No. 677,258. Patented June 25, 1901.

B. H. MUEHLE.

HYDRAULIC DREDGE.

(Application filed Mar. 28, 1901.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

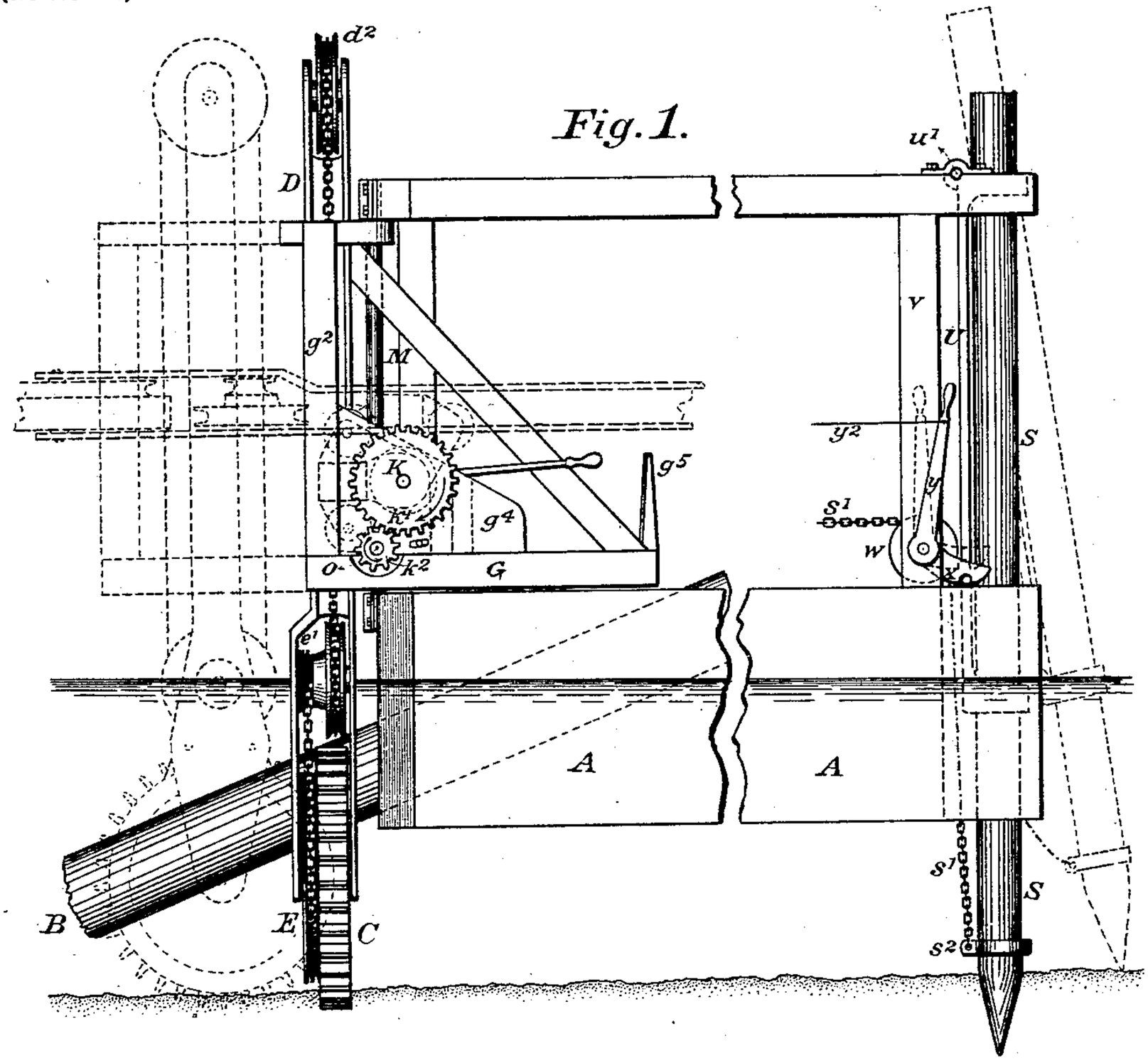
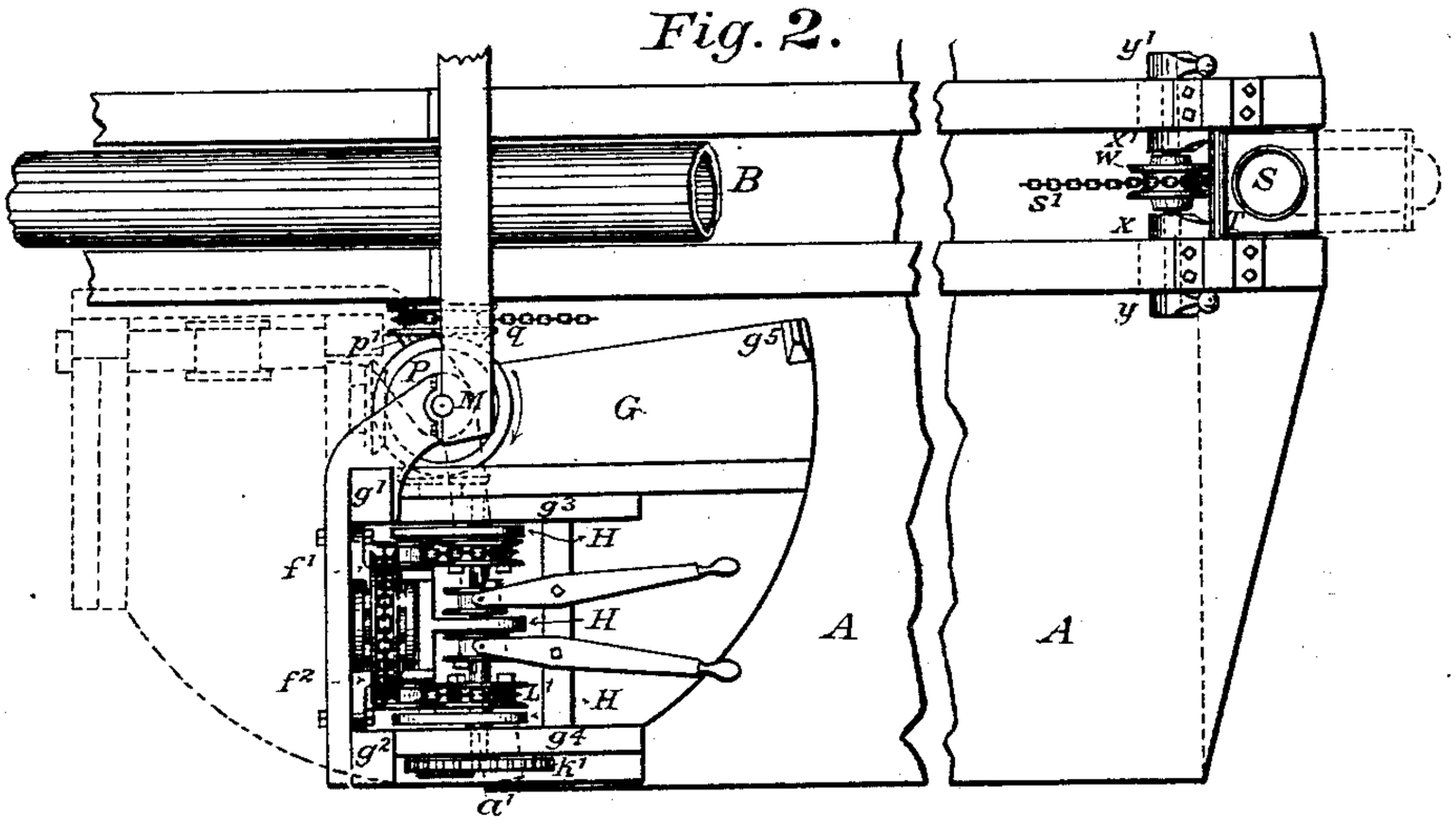


Fig. 2.



WITNESSES:

B. B. A. Laitner

Sylvanus Palmer

INVENTOR:

Bernard Hugo Muehle

No. 677,258. Patented June 25, 1901.

B. H. MUEHLE.

HYDRAULIC DREDGE.

(Application filed Mar. 28, 1901.)

(No Model.) 2 Sheets—Sheet 2.

Fig. 3.

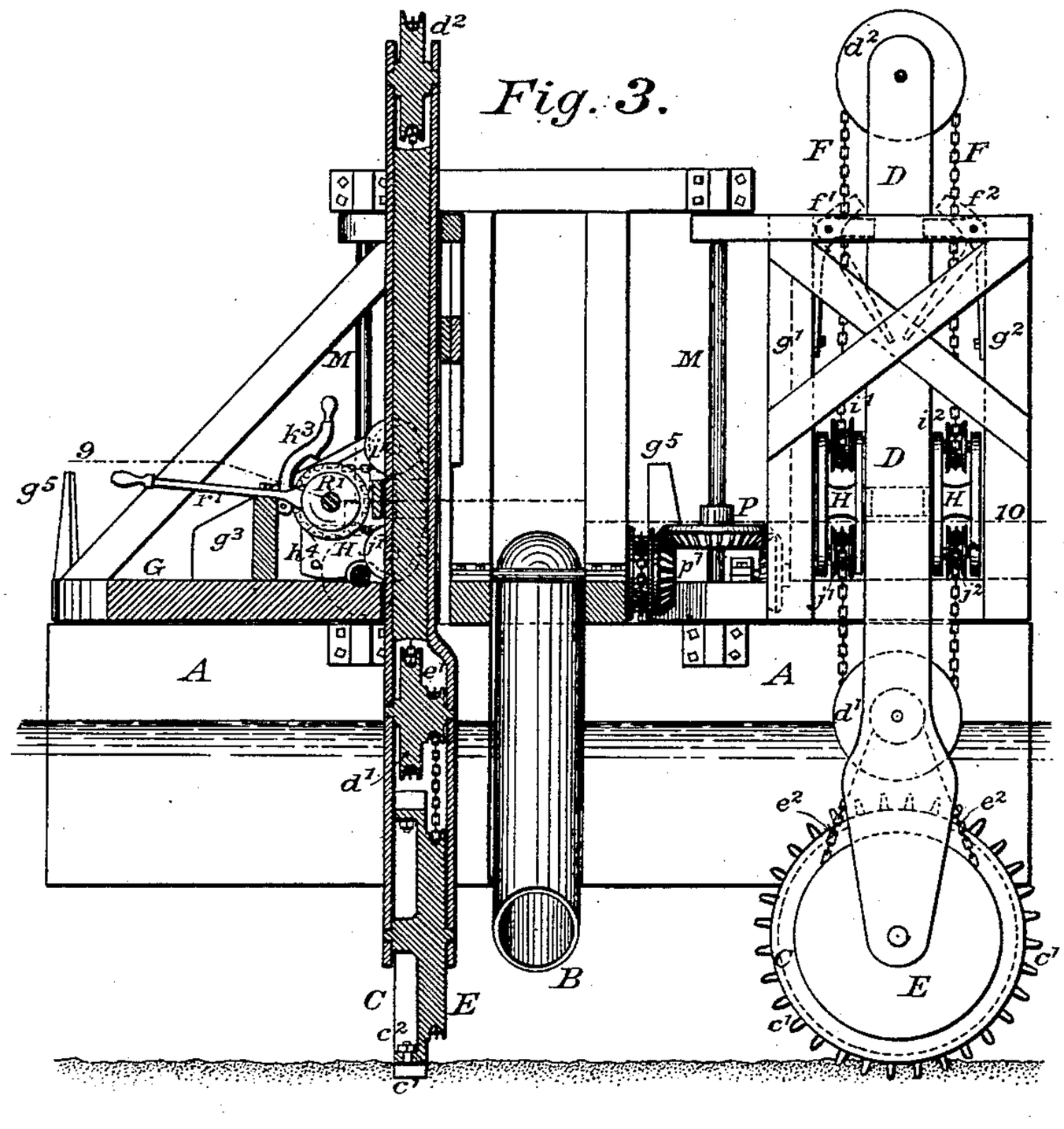


Fig. 5.

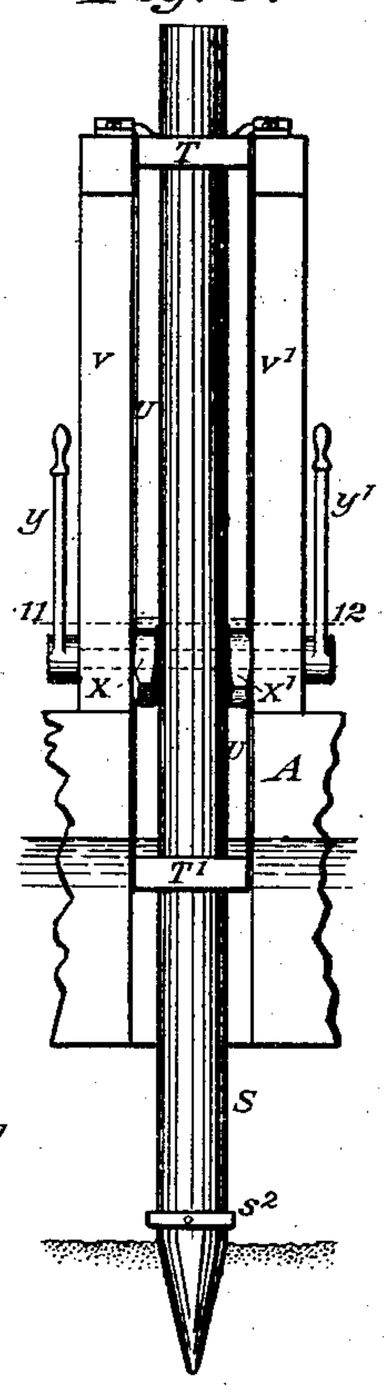


Fig. 4.

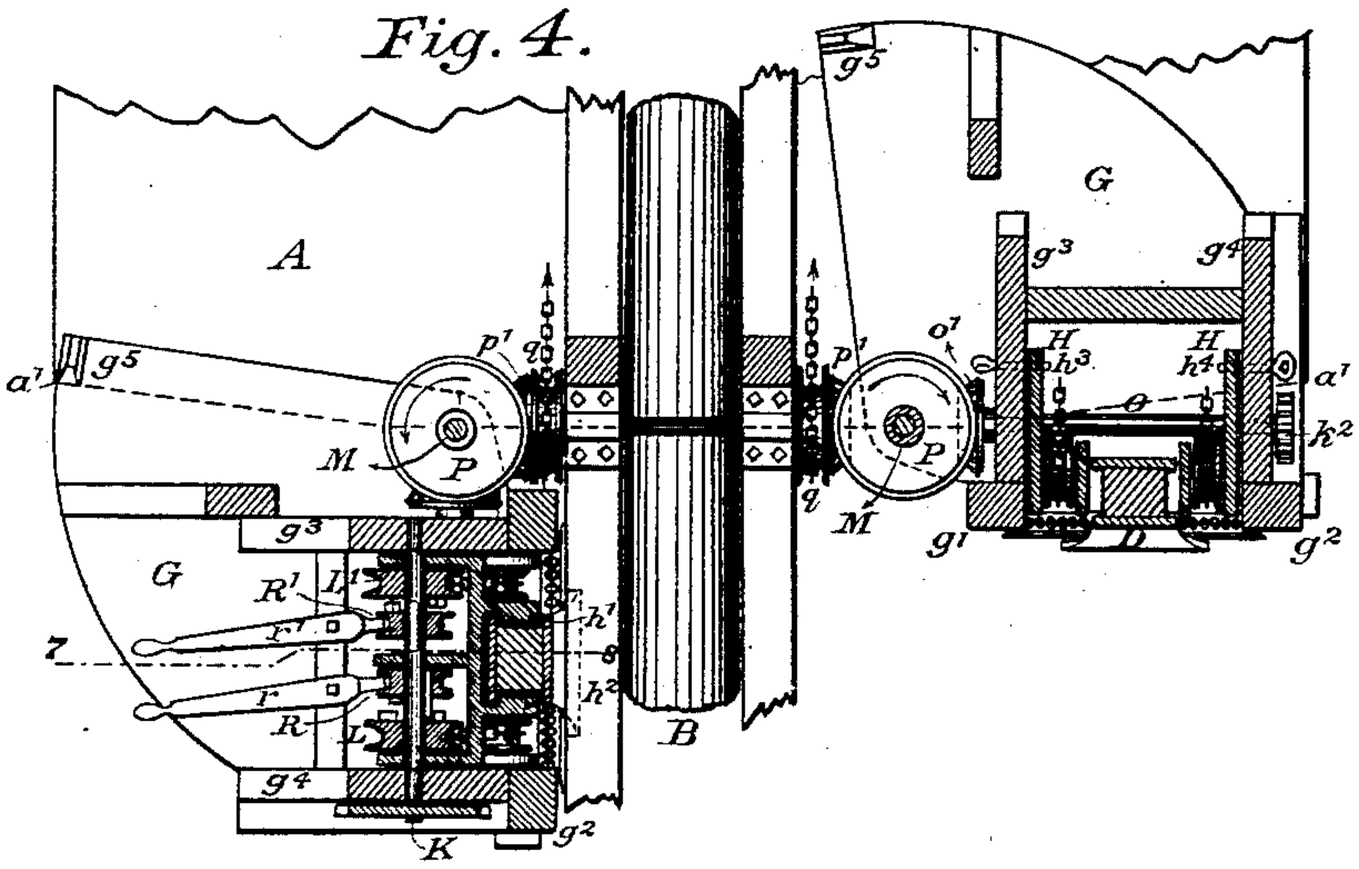
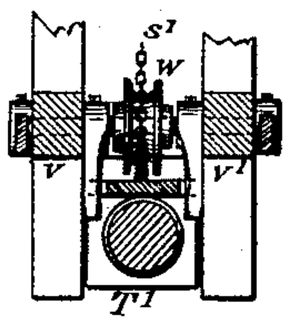


Fig. 6.



WITNESSES:

B. G. A. Laitner

Sylvanus Palmer

INVENTOR:

Bernard Hugo Muehle

UNITED STATES PATENT OFFICE.

BERNARD HUGO MUEHLE, OF DETROIT, MICHIGAN.

HYDRAULIC DREDGE.

SPECIFICATION forming part of Letters Patent No. 677,258, dated June 25, 1901.

Application filed March 28, 1901. Serial No. 53,257. (No model.)

To all whom it may concern:

Be it known that I, BERNARD HUGO MUEHLE, a citizen of the United States, residing at the city of Detroit, in the county of Wayne and State of Michigan, have invented a new and useful Hydraulic Dredge, of which the following is a specification.

My invention relates to improvements in dredging-machines by means of which the dredge-hull is moved and revolved around a pivotal spud; and the objects of my improvements are, first, to provide the hull of a dredge with one or more traction-wheels which may be adjusted so as to travel on the river-bottom and propel the dredge around a pivotal spud or in any other desired direction; second, to so adjust these wheels upon the lower ends of vertical timbers or spuds and connect them by means of chains, chain-wheels, and gearing with the motive power of the dredge that their rotary motion for the purpose of propelling the dredge in any desired direction may be initiated and controlled by an attendant on board of the dredge without stopping the operation of the excavating machinery; third, to so arrange the mechanism provided for revolving the traction-wheel that the latter may be lifted vertically out of the water and the supporting-spud moved into a horizontal position above the deck of the dredge-hull; fourth, to provide the traction-wheels with adjustable teeth, so as to permit the use of such as are specially adapted for taking a firm hold on any kind of material composing the river-bottom, and, fifth, to provide at one end of the dredge-hull a single spud which can be used both as a pivot around which the dredge-hull may be moved and as a trailer during the forward movement of the dredge. I attain these objects by the mechanism illustrated in the accompanying drawings, on two sheets, in which—

Figure 1 is a side elevation of both ends of a dredge-hull, showing my improvements. Fig. 2 is a plan view of the same. Fig. 3 is an end elevation, part of which is a vertical section on line 7 8. Fig. 4 is a horizontal section on line 9 10; Fig. 5, an end elevation of the pivotal spud and its operating mechanism, and Fig. 6 a horizontal section of the same on line 11 12.

Similar letters refer to similar parts in each of the figures.

The hull of a hydraulic dredge is shown at A and the suction-tube at B. The latter is located within a recess at one end of the hull and is vertically adjustable, so as to adapt it to excavation at any desired depth within reach of its mouth.

C is a traction-wheel the rim of which is perforated at suitable intervals and provided with adjustable teeth c'. Each tooth has a shank which passes through one of these holes in the rim and is secured to the latter by means of a nut c^2 upon the inner face of the rim, as shown in Fig. 3. The traction-wheel is supported between jaws formed on the lower end of the spud D and carries upon one side a chain-wheel E, of smaller diameter than the traction-wheel. Between these jaw-plates and above the wheel E a small chain-wheel e' is supported upon a counter-shaft, and these two wheels are connected by an endless chain e^2. Another chain-wheel of larger diameter, d', upon the same counter-shaft is connected with a similar wheel d^2 on or near the top of the spud D by means of the endless chain F, hereinafter described.

The spud D may be composed of three parts, as shown, the central one being a timber rectangular in cross-section, and two plates bolted or riveted to opposite sides of the timber. Both edges of each plate project beyond the sides of the timber, so as to form recesses or grooves throughout the entire length of the spud. Extensions of these plates beyond the ends of the central part of the spud form the jaws or framework between which the traction-wheel C and the chain-wheels are supported, as above described. The spud should be of greater length than can be shown in the drawings. It is held in a perpendicular position and may move freely up and down between two pairs of guide-blocks f' f^2 and h' h^2, which reach into the grooves or recesses from opposite sides of the spud and may be provided with suitable friction-rollers. The upper pair of guide-blocks f' f^2 are bolted onto one side of a cross-beam on or near the top of two upright timbers g' g^2, which are erected on the edge of the platform G. These guide-blocks are provided

with arms or levers, by means of which they may be lifted or turned out of the grooves of the spud, and thus release the latter when required, substantially as shown by broken lines in Fig. 3. The lower pair of guide-blocks h' h^2 are secured to the hinged frame H, which also carries two pairs of chain-pulleys i' i^2 and j' j^2. The shaft K, upon which the frame H is hinged, has its bearings on the upright side frames g^3 g^4, which are erected on the platform G. It will be readily seen that the lower guide-blocks h' h^2 reach into the grooves of the spud from one side, while the upper guide-blocks f' f^2 hold the spud from the opposite side. When, therefore, the upper end of the spud is released from the grasp of the adjustable guide-blocks f' f^2, as above described and shown in Fig. 3, the spud may still be held by the lower guide-blocks on the frame H and may be revolved around the shaft K and placed in a horizontal position, as shown in broken lines in Fig. 1. This is done when the dredge is not in operation and while it is being towed to and from the places where the dredging is required; also, for the purpose of lifting the traction-wheel out of the water and placing it in position convenient for adjusting teeth or repairing the mechanism.

While the dredge is in operation and the spud must be in an upright position, the frame H is locked to the platform and bearings g^3 g^4 by means of the bolts h^3 h^4.

The platform G, uprights g' g^2, and cross-beam form a framework, which is suitably braced and connected at top and bottom with the vertical shaft M, so as to permit about a quarter-turn horizontally of the platform with spud, traction-wheel, and operating mechanism around this shaft. By this arrangement the face of the traction-wheel may be placed parallel to the axis of the dredge-hull, as shown by broken lines in Figs. 1 and 2, and when resting on the river-bottom and revolved by means of the mechanism hereinafter described move the dredge-hull lengthwise or along the axis of the dredge cut. The platform may be turned by hand, taking hold of the hand-lever g^5, or by means of suitable mechanism connected with the dredge machinery.

In Figs. 3 and 4 two traction-wheels, spuds, platforms, and operating mechanism are shown, one upon each side of the axis of the dredge-hull and suction-tube, the one on the left having the faces of the traction-wheel parallel to said axis and the one on the right at right angles thereto, the same as shown in Figs. 1 and 2. The end walls of the dredge are divergent from the axis to the corners at a', the faces between the vertical shafts M and these corners being intended to be shown as tangent to a circle the center of which is the pivotal spud located at the other end of the dredge-hull. When the end of the dredge which carries the excavating device and traction-wheels is to be moved around the pivotal spud, the faces of one or both of the traction-wheels are turned to a position parallel to this tangent M a'.

The mechanism by means of which each of the traction-wheels may be revolved in either direction consists of the following parts: The endless chain F, which connects the chain-wheels d' and d^2 on the spud D, also passes over the pulleys i' i^2 and j' j^2, thence horizontally toward and around the chain-wheels L L', which are loose upon the shaft K. The latter carries a spur-wheel k', which gears with the pinion k^2 on the counter-shaft O. This shaft revolves in bearings on the platform G and carries upon its other end, adjacent to the vertical shaft M, a bevel-wheel o'. This gears with the horizontal bevel-wheel P, which may revolve freely around the vertical shaft. The bevel-wheel P is revolved by means of a corresponding bevel-wheel p' on a counter-shaft having its bearings upon the framework of the dredge-hull and may be connected with the main engine of the dredge by means of the chain-wheel q and endless chain q' or with a separate engine by any other suitable or convenient device.

The rotary motion of the traction-wheels when on the river-bottom and in the act of propelling the dredge-hull is initiated by the revolution of the horizontal bevel-wheel P in the direction of the arrow. This is communicated through the gearing above described to the shaft K, causing the latter to revolve continuously in one direction, also indicated by an arrow. By means of the clutches R and R', sliding horizontally upon the feathered portion of the shaft K and operated by levers r and r', the rotary motion of the shaft may be communicated to either of the chain-wheels L or L', thence through the endless chain F to the traction-wheel, revolving the latter in either direction. When, therefore, one or both of the traction-wheels touch and take hold of the river-bottom while in position tangent to the circle of which the pivotal spud is the center, the revolution of the traction-wheels and the resulting circular movement in either direction of the end of the dredge which carries the suction-tube or other excavating device may be regulated by an attendant on the dredge taking hold of either of the clutch-levers and bringing the clutches into contact with either of the chain-wheels L or L' alternately, and when one or both of the traction-wheels are in a position parallel to the axis of the dredge-hull the latter may be moved forward by turning the lever r so as to connect the clutch R with the chain-wheel L, thereby giving the traction-wheel a rotary motion in the direction required to propel the dredge forward in the proposed channel.

When it becomes necessary to raise the traction-wheel from the river-bottom, either for the purpose of shifting its position around the vertical shaft M or for lifting it entirely out of the water, as above described, the prime-

motor wheel P is first caused to revolve in the direction opposite to that shown by the arrow. Then both clutches R R′ are brought into contact with their respective chain-wheels L L′, thus pulling both lower reaches of the endless chain F over the lower guide-rollers j' j^2 and raising the spud vertically between the guide-blocks. After the spud has thus been lifted to the required height the clutches are again disconnected and the spud may be held suspended by means of a stop lever or pawl engaging with a ratchet-wheel attached to either one or both of the chain-wheels L L′, as shown at k^3, Fig. 3.

S is a pivotal spud located at the end of the dredge-hull opposite to that which carries the excavating device and traction-wheels. This spud is cylindrical throughout its entire length and has a sharp-pointed foot. It is held upright within guide-blocks T T′, having circular orifices a trifle larger in diameter than the cross-sectional area of the spud, so as to permit the latter to slide freely up and down within them. The guide-blocks are connected by means of a bar U, which is hinged at or near its upper end to a horizontal shaft u', having bearings on a framework supported by the upright timbers v v', between which the bar, with its guide-blocks and the spud, may oscillate in a direction parallel with the axis of the dredge-hull. A chain s' is attached to a ring-bolt or collar, as shown at s^2, the point of attachment being upon the outer face of the cylindrical spud, near its lower end. The chain is passed over a chain-wheel W, and thence to a drum or other suitable device connected with the machinery of the dredge.

When the dredge is being moved forward along the axis of the dredge cut, the pivotal spud resting on the river-bottom, the bar U will oscillate upon its fulcrum u', permitting the spud to act in the capacity of a "trailer," keeping the dredge in alinement during the forward movement, as shown in broken lines in Fig. 1. As soon as the dredge has arrived at the required advanced position the act of pulling the chain s' causes the foot of the spud to slide along the river-bottom, simultaneously lifting the spud within the guide-blocks and oscillating it upon the fulcrum u' until it assumes a perpendicular position. Then upon the strain of the chain being relaxed the sharp end of the spud will permit the latter by its own weight to penetrate the river-bottom, thus anchoring that end of the dredge-hull. While in this position the spud may act as a pivot around which the opposite end of the dredge and its excavating device are revolved in order to make a circular dredge cut.

X X′ are latch-bars which are attached to a horizontal shaft, which also carries hand-levers y y'. The latch-bars engage with projections upon the sides of the hanging plate and operate automatically, locking the lower end of the plate when the spud has been brought to a vertical position. One latch-bar and one lever may be used; but for greater convenience and to secure a firmer hold of the locking device upon the hanging bar it will be found preferable to use two latch-bars and levers. One of the latter may be provided with a rope or chain y^2, leading to a place within reach of the engineer of the dredge, so that the entire mechanism for operating, moving, and holding the spud S may be controlled by the engineer.

The following is a brief description of the operation of a dredge provided with my improvements: The pivotal spud S being held suspended from the chain s', the traction-wheels raised from the bottom, and their spuds placed in the horizontal position shown in Fig. 1, the dredge may be towed to the place where excavation of the river or lake bottom is to be commenced. Arriving at the initial point of the proposed dredge cut, the pivotal spud is dropped, so as to enter the soil and firmly anchor that end of the dredge-hull. The other end is then swung into the axis of the proposed channel, and by turning the spuds D around the shafts K into a perpendicular position and adjusting the upper guide-blocks f' f^2 the traction-wheels may also be allowed to drop to the river-bottom, thus holding this end of the dredge-hull in place. Then an attendant turns the platform G so that the faces of the traction-wheels are parallel with the tangent of a circle the center of which is the pivotal spud S and adjust the mouth of the suction-tube at the required depth or grade. Excavation is now commenced and may be continued uninterruptedly and rapidly, while the dredge-hull and the excavating device are moved and controlled by one attendant on the dredge in the following manner: Connection having been made with the dredge machinery or other motive power, so as to revolve the horizontal bevel-wheel P, and thereby the shaft K, in the direction of the respective arrows, the attendant moves one of the clutch-levers r r', causing the clutch to engage with one of the chain-wheels L L′. Through the endless chain F a rotary motion is thus communicated to the traction-wheel C in a manner to propel the end of the dredge-hull around the pivotal spud, and thereby introduce and push the mouth of the suction-tube or excavating device into the material to be removed. As soon as the excavator has reached the side of the proposed channel, the distance of which (measured from the axis) is limited to the length of a line drawn between the pivotal spud and the mouth of the suction-tube, the circular motion of the dredge-hull around the spud S is reversed by disengaging the clutch from the chain-wheel and connecting the other clutch with the adjacent chain-wheel, the attendant standing on the platform G and moving the respective clutch-levers accordingly. The return movement toward the axis of the channel may be made with greater speed, completing the excavation and insuring a level

bottom. Then continuing across the axis in the same direction the other half of a semicircular dredge cut or fractional part thereof is made across the proposed channel, after which the swinging end of the dredge-hull is returned to the axis. A forward movement of the dredge-hull along the axis is then effected in the following manner: The attendant raises one of the traction-wheels, turns its faces so as to be parallel with the axis by revolving the platform G around the vertical shaft M, and allows it to drop again to the bottom. The other traction-wheel may be moved in like manner or held suspended during the forward movement of the dredge. The hanging bar U is then released by raising the latch-bars X X′ and the pivotal spud S lifted up sufficiently to loosen its hold on the river-bottom. By bringing the clutch R into contact with the chain-wheel L, as above described, the traction-wheel, the teeth of which have a firm hold on the river-bottom, will be revolved in the direction required to propel the dredge-hull forward, while the pivotal spud operates as a trailer, oscillating upon the fulcrum *u′* and guided by the upright timbers *v v′*, keeping the dredge in alinement. The dredge having been moved the required distance, the act of winding up the chain *s′* will cause the spud S to be lifted within the guide-blocks and at the same time drawn into a vertical position. The latch-bars will automatically lock the bar U, and when the chain is released the spud drops by its own weight and enters the soil, resuming its function as a pivot, around which the opposite end of the dredge-hull may be propelled in the manner above described for the purpose of making a second concentric dredge cut across the proposed channel. These movements of the dredge-hull may be repeated and continued while the excavating machinery is in operation, lifting and removing all material found above the grade at which the mouth of the suction-tube or other excavating device has been adjusted. The simple mechanism for initiating and controlling these movements is located on the dredge and may be operated by one attendant.

It will be readily seen that there is no absolute necessity for more than one of the traction-wheels, yet in practice the use of two wheels, each independent of the other and provided with separate operating mechanism, will be found preferable. Especially when working in a current the dredge-hull may be held in place by one of the wheels and the pivotal spud, while the other traction-wheel is lifted from the bottom and its position changed for either forward or side movement of the dredge-hull.

The arrangement of the mechanism designed to connect the horizontal bevel-wheel P as prime motor with the traction-wheel C is herein shown and described in the simplest possible form. Modifications may, however, be made in the diameter and location of the several chain-wheels, spur-wheels, and bevel-wheels or other additional gearing be introduced for the purpose of attaining the objects herein set forth and without changing the general design and scope of this invention.

What I claim as my invention, and desire to secure by Letters Patent of the United States, is—

1. A dredge-hull provided, at or near one end, with an upright spud or timber carrying a traction-wheel arranged to travel on the river-bottom, said spud having a free vertical movement between guide-blocks which are connected with a framework erected on a platform, both of which may be revolved around a vertical shaft on the dredge, in order to permit the adjustment of the traction-wheel parallel either with the axis of the dredge-hull or with the tangent of a circle the center of which is a pivotal spud located at the opposite end of the dredge-hull, substantially as herein described.

2. A dredge-hull provided with an upright spud or timber carrying a traction-wheel arranged to travel on the river-bottom, a chain-wheel connected with the traction-wheel, additional chain-wheels of different diameters on a counter-shaft, another chain-wheel at or near the top of the spud, an endless chain connecting the first-mentioned chain-wheel with the smaller wheel on the counter-shaft, and another endless chain connecting the large wheel on the counter-shaft with that on the top of the spud, the second endless chain also passing over two chain-wheels on a horizontal shaft, the revolution of either of these chain-wheels communicating a rotary motion to the traction-wheel in either direction, for the purpose and substantially as herein described.

3. A dredge-hull provided with an upright spud carrying a traction-wheel, a system of chain-wheels and endless chains including a pair of chain-wheels on a horizontal shaft, and a pair of clutches, the engagement of both of which, with this pair of chain-wheels, causing the traction-wheels to be lifted from the river-bottom, for the purpose and substantially as herein described.

4. A dredge-hull provided with an upright spud carrying a traction-wheel and having a vertical movement between two pairs of guide-blocks, the upper pair being adjustable and arranged to release the upper end of the spud, the lower pair connected with a frame which is hinged on a horizontal shaft carrying chain-wheels and clutches by means of which the traction-wheel may be revolved or lifted from the river-bottom, for the purpose of turning the spuds upon said shaft into a horizontal position, substantially as herein shown and described.

5. A dredge-hull provided with a spud carrying a traction-wheel, a platform and upright frame with guide-blocks between which the spud has a longitudinal movement, a sys-

tem of chain-wheels and endless chains including a pair of chain-wheels upon a horizontal shaft having its bearings on said platform, a bevel-wheel revolving horizontally around a vertical shaft, to which the platform is hinged, and suitable gearing connecting the bevel-wheel with the horizontal shaft, for the purpose and substantially as described.

6. A dredge-hull provided with a cylindrical spud having a free vertical movement within guide-blocks having circular orifices, said guide-blocks being connected by a bar which is hinged at or near its upper end and suspended so as to permit an oscillatory movement of the bar and spud between upright frame-timbers, when said spud acts as a trailer and guide during the forward movement of the dredge, substantially as set forth.

7. A dredge-hull provided at one end with a cylindrical spud, having a free vertical movement within circular guide-blocks upon a bar which is suspended on a hinge or horizontal shaft at or near its upper end, and a latch for locking and holding the lower end of the bar in a perpendicular position, when said spud acts as a pivot around which the opposite end of the dredge-hull and an excavating device may revolve, for the purpose and substantially as set forth.

8. In combination with the dredge-hull A, one or more traction-wheels C, having adjustable teeth c' provided with shanks which pass through orifices in the rim of the traction-wheel, and screw-nuts c^2 for the purpose and substantially as described.

9. In combination with the dredge-hull A, the traction-wheel C, spud D, chain-wheels E, e' d' and d^2, endless chains e^2 and F, pulleys i' i^2 and j' j^2, and chain-wheels L L′ upon the shaft K, all parts being arranged and operating substantially as described.

10. In combination with the dredge-hull A, the traction-wheel C, spud D, frame H with guide-blocks h' h^2 and shaft, K, all parts being arranged and operating substantially as described.

11. In combination with the dredge-hull A, the traction-wheel C, spud D, frame H with guide-blocks h' h^2, platform G, upright timbers g' g^2 and adjustable guide-blocks f' f^2, and shaft K, these parts being arranged and operating substantially as described.

12. In combination with the dredge-hull A, the traction-wheel C, spud D, guide-blocks f' f^2 and h' h^2, platform G, upright timbers g' g^2 and vertical shaft M, all parts being arranged and operating substantially as described.

13. In combination with the dredge-hull A, the traction-wheel C, spud D, guide-blocks f' f^2 and h' h^2, frame H, platform G, horizontal shaft K, gearing k' k^2, bevel-wheels o' and P, and vertical shaft M, arranged and operating substantially as described.

14. In combination with the dredge-hull A, the traction-wheel C, spud D, chain-wheels E, e', d' and d^2, endless chains e^2 and F, chain-wheels L L′ on shaft K, gearing k' k^2, bevel-wheels o' and P, and vertical shaft M, all parts being arranged and operating substantially as herein described.

15. In combination with the dredge-hull A, the traction-wheel C, spud D, chain-wheels E, e', d' and d^2, endless chains e^2 and F, the chain-wheels L L′ and clutches R R′ on the shaft K, all parts being arranged and operating substantially as described.

16. In combination with the dredge-hull A, the cylindrical spud S, guide-blocks T T′, hinged connecting-bar U, upright timbers v v' and latch-bars x x', said parts being arranged and operating substantially as herein described.

17. In combination with the dredge-hull A, the cylindrical spud S, guide-blocks T T′, hinged connecting-bar U, upright timbers v v', chain s' and chain-wheel W, said parts being arranged and operating substantially as described.

18. In combination with the dredge-hull A, the cylindrical spud S, guide-blocks T T′, hinged connecting-bar U, chain s', chain-wheel W and latch-bars x x', all parts being arranged and operating substantially as herein described.

BERNARD HUGO MUEHLE.

Witnesses:
B. G. A. LAITNER,
SYLVANUS PALMER.