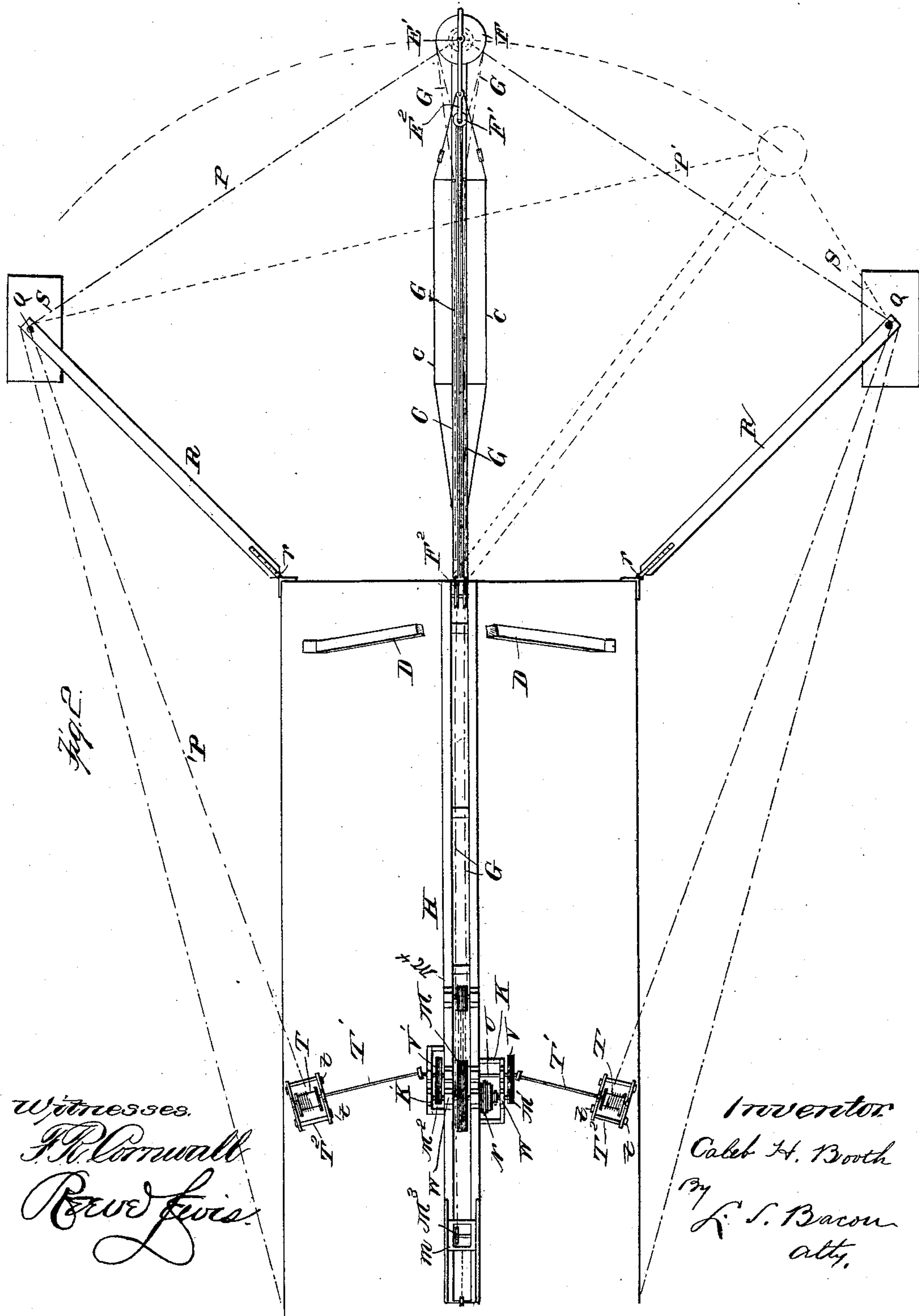
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Witnesses.

J. H. Cornwall
R. W. Lewis

Inventor

Caleb H. Booth

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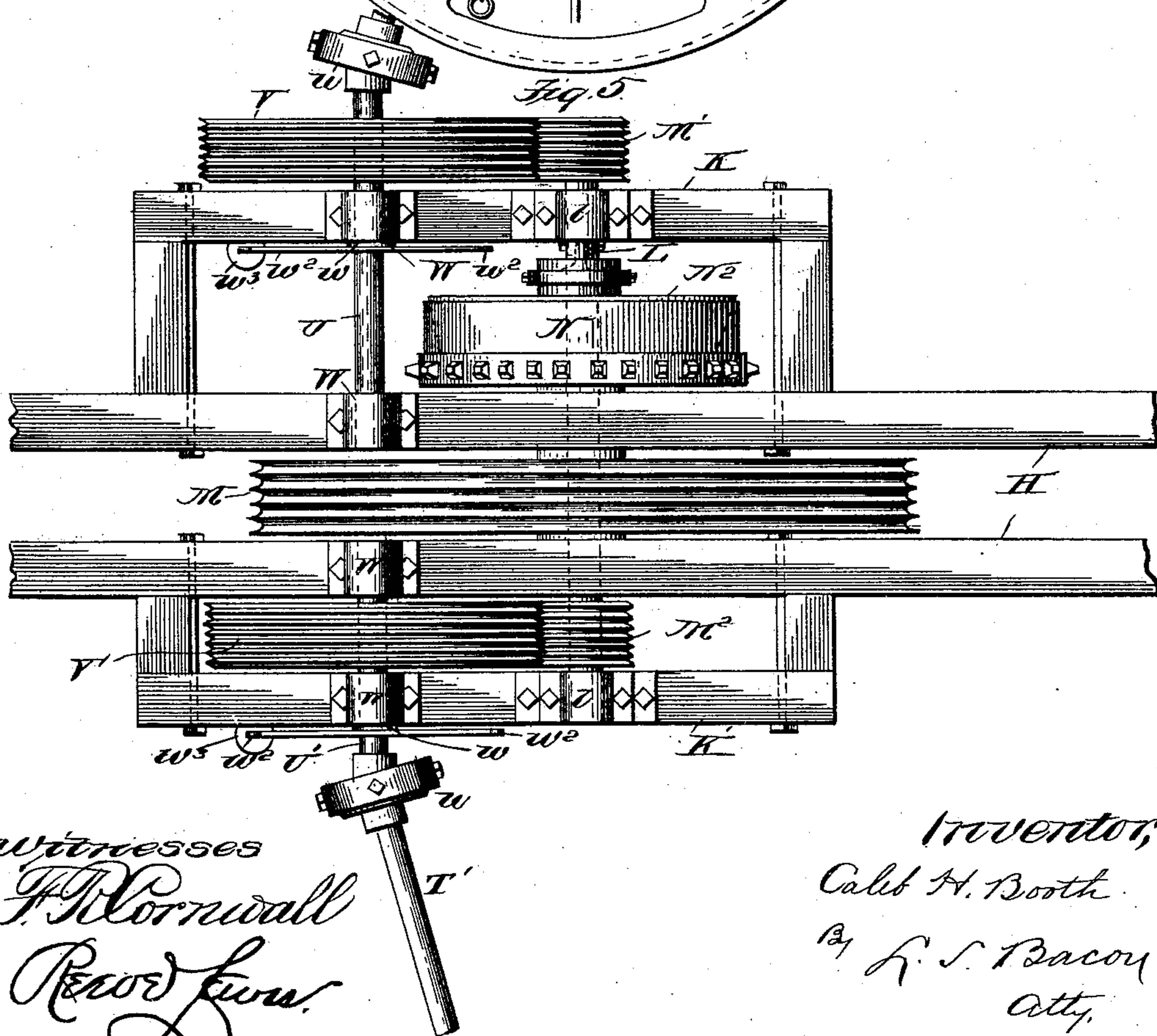
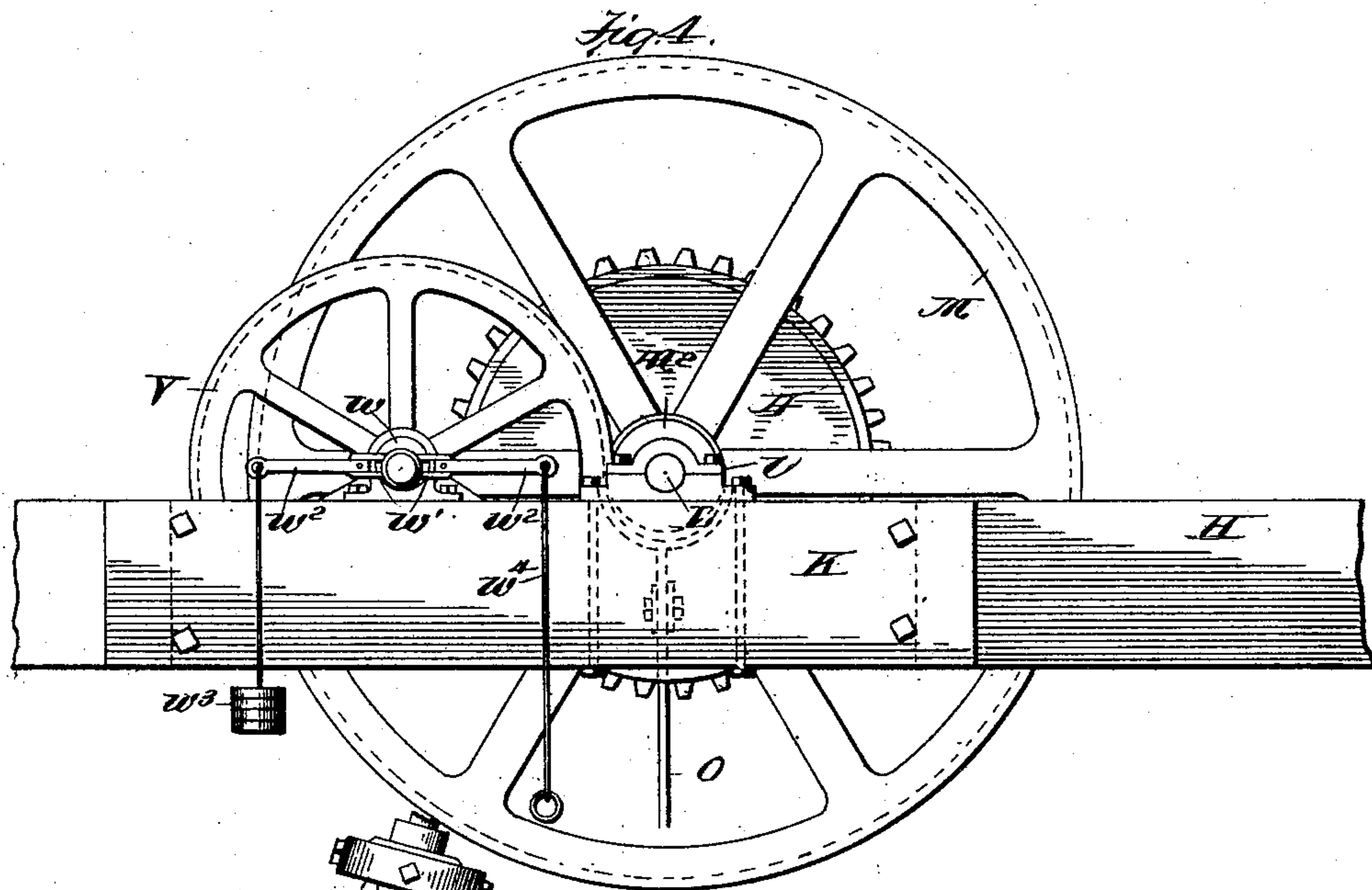
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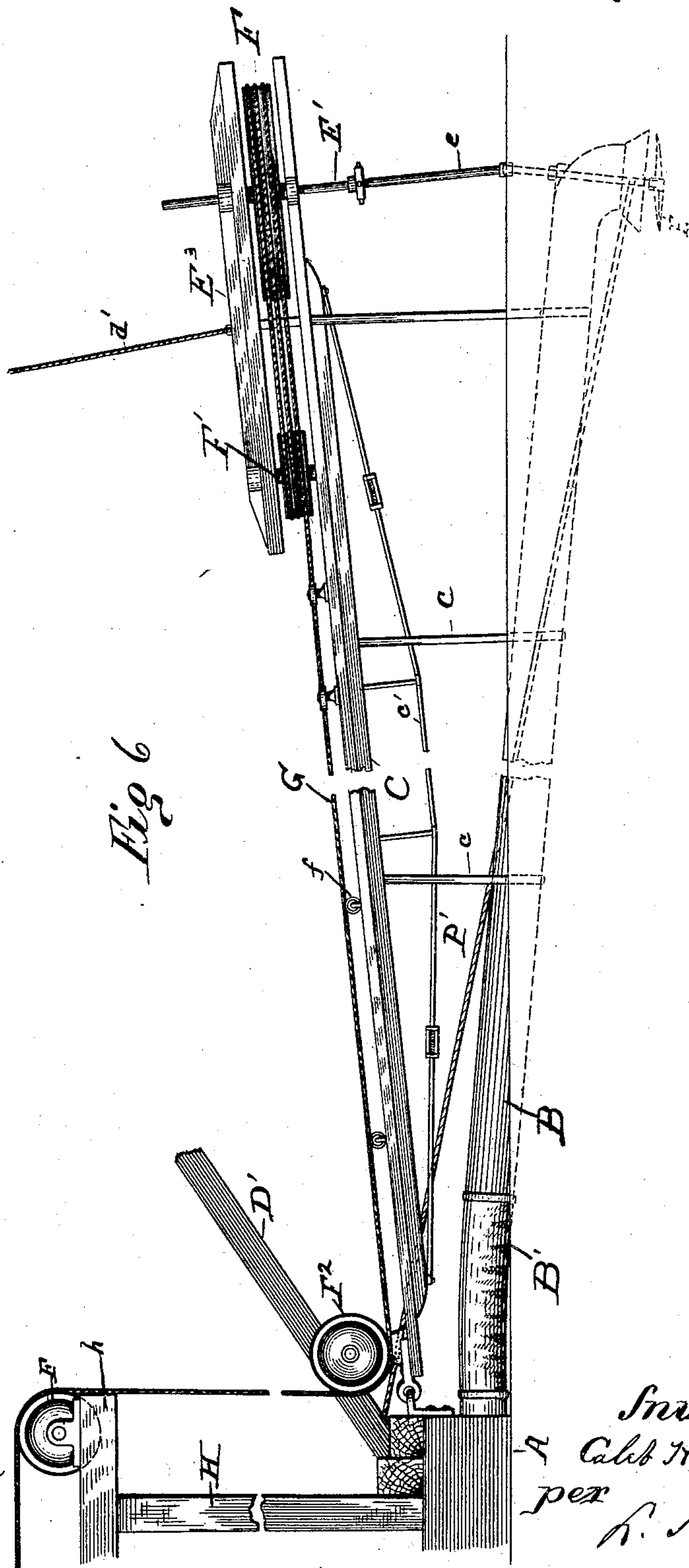
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C. H. BOOTH.
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Attest;
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Wm. DuVal Brown.

Inventor,
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UNITED STATES PATENT OFFICE.

CALEB H. BOOTH, OF DUBUQUE, IOWA.

HYDRAULIC DREDGE.

SPECIFICATION forming part of Letters Patent No. 479,486, dated July 26, 1892.

Application filed January 8, 1892. Serial No. 417,412. (No model.)

To all whom it may concern:

Be it known that I, CALEB H. BOOTH, a citizen of the United States, residing at Dubuque, in the county of Dubuque and State of Iowa, have invented certain new and useful Improvements in Hydraulic Dredges; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improvement in hydraulic dredges; and it consists in the construction and arrangement of parts hereinafter described, and definitely pointed out in the claims.

The aim and purpose of this invention is the provision of an improved dredging apparatus embodying simplified and improved means for actuating the stirrer and for moving the supporting-jib, together with the suction-pipe, so that the bell-mouth or suction end of the pipe will retain its proper angle relative to the angle of the surface of the material to be removed during the the movement of the suction-pipe in its arc, and, further, in simplifying the general arrangement and construction of the parts. This object I attain by the construction illustrated in the accompanying drawings, wherein like letters of reference indicate corresponding parts in the several views, and in which—

Figure 1 is a side elevation of an improved dredge embodying my invention. Fig. 2 is a top plan view of the same, showing in dotted lines the position of the suction-pipe when being moved laterally in an arc of a circle. Fig. 3 is a detail perspective of the bell-mouth of the suction-pipe, showing the position it assumes as the same is being drawn to one side. Fig. 4 is a top plan view of the gearing for actuating the stirrer and moving the suction-pipe, and Fig. 5 is a side elevation of the gearing. Fig. 6 is an enlarged elevation of the forward part of the dredge.

In the drawings, A represents the boat or barge, B the suction-pipe, having a flexible connection B' with the conducting-pipe on the barge, and C the supporting-jib for the suction-pipe, braced or trussed by the rods c'. The connection between the jib and pipe is made by a graduated series of hanger-rods c, attached to the jib and formed with suitable

collars on their lower ends, through which the pipe passes. The inner end of the supporting-jib is secured to the forward end of the barge by a suitable universal joint, so that the same may be moved vertically or laterally, as desired.

To raise and lower the supporting-jib and suction-pipe, an A-mast D is placed on the deck of the barge, having a suitable pulley or snatch block on its upper end, over which the rope d passes and connects over a pulley-block on the outer end of crane-jib D', to which the outer end of the supporting-jib is secured by a suitable cable or rope d'. The lower end of the crane-jib is fitted into a suitable socket on the frame of the barge, so that the same may be moved vertically and laterally.

At the end or bell-mouth of the suction-pipe is a stirrer E, mounted on a suitable shaft e, passing through the mouth and journaled in bearings formed in the elbow of the piping, its upper end having a universal connection with an actuating-shaft E', keyed at its upper end in a large grooved drum or wheel F, mounted horizontally in a frame E² on the extreme outer upper end of the supporting-jib. In the frame E², back from the wheel F, is mounted a grooved idler-wheel F', of smaller diameter than the diameter of the wheel F. On the upper face of the supporting-jib is a series of carrying-wheels f, and on the extreme inner end are two pulley-wheels F² F², the peripheries of which project directly above the hinged connection of the supporting-jib, so that the movement of the pulley will be but slight when the suction-pipe is being carried around.

Over the wheels F, F', f, and F² an endless cable G travels, it extending up to and over pulleys F³, located on the extension h of the frame H on the barge, so that the peripheries of these wheels will be directly over the peripheries of the wheels F². From the wheels F³ the cable passes to the driving-gear, which is located on a superstructure directly above the crank-shaft of the pumping-engine. This gearing consists of two frames K K', securely bolted to the opposite sides of the side bars H of the frame H, respectively. A main shaft L is journaled in suitable boxes l, secured on the top of the outer side bars of

frames K K', and extends entirely across the frames. This shaft has mounted thereon between the side bars H a grooved driving-drum M and on its outer ends the small friction-wheels M' and M², having V-shaped grooves in their peripheries. The wheel M' is keyed on the projecting end of the shaft L beyond the frame K, while the wheel M² is located within the frame K'. Over the wheel M the cable G is wound, it passing over a grooved idler M⁴ in advance of the frame and over a sliding wheel M³ in the rear. The wheel M³ is mounted on a sliding block *m*, to which a weight M⁵ is attached, the purpose of which is to take up the slack in the cable. The wheel M receives its movement through the shaft L, on which is loosely mounted a cup friction-disk N, having a peripheral series of sprockets thereon, over which passes a sprocket-chain *n* from a sprocket on the engine-shaft, as shown in Fig. 1. A friction-block N² is slidably keyed on the shaft L and moved into engagement with the cup-disk by a suitable lever O, so that the movement of the cup-disk will be transmitted to the shaft when the block is pressed into engagement with the disk.

Heretofore it has been usually customary to move the suction-pipe by suitable means attached either directly to the supporting-jib or to the pipe itself, beyond the mouth thereof, in which case the curved end or bell-mouth of the pipe will turn more or less in a direction opposite that of its movement, so that the contact between the stirrer and earth is broken. To overcome this defect, I attach directly to the edges of the mouth of the suction-pipe, on opposite sides, (it being understood that the bell-mouth is curved and has a limited rotary axial movement, as is usual in this class of dredges,) two ropes or guys P P', they being secured in suitable eyes formed thereon and extending up obliquely and back to the snatch-blocks Q on the outer ends of the diagonal corner-booms R, hinged to the barge at *r*. The outer ends of the booms R rest on floats S, which are to be anchored in place. The ropes extend from the booms up and back to the barge and are wound on drums T, mounted on suitable supports *t* on each side of the gearing. These drums are arranged at an angle corresponding to the angle of the ropes extending from the ends of the booms and are mounted on shafts T', journaled in the frame T², supported on the supports *t*. The shafts T' are necessarily at an angle to the shaft L.

Journaled in frames K K' are counter-shafts U U', the former carrying on its outer end, beyond the frame, a friction-wheel V, having V-grooves in its periphery, and the latter having a similar friction-wheel V' thereon between the frame. These wheels V V' engage the friction-wheels M' M² on shaft L. The shafts on which they are mounted are journaled in boxes W, mounted in eccentrics *w*,

loosely secured in brackets W' on the frames. The eccentric-bearings have oppositely-extending arms *w*² thereon, on one of which is placed a weight *w*³, normally tending to force the wheels V V' from engagement with the wheels M' M², while the other arm has a hand-line *w*⁴ attached thereto, extending down within easy reach of the engineer on the deck. By pulling this lever the friction-wheels are brought into engagement. The friction-wheels V V' are employed to drive the winding-drums T, the shafts U U' being extended out and connected by a flexible or universal coupling *u* with shaft T.

In operation the suction-pipe is moved around in an arc of a circle by the winding of one of the ropes P, the rope on the opposite side of the mouth unwinding. As the pipe is moved the bell-mouth is drawn up at an incline, which is permitted by its rotary movement, and rides over the bank of sand or other material to be removed, the draw being slightly upward and laterally or sidewise. By this means the stirrer is kept in the material and the operation is not interrupted by the movement of the suction-pipe. The arrangement of the wheels F² F³ is such that the turning of the supporting-jib will not throw the cable from the grooves therein, and when the cable is started by the clutch the movement is uninterrupted throughout the entire movement of the suction-pipe.

By arranging the suction-pipe on the supporting-jib, as described, I retain the same in an inclined position, so that the lift for the pumps will not be so great as it would were the pipe held vertically. It will be further observed that the stirrer is actuated by the pump-actuating means, and the means for transmitting the power to the stirrer is simple and very effective, allowing the stirrer or cutter to work at an angle, a vertical or a horizontal plane.

I am aware that many minor changes in the construction and arrangement of the parts of my device can be made and substituted for those herein shown and described without in the least departing from the nature and principle of my invention.

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

1. In a hydraulic dredge, the combination, with the barge and supporting-jib and a suction-pipe, of a curved bell-mouth for the pipe, arranged to have a slight axial movement, a stirrer at the mouth, means for actuating the stirrer, and moving means connected with the sides of the bell-mouth, extending out laterally therefrom, substantially as described.

2. In a hydraulic dredge, the combination, with the suction-pipe having a bell-mouth arranged to have a slight rotary axial movement and a stirrer at the end thereof, of ropes or the equivalent attached to the sides of the mouth and extending in opposite directions

substantially on a horizontal plane obliquely to the suction-pipe, and means for moving the ropes, substantially as described.

3. In a hydraulic dredge, the combination, with the barge, of the suction-pipe, a curved bell-mouth arranged to have a slight rotary movement, a stirrer, means for actuating the stirrer, booms hinged to the barge and extending horizontally and at an incline therefrom, ropes passing over the outer ends of the booms and attached to the sides of the bell-mouth, and means for winding the ropes up, substantially as described.

4. In a hydraulic dredge, the combination, with the suction-pipe having a curved bell-mouth thereon arranged to have a slight rotary movement, of a stirrer at the mouth thereof and drawing means on the sides of the mouth of the suction-pipe extending out substantially on a horizontal plane to create a side draw when the suction-pipe is to be moved, substantially as described.

5. In a hydraulic dredge, the combination, with a barge, a supporting-jib, and a suction-pipe having a flexible section, of means for raising and lowering the pipe, a bell-mouth arranged at an angle to the pipe and allowed a slight rotary axial movement, a stirrer at the mouth, booms extending out horizontally from the corners of the barge, winding-drums on the barge, and ropes on the drums extending out to the ends of the horizontal booms and back to the mouth of the suction-pipe, to which they are attached, substantially as described.

6. In a hydraulic dredge, the combination, with the barge, a supporting-jib, and a suction-pipe, of a stirrer for the suction-pipe, a grooved wheel on the supporting-jib, a shaft for said wheel connected with the stirrer, an endless cable wound on the wheel, two wheels arranged at the inner end of the supporting-jib, a superstructure on the barge, wheels on the structure, having their peripheries arranged directly over the wheels on the inner end of the supporting-jib, and means for driving the cable, substantially as described.

7. In a hydraulic dredge, the combination, with the barge, supporting-jib, and suction-pipe, of a stirrer on the pipe, an endless cable for actuating the stirrer, a grooved wheel over which the cable passes located at the end of the jib, a grooved wheel on the barge, over

which the opposite end of the cable passes, means for taking up the slack in the cable, a friction-disk having connection with a suitable motive power, and means engaging the disk and connected with the shaft of the wheel on the barge, substantially as described.

8. In a hydraulic dredge, the combination, with a barge, a supporting-jib, and a suction-pipe, of a curved bell-mouth on the pipe, arranged to have a slight axial movement, a stirrer at the mouth of the pipe, means for actuating the stirrer, ropes secured to the sides of the mouth of the suction-pipe, pulley-blocks arranged beyond the barge on a plane substantially horizontal with the deck thereof and over which the ropes pass, winding-drums on the barge, with which the inner ends of the ropes are connected, and friction-wheels connected with the shafts of the drums and actuated by the stirrer-actuating means, substantially as described.

9. In a hydraulic dredge, the combination, with the suction-pipe, of a curved bell-mouth on the pipe, arranged to have a slight axial rotary movement, a stirrer at the mouth, means connected with the sides of the mouth for drawing the same horizontally in the arc of a circle, drums to which said drawing means are attached, shafts on said drums, friction-wheels on the ends of said shafts, gearing for actuating the stirrer, friction-wheels actuated by said gearing, and means for forcing said friction-wheels into engagement, substantially as described.

10. In a hydraulic dredge, the combination, with the suction-pipe, a stirrer at the end thereof, means for actuating the stirrer, and ropes connected with the mouth of the suction-pipe, of drums for winding said rope and means for actuating the drums, consisting of flexible shafts, friction-disks on the shafts, friction-wheels normally out of contact with said disks, means for actuating said friction-wheels, and levers for forcing the friction-disks into contact with the friction-wheels, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

CALEB H. BOOTH.

Witnesses:

F. THORNELY,
C. SIGHNORY.