No. 618,300. Patented Jan. 24, 1899.

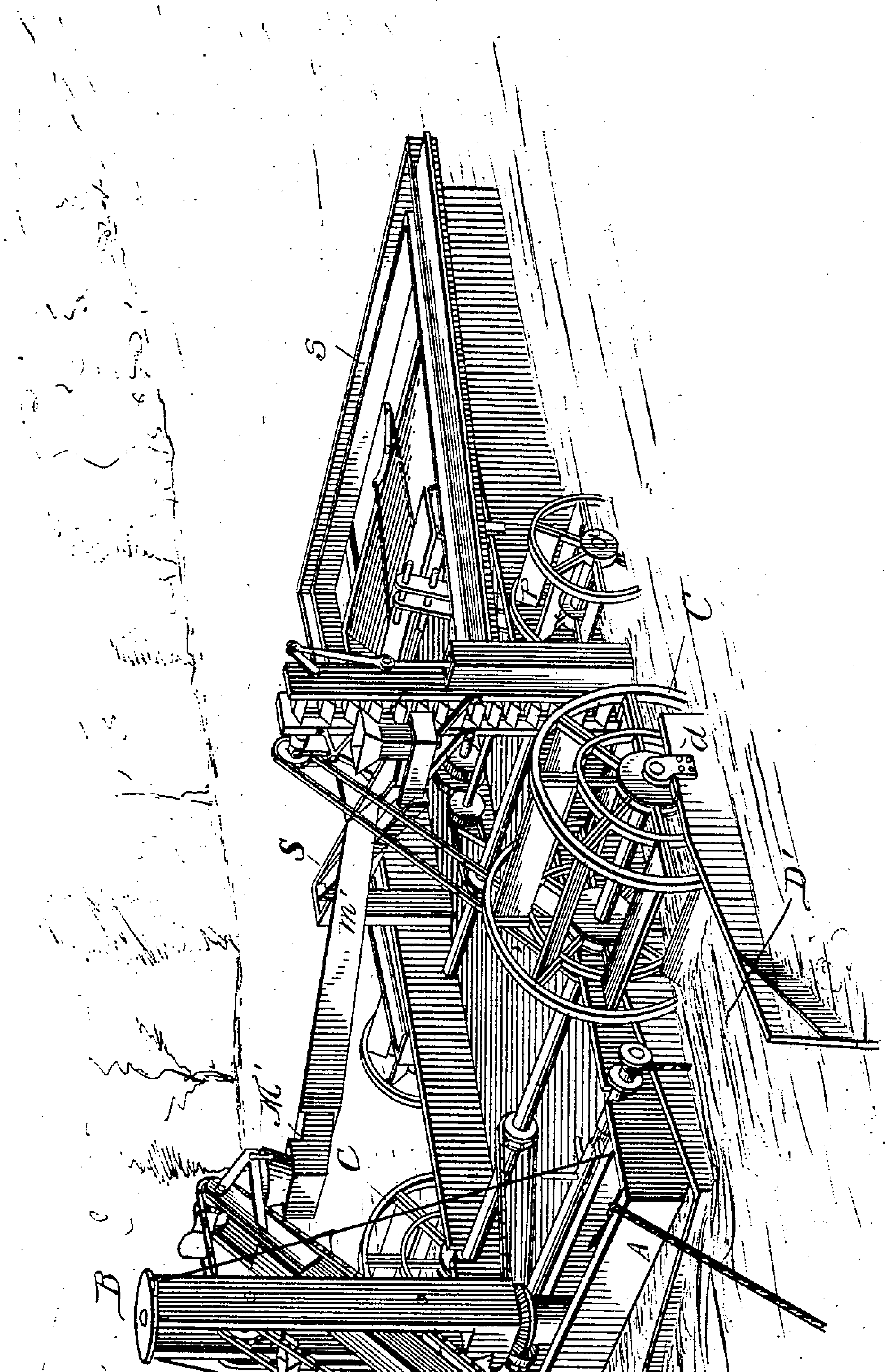
M. STEINBERG.

DREDGING AND MINING APPARATUS.

(Application filed Mar. 19, 1898.)

(No Model.) 4 Sheets—Sheet I.

Fig. 1.



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

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(No Model.) 4 Sheets—Sheet 2.

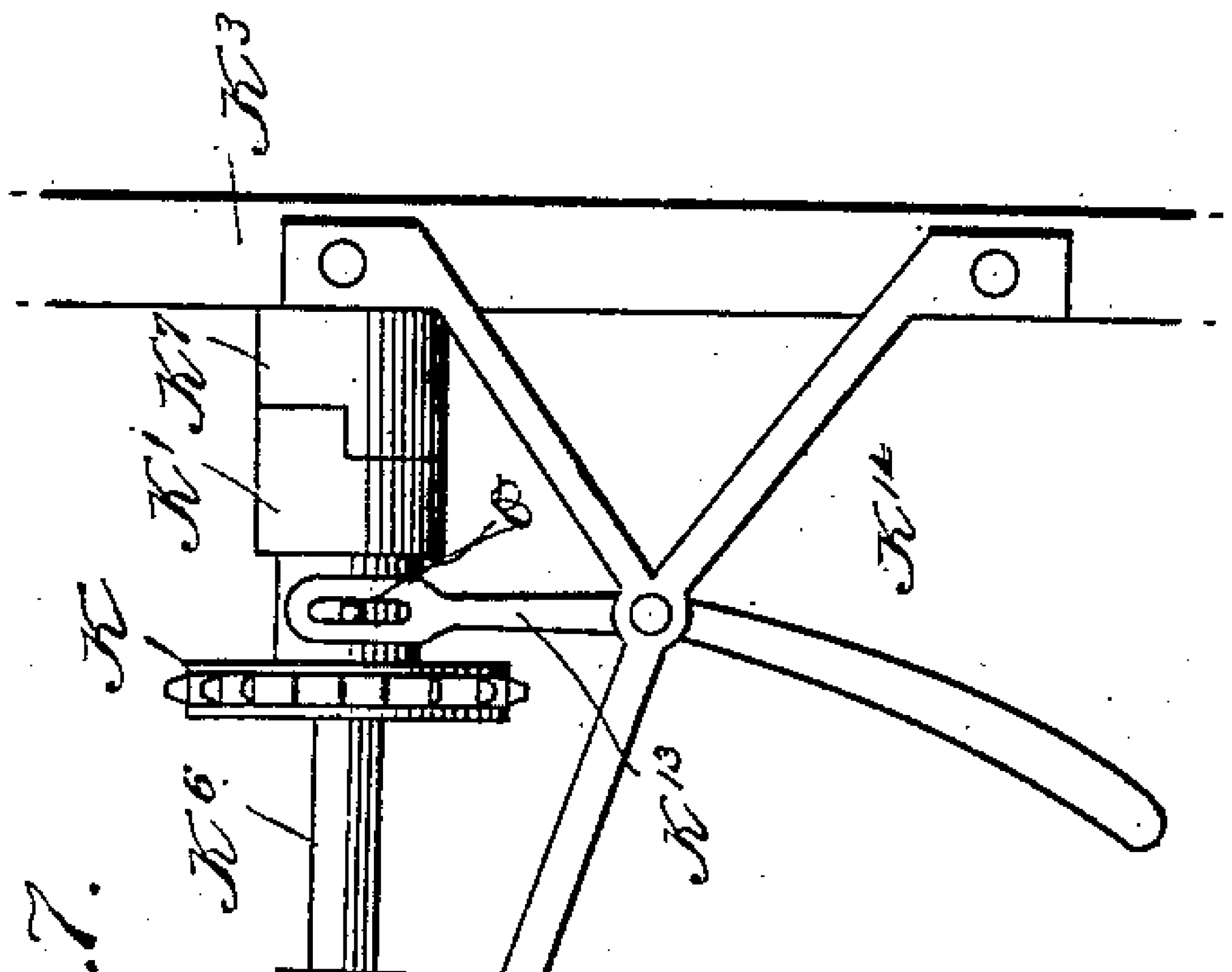

Fig. 7.

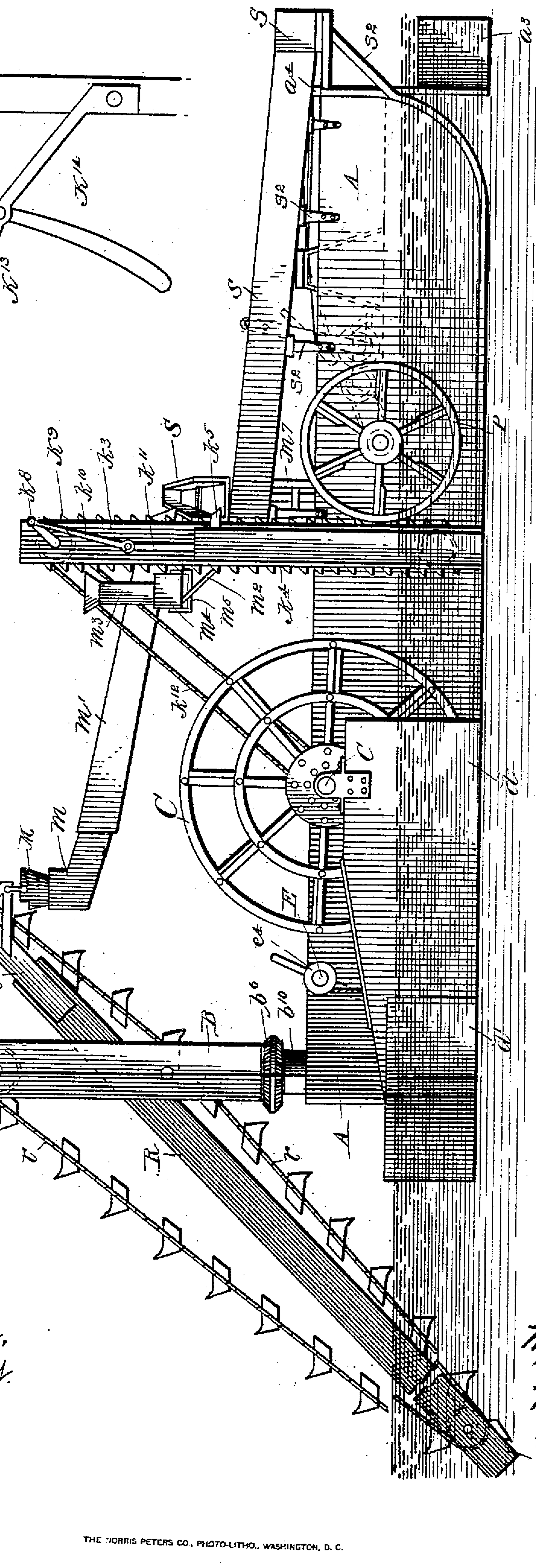

Fig. 2.

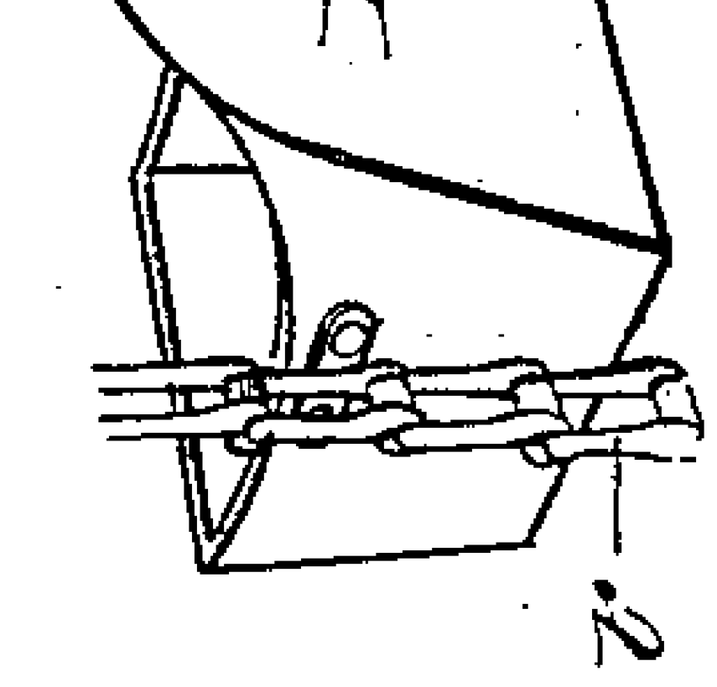

Fig. 8.

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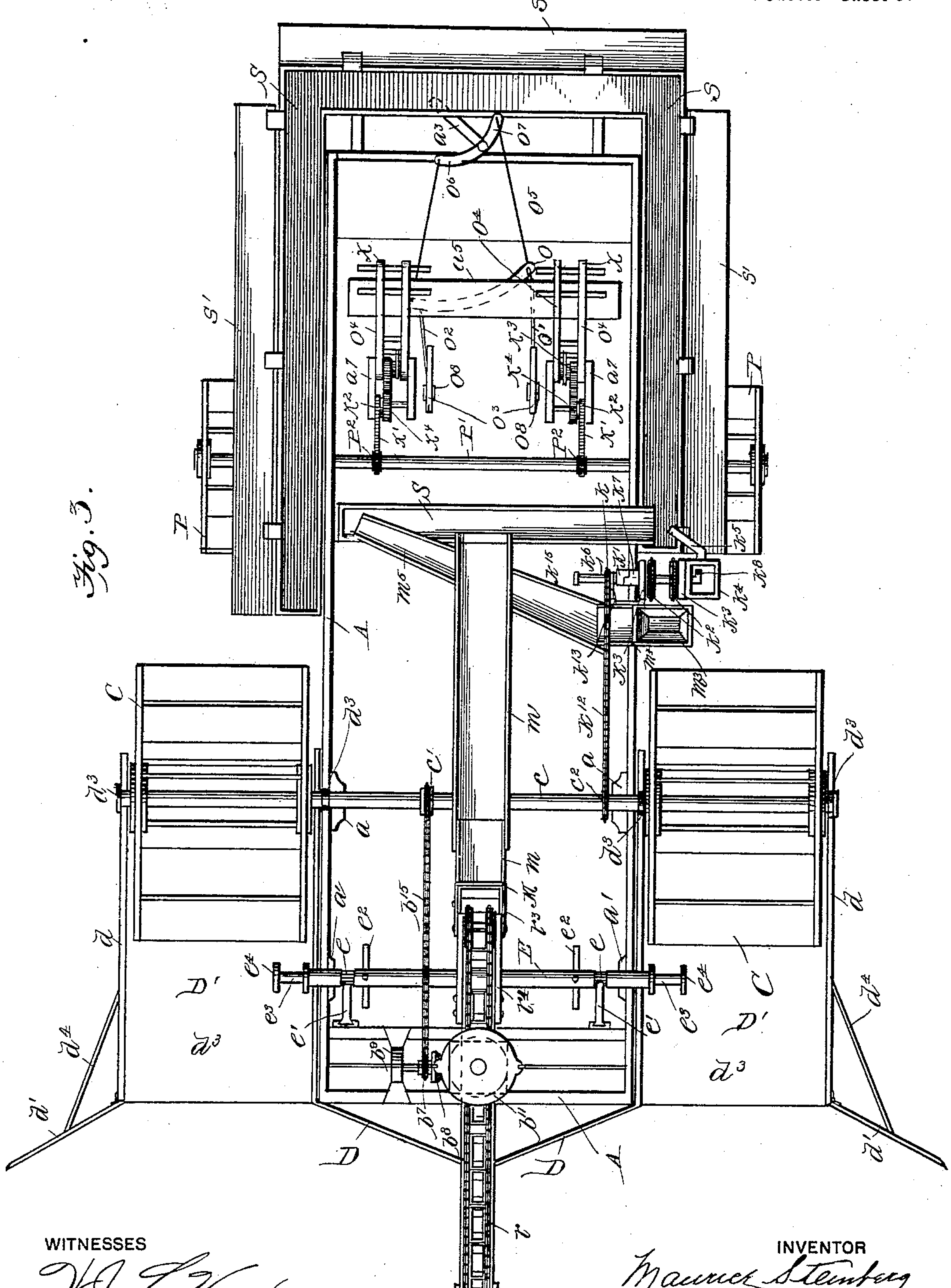
(No Model.) 4 Sheets—Sheet 3.

Fig. 3.



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(No Model.) 4 Sheets—Sheet 4.

Fig. 4.

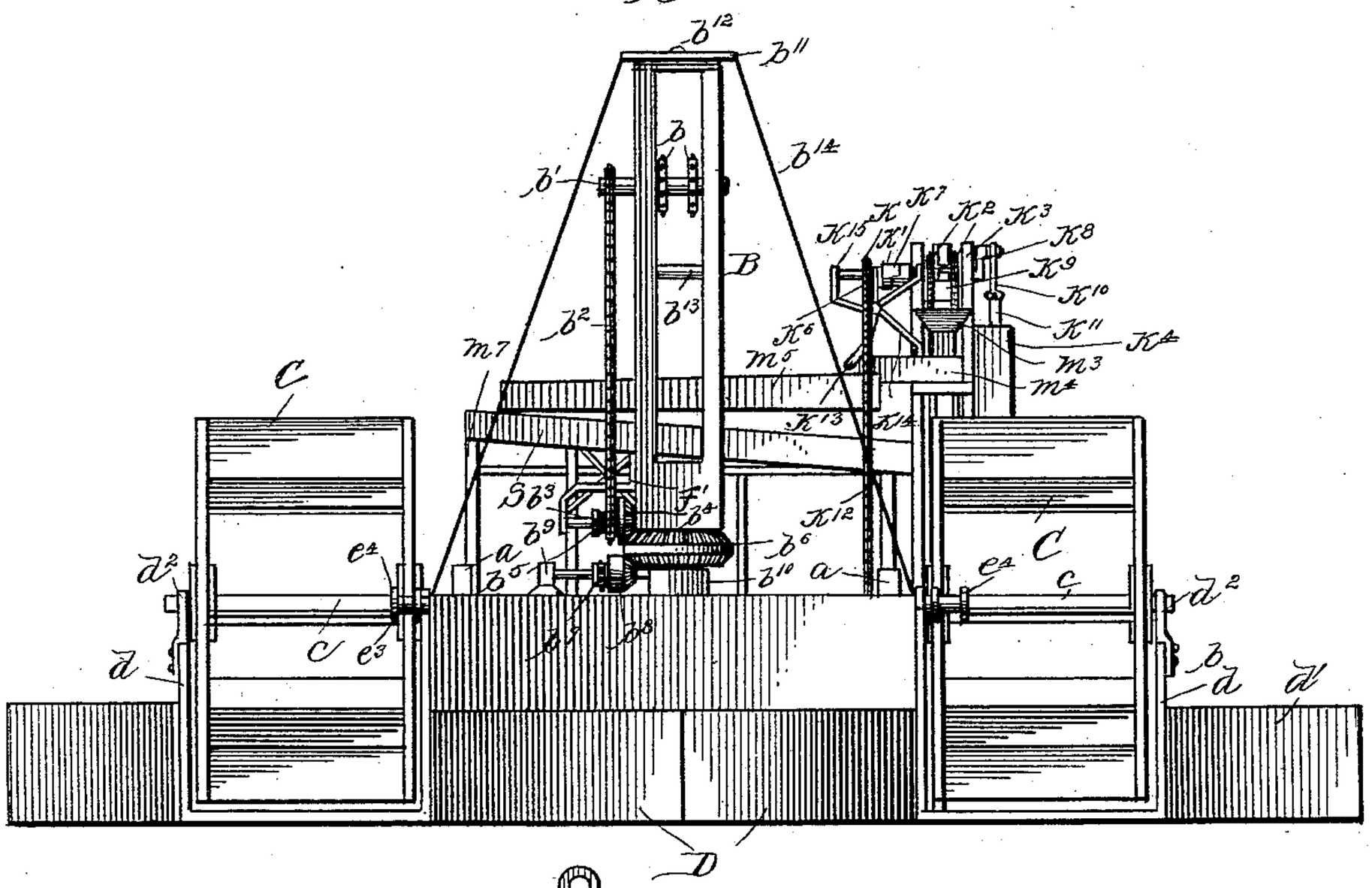


Fig. 5.

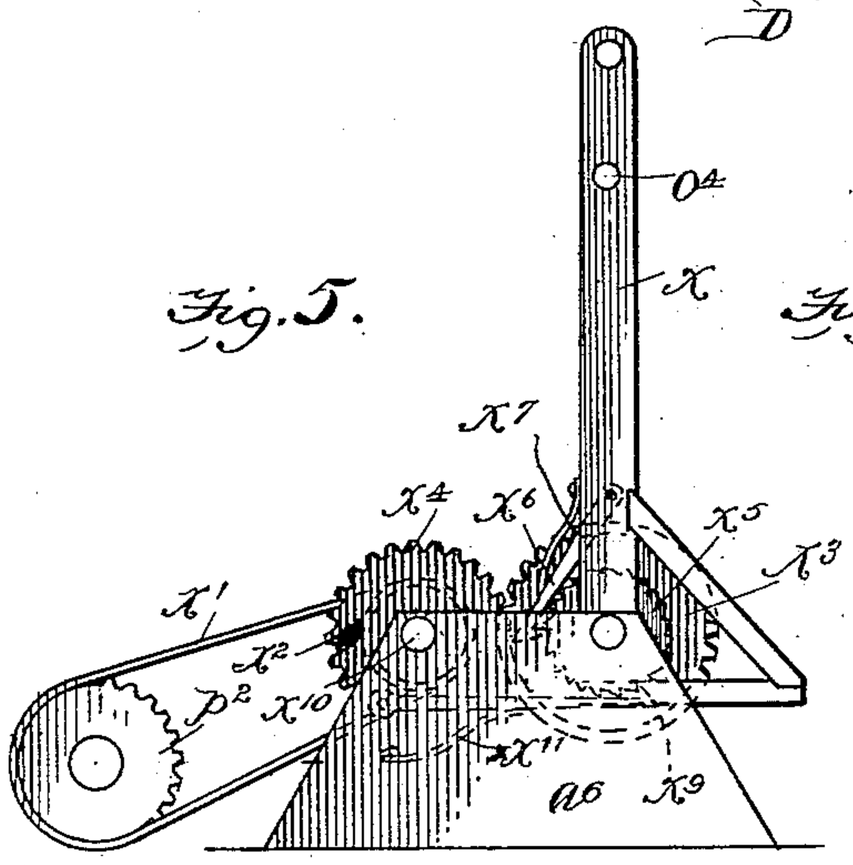


Fig. 6.

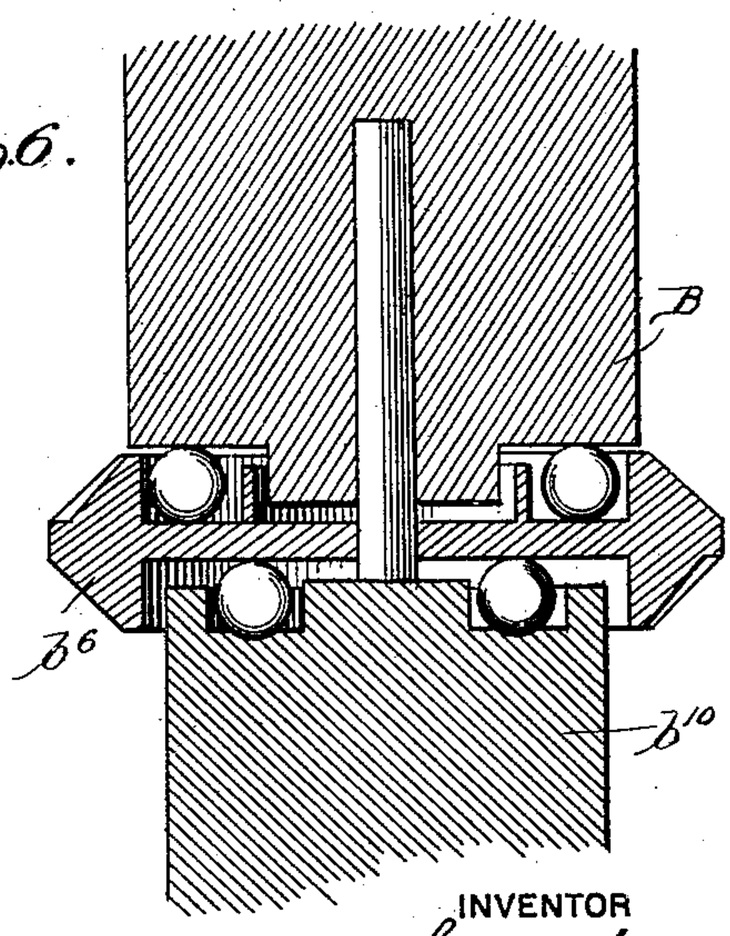
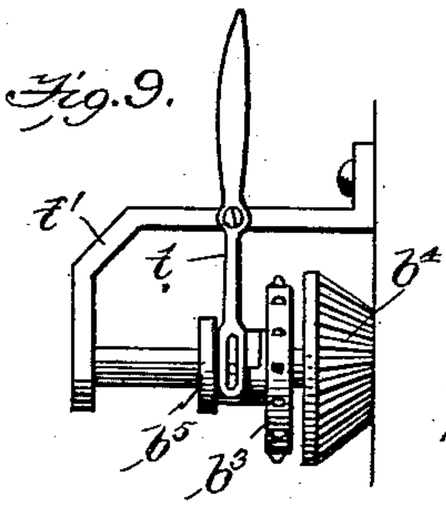


Fig. 9.



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UNITED STATES PATENT OFFICE.

MAURICE STEINBERG, OF BIWABIK, MINNESOTA.

DREDGING AND MINING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 618,300, dated January 24, 1899.

Application filed March 19, 1898. Serial No. 674,485. (No model.)

To all whom it may concern:

Be it known that I, MAURICE STEINBERG, a citizen of the United States, residing at Biwabik, in the county of St. Louis and State of Minnesota, have invented certain new and useful Improvements in Dredging and Mining Apparatus; 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 improvements in dredging-machines; and the objects of my improvements are, first, to provide a machine which may be moved about from place to place on the water and be operated by the currents of the stream, and, second, to provide a machine which is practically adapted for placer-mining to take the material from beneath the water and convey it into sluices and therein wash it and separate the mineral from the dirt or sand. I accomplish these objects by means of a novelly-constructed scow, a movable dam, undershot water-power wheels on either side of said scow and between the wings of said dam, a windlass for raising and lowering said dam, suitable dredging apparatus provided with an endless sprocket-chain carrying a succession of dredging-buckets, gear-wheels and chains for communicating power from the power-shaft to the dredging apparatus, troughs for conveying material dredged to the sluice-boxes, sluice-boxes arranged on either side and at the stern of said scow and inclined downwardly and provided with riffles, means for raising and conveying water to the upper end of said sluice-boxes, gear-wheels and chains for communicating motion from said power-shafts to the pumping apparatus, side propelling-wheels, a ratchet propelling apparatus, and means for communicating motion from said ratchet propelling apparatus to the said side propelling-wheels, and linked levers and pivoted yoke connected by flexible means to the cross-head of the rudder for the purpose of steering.

The invention consists of certain novel constructions, combinations, and arrangements of parts, as will be hereinafter more fully set forth and claimed.

In the drawings, Figure 1 is a perspective view of my said invention from a point off the starboard bow. Fig. 2 is a side elevation of my improved dredge. Fig. 3 is a plan view of my improved dredging apparatus. Fig. 4 is a front elevation with the dredging yard and buckets omitted. Fig. 5 is an enlarged side elevation of the ratchet propelling mechanism which operates the propelling-wheels for moving the boat forward. Fig. 6 is a vertical sectional view through the head of the pedestal, double-faced gear-wheel, and the front of the dredger-mast. Fig. 7 is an enlarged detail view of the clutch mechanism for throwing the water-delivery bucket mechanism into and out of operation. Fig. 8 is a detail perspective view of one of the buckets, showing the manner of attaching the chain to the same. Fig. 9 is a side elevation of the clutch mechanism for throwing the dredging mechanism into and out of operation.

In the drawings, A represents the scow, which is preferably flat-bottomed with partly vertically-curved ends and straight sides.

a a are trunnion-pedestals for carrying the power-shaft *c*. These pedestals project above the sides of the scow and are deeply slotted at the top to form journals for the shaft *c* and are left open at top, so that the shaft can be jacked up and bearing-blocks interposed in said slots between the shaft and the pedestals, thus permitting of the raising and lowering of the power-wheels *c c* to suit the convenience.

a′ a′ are bearing blocks or brackets for the windlass-shaft E, which blocks may be omitted, if desired, and the said shaft E may then bear in depressions in the side of the scow.

a^3 is the rudder, and a^4 the rudder cross-head.

a^6 a^6 are bearing plates or standards carrying part of the ratchet propelling mechanism.

B represents a horizontally-revoluble dredging-mast.

b b are sprocket-wheels keyed to a mutual shaft, which wheels engage the chains carrying the dredging-buckets.

b′ is a sprocket-wheel keyed to the same shaft as *b b* and engaging the chain b^2, which communicates motion from the power-shaft *c* through chain b^{15}, sprocket-wheel b^7, and gear-wheels b^8, b^6, and b^4. The sprocket-wheel b^7 is integral with and projects from the face of the gear-wheel b^8.

b^3 is a sprocket-wheel integral with beveled gear-wheel b^4. The beveled gear-wheel b^4 is keyed to its shaft and meshes with double-beveled gear-wheel b^6, but capable of being projected along its shaft by means of a disengaging-lever t, so as to be disengaged from gear-wheel b^6, as shown in Fig. 9. The disengaging-lever t is pivoted at its lower end to a stud projecting from a collar which encircles the neck b^5 and is also pivoted above its lower end and below the center to a suitable bracket which projects from the side or rear of the mast parallel to the shaft of the wheel b^3, said disengaging-lever being vertically slotted at its foot-pivot to admit of sufficient play of the pivot-pin in operation. The disengaging-lever t may be pivoted to a pivot pin or stud proceeding directly from the peripheries of the respective hubs of the wheels, if so desired, without the interposition of a collar; but in any event the end pivots, pins, or studs project through vertical slots in the lower end of the disengaging-lever to admit of sufficient play.

t' is a bracket projecting and depending from the side of mast B and forming at its outer end a bearing for the shaft of gear-wheel and sprocket-wheels b^3 and b^4.

b^6 is preferably a double-faced beveled cog-gear which is mounted on ball-bearings which are interposed between the pedestal b^{10} and the dredging-mast B.

b^9 is a bearing-post for the shaft of gear-wheel b^8.

b^{10} is a pedestal built into said scow for carrying the gear-wheel b^6 and the dredging-mast B.

b^{11} is a pivotal cap-plate on mast B, provided with horizontal apertured ears, to which are affixed the upper ends of guys b^{14} b^{14}, which latter are secured at their lower ends to the sides of the scow. b^{12} is the pivot-bolt which secures the said pivotal cap b^{11} to the head of mast B.

b^{13} is a roller interposed between and journaled in the sides of the mast B.

D represents a dam which is pivotally supported and hung near its rear end on the power-shaft c by means of straps d^2 d^2 of any suitable construction, so that the forward or outer end of said dam can be raised vertically. The front central portion of said dam is horizontally wedge-shaped or pointed and in its lowered operative position divides the water in front of the scow and causes the water to flow on either side into races D′ formed by the walls d d and the floor d^3. The central portion of said dam has no floor. d' d' are vertically-hinged wings of said dam, and in the operative position they project forward at an angle therefrom and are braced in that position by the rods d^4 d^4, which project from the outer walls d d of the race. These wings d' in operative position serve to divert an additional volume of water through the race and under and against the power-wheels C C.

E is the shaft of a windlass, which is provided with either an integral or attached ratchet e, which engages a dog e', pivoted at its lower end to the bulkhead of said scow. The outward ends of said windlass are preferably reduced in size and are provided with suitable guide or retaining flanges to keep the rope within said reduced portion. Ropes are attached, respectively, to the reduced ends of said windlass between said flanges, and the lower ends of said ropes are attached by any suitable means to the floors d^3 d^3 of said race portions, respectively, of said drum and forward of the wheels C C. Said windlass is provided with operating-pawls e^2.

R is the dredger yard or arm, projecting through the mast B and resting partly on the roller b^{13} and with its lower end on the bed of the river and provided at its upper and lower ends with parallel projecting plates r' r^4 or brackets, between which are journaled, respectively, twin head sprocket-wheels and twin foot sprocket-wheels, around which pass the parallel endless sprocket-chains carrying the dredging-buckets. The plates r' r' at the foot of said dredging-yard project a considerable distance beyond the shaft of the foot sprocket-wheels and serve to protect said foot sprocket-wheels from injury; but the peripheries of the head sprocket-wheels r^2 r^2, which are journaled on the same shaft, project slightly beyond the upper ends of the plates or brackets r^4 r^4. The brackets r^3 r^3 are journaled at one end of the shaft of sprocket-wheels r^2 r^2 where the same projects beyond the faces of the plates r' r' and are secured at the other end to said plates r' r'. These brackets r^3 r^3 carry at their angles the depending pivotal supports of the funnel M. These brackets r^3 may be omitted, if desired, and the funnel M may be depended directly from the shaft of the sprocket-wheels r^2, but always so as to have a swivel connection with the first section of the trough and turn horizontally when the dredging-arm turns to the right or left.

By the construction and arrangement of the machine thus far described it will be observed that the mast carrying the yard-arm and dredging-buckets can be turned horizontally to any extent required and that the dredging operation can be readily stopped for any purpose desired. When the machine is being moved from one place to another and while being so moved, the forward end of the dam can be elevated so as not to retard the progress of the scow.

c^2 is a sprocket-wheel keyed to the power-shaft c in line with a sprocket-wheel K. The sprocket-wheel K is integral with the sliding portion of a split drum or pulley K′ and K^7 and engages the endless sprocket-chain K^{12}, which latter connects said wheel K with the power-shaft c by means of the sprocket-wheel c^2 on said power-shaft. K^2 K^2 are head sprocket-wheels keyed to the same shaft and engaging endless sprocket-chains carrying a succession of water-buckets K^9, said chains

passing around corresponding foot sprocket-wheels in a vertical line with said head sprocket-wheels K^2 K^2, which latter are partially or wholly submerged below the water, the power being communicated to said bucket mechanism from the power-shaft *c* through the medium of sprocket-wheel c^2, chain K^{12}, and sprocket-wheel K′ K^7.

K^{13} is a disengaging-lever pivoted above the center to bracket K^{14} and pivoted at its upper end to a wrist pin or stud *o* on a collar which encircles the reduced portion K^6 of the half-drum K′, the upper end of said disengaging-lever K^{13} being vertically slotted to allow of sufficient play to the pivot when the lever is operated.

K^{15} is a bracket secured to and proceeding inward and upward from the inboard face of the inner member of support K^3 and serving to support the inboard end of the shaft of the head sprocket-wheels K^2 K^2.

K^3 K^3 are the supports for the water-bucket mechanism and are constructed of plank spaced a suitable distance apart and secured to the side of said scow in any suitable manner, the outer support being secured to the inner support by braces, lattice-work, or other suitable means, so as not to interfere with the operation of said water-bucket mechanism.

K^4 is an ordinary box pump-pipe secured to the outer face of the support K^3, said support K^3 and said pump-pipe both extending below the normal water-line of said scow. K^5 is a waterspout leading from said pump-pipe and to the second sluice-box S.

K^8 is a crank-arm keyed at one end to the end of the shaft of the head sprocket-wheels of the water-bucket mechanism and at the other end carrying the upper journaled end of a connecting-rod K^{10}.

K^{11} is an ordinary pump-rod journaled at its upper end to the lower end of connecting-rod K^{10} and carrying on its lower end a suitable pump plunger and valve within the pump-pipe K^4.

M is a funnel depending and swinging from the bracket r^3 and connected by a suitable swivel connection with the upper end of one section *m* of a trough M′ near the edge thereof. The sections *m* and *m′* constitute the trough designed to carry the dredged materials from the dredging-buckets to the head of the first sluice-box, the portion *m* telescoping into the portion *m′*. Other sections of trough may be added in any suitable manner, as desired. m^3 is a broad vertical pipe, of any suitable construction, preferably provided with a funnel-shaped top to receive the water from the buckets K^9 K^9 and convey it into the trough m^4. This pipe m^3 may be carried by suitable brackets from the supports K^3 K^3 or may be carried on cross-bars constructed across the trough m^4. The trough m^4 receives the water from the pipe m^3 and conveys it to trough m^5, which is suspended at one end from trough m^4 and rests at the other end upon or leads into the first section of the sluice-box S. These several troughs may, however, be divided into several more sections, or other sections may, if desired, be added, and they may be supported in any other suitable manner without departing from the spirit of my invention.

P P are propelling paddle-wheels, of any suitable construction, keyed to the shaft *p′*, upon which are keyed one or more sprocket-wheels p^2 for connecting the shaft with a driving mechanism.

S S S S are a series of sluice-boxes provided with a suitable number of riffles and leading into each other and gradually inclining downward, the first of said sluice-boxes being supported on trestles or staging m^7 within said scow and the others being supported on brackets S^2 S^2, projecting from the sides thereof. Additions may be made to said sluice-boxes or others may be added, providing alternative courses for the dredged material and water, so as to admit of one box being cleaned or repaired without stopping work with the dredge, all within the spirit and contemplation of my invention. Said sluice-boxes may be left open or provided with covers S′, with locks or otherwise.

O is a rearwardly-curved centrally-pivoted horizontal yoke or cross-bar, preferably pivoted to the under side of the seat a^5, the ends of which are connected by flexible means o^5 (preferably wires or ropes) with the corresponding ends of the rearwardly-curved cross-head O^7 of the rudder a^3.

O′ and O^2 are pivoted connecting-links connecting the ends of the yoke O and the foot of the vertically-pivoted hand-lever O^3. The levers O^3 are pivoted above their lower ends between the trunnions O^8 O^8. These, with their connections, comprise the steering apparatus.

X is a parallel hand-lever the members of which are fixed with relation to each other and pivoted at their lower ends in the bearing-plates a^6 a^6 by a continuous axle which is journaled in said plates and proceeds loosely through the lower end of said lever on either side and through the keyed cog-wheels X^3 and the ratchet-wheel X^5, which ratchet-wheel is integral with said cog-wheel X^3, or which ratchet-wheel, if desired, may be separate and keyed to the same shaft. X^4 is a cog-wheel keyed to a shaft X^{10} between said plates a^6 a^6 and forward of and registering with the cog-wheel X^3, with which it meshes.

X^2 is a sprocket-wheel integral with cog-wheel X^4 or, if desired, separate and keyed to the same shaft.

X^5 is a ratchet-wheel integral with the cog-wheel X^3 or, if desired, separate and keyed to the same shaft.

X^6 is a pawl journaled upon an axle between the members of the lever X, the lower hooked end of which pawl engages the ratchet-wheel X^5 when the lever X is pushed forward and turns the same when the lever X is pulled rearwardly.

X^7 is a spring secured at its upper end to the cross-bar of lever X and with its lower free end bearing upon the pawl X^6 to insure the engagement of the pawl with the ratchet X^5.

X′ is an endless sprocket-chain connecting the sprocket-wheel X^2 with the sprocket-wheel P^2.

X^9 is a dog pivoted at one end between the plates a^6 a^6 and projecting rearwardly beneath ratchet-wheel X^5, the free end of said dog resting on the free end of an underlying spring X^{11}, secured to the floor of said scow. The free end of said dog X^9 is hook-shaped and turned upwardly to engage the ratchet X^5 and prevent a reverse movement of the same.

In Fig. 3 I have shown the propelling mechanism duplicated, so that when one parallel hand-lever is up the other may be down, or they may be both up or both down at the same time to suit the convenience of the operator, the pawls gripping alternately when the levers are worked alternately and gripping together when the levers are worked together. In the alternate movements the motions of the paddles will be continuous, and in the simultaneous movements there will be a slight halting tendency in the paddles between each stroke of the levers. If desired, it is obvious that one propelling mechanism only need be employed, and that this could be arranged centrally of the width of the scow instead of on the sides thereof, as shown in said Fig. 3. It is also obvious that the propeller-shaft P′, the sprocket-wheel P^2 thereon, the sprocket-chain X′, and the sprocket-wheel X^2 might be dispensed with and the shaft X^{10} extended and the propeller-wheels P applied directly to the same.

I have indicated in Fig. 6 a ball-bearing for the mast B and the double-faced cog-wheel b^6; but I contemplate using any suitable kind of ball bearing for such purpose, or the ball-bearing may, if desired, be omitted altogether, and the reduced head of the pedestal b^{10} and the reduced foot of mast B may contact through a central aperture in the web of wheel b^6.

It is my primary purpose to make my invention as cheap and simple as possible, particularly in territory removed from depots of supplies, and therefore the use of much complicated machinery will as far as possible be avoided and wood will be used as far as practicable; but it is my ultimate purpose to interpose or incorporate ball-bearings and other suitable minor conveniences in all desirable parts of my machine without departing from the general scheme and spirit of my invention.

The dredge-bucket may be of any suitable construction, but preferably that shown in Fig. 8, in which it appears as having a projecting rounded digging-lip on front and is either perpendicular on its rear face or may be slightly inclined. The bucket is bolted by two bolts to one link on each side and is rigid with relation to these links only.

In operation of the dredge the scow is anchored to the bed of the stream or tied up by cables to either bank, so as to keep the dredge out in the stream. The dam D is then lowered and the wings d' d' braced out. The dam and the wings act as an obstruction to the current and divert a volume of water into the openings in the dam which correspond to the race and beneath the power-wheels, the lower blades of which are partially submerged. The power-wheels, being turned by the force of the current, communicate motion through the shaft and the sprocket-wheel c', chain b^{15}, sprocket-wheel b^7, gear-wheels b^8 and b^6, gear-wheel b^4, sprocket-wheel b^3, chain b^2, sprocket-wheel b', and sprocket-wheels b b to the dredger-bucket chains r r, which carry the dredging-buckets. If it is desired to stop dredging without stopping the power-wheels C C, the disengaging-bar t is thrown over and the gear-wheel b^4 (with the sprocket-wheel b^3) is projected along its shaft and thrown out of mesh with the gear b^2. The power-shaft c also communicates motion to the water-raising apparatus through the sprocket-wheel c^2, chain K^{12}, sprocket-wheel K, split pulleys K′ and K^7, sprocket-wheels K^2 K^2, and crank-arm K^8. If it is desired to use only half of the pumping capacity, the crank-arm K^8 may be disengaged from the connecting-bar K^{10}. If it is desired to stop raising water entirely, the disengaging-lever K^{13} may be thrown over and the half of the split hub or pulley K′ (with the sprocket-wheel K) disengaged from the other half of said split pulley K^7 and projected along its shaft, so that it will freely revolve thereon without turning said shaft. The power-wheels and dam may be raised vertically by interposing bearing-blocks in the slots of pedestals a a between the shafts c and the bottom of said slots, as heretofore described. When it is desired to shut off the power altogether, the front of the dam D is raised by means of the windlass E and the wings d' d' are folded back against the sides of the walls d d and latched by any suitable means. The rear portion of the floors of the race may then trail in the water; but is to be accounted no inconvenience, or, if desired, the shaft c may be jacked up, as before described, so that the whole dam will clear the water. The anchors then being raised, the scow is propelled forward by the mechanism O P X and its component parts, the projecting lever X and the steering-levers O^3 O^3 being worked by hand, but not to the exclusion of steam-power connections in the place of hand-power, if so desired. It is my purpose also to use the propelling and steering mechanism O P X and its component and connecting parts separately for other boats than dredges. The dredged material and water reaching the head of the first sluice through their several conduits passes through the succession of sluices and over numerous riffles, and finally the refuse material drops into the stream from an aperture at the end of the last sluice.

I do not desire to be restricted to any relative dimensions, since it is my purpose to change and adjust the relative proportions of the several parts of my machine to suit the requirements. Wherever axles or shafts bear upon or enter the wood or iron work, any suitable journal-boxes and oil-cups may be constructed for them.

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

1. In a dredging-machine, the combination of a scow or float, a vertically-arranged horizontally-revoluble mast, a yard-arm movably mounted in said mast and passing through the same, whereby it may be adjusted longitudinally to a greater or less depth, an endless chain of dredging-buckets upon said arm, a trough for receiving the dredged material, a sluice-box for receiving the material from the trough, and means for operating the dredging-buckets, substantially as described.

2. In a dredging-machine, the combination of a scow or float, a vertically-arranged horizontally-revoluble mast, a yard-arm passing through and movably mounted in said mast, whereby it may be moved lengthwise to adjust it to different depths, an endless chain of dredging-buckets upon said arm, a trough for receiving the dredged material, a sluice-box provided with riffles for receiving material from the trough, means for introducing water into the sluice-box, and propeller-wheels for operating the dredging-buckets, substantially as described.

3. In a dredging-machine, the combination with a suitably-constructed scow or float, of a vertically-arranged horizontally-revoluble mast, a yard-arm passing through the said mast, a roller upon the mast for movably supporting the said arm, whereby it may be moved lengthwise to adjust it to different depths, an endless chain of dredging-buckets upon the arm, the said arm having parallel sprocket-wheels at top and bottom over which the chain carrying the buckets pass, and means for operating the buckets, substantially as described.

4. In a dredging-machine, the combination with a suitably-constructed scow or float, of a vertically-arranged horizontally-revoluble mast, a yard-arm mounted in said mast and carrying an endless chain of dredging-buckets, said yard-arm having parallel sprocket-wheels at top and bottom over which the chains carrying the buckets pass, plates secured to the lower end of the yard-arm and projecting below the foot sprocket-wheels and plates at the upper end of the yard-arm and carrying a funnel-shaped spout or hopper, means for operating the buckets, and a disengaging clutch mechanism for throwing the operating mechanism into and out of operation, substantially as described.

5. In a dredging-machine, the combination with a suitably-constructed scow or float, of a vertically-arranged horizontally-revoluble mast, a yard-arm mounted in said mast and carrying an endless chain of dredging-buckets, ball-bearings between the mast and its pedestal, a double-beveled gear-wheel and beveled gears meshing therewith for transmitting motion to the dredging-buckets and permitting the mast to be turned horizontally without interfering with the operation of the buckets, and means for transmitting motion to the gears, substantially as described.

6. In a dredging-machine, the combination with a suitably-constructed scow or float, of a vertically-arranged horizontally-revoluble mast, a yard-arm mounted in said mast and carrying an endless chain of dredging-buckets, paddle-wheels arranged on a shaft and extending from the sides of the body of the scow or float, a dam extending on both sides of the scow or float in front of the paddle-wheels, and having a central prow or point forming with the sides flaring entrances for diverting the water beneath the paddle-wheels, and means for operating the dredging-buckets by the paddle-wheels, substantially as described.

7. In a dredging-machine, the combination with a suitably-constructed scow or float, of a vertically-arranged horizontally-revoluble mast, a yard-arm mounted in said mast and carrying an endless chain of dredging-buckets, paddle-wheels arranged on a shaft and extending from the sides of the body of the scow or float, a dam extending on both sides of the scow or float in front of the paddle-wheels and pivoted to the shaft of the said paddle-wheels, and having a flaring entrance for diverting the water beneath the paddle-wheels, means for raising the dams, and means for operating the dredging-buckets by the paddle-wheels, substantially as described.

8. In a dredging-machine, the combination with a suitably-constructed scow or float, of paddle-wheels arranged on the shaft and extending from the sides of the body of the scow or float, a dam extending on both sides and in front of the scow or float and pivoted to the shaft carrying the propeller-wheels, said dam having vertical side walls and horizontal bottoms forming raceways in front of the paddle-wheels and outwardly-flaring wings, and a horizontal wedge-shaped or pointed end intermediate the raceways, substantially as described.

9. In a dredging-machine, the combination with a suitably-constructed scow or float, of a vertically-arranged horizontally-revoluble mast, a yard-arm mounted in said mast and carrying an endless chain of dredging-buckets, and paddle-wheels arranged on a shaft and extending from the sides of the body of the scow or float, the shaft carrying the wheels being mounted in elongated bearings so that the shaft and paddles can be jacked up to suit the convenience, as desired, substantially as described.

10. In a dredging-machine supported on a scow or float, the combination with a dredg-

ing-yard provided with conveying chains and buckets, of a funnel suspended from the upper end of said yard and attached by a swiveled connection to the head of a conveying-trough leading to sluices, substantially as described.

11. In a dredging-machine, the combination with a suitable scow or float, of an endless chain of dredging-buckets, a telescoping trough for receiving the dredged material from the buckets, a sluice-box provided with riffles for receiving the dredged material from the trough, a water-elevating mechanism arranged to discharge water into the sluice-box at different points, and means for operating the dredging-buckets and the water-elevating mechanism, substantially as described.

12. In a dredging mechanism, the combination with a suitable scow or float, of an endless chain of dredging-buckets, means for operating the same, a trough for receiving the dredged material from the buckets, a sluice-box provided with riffles for receiving the dredged material from the trough and provided with a locked cover, a water-elevating mechanism arranged to discharge water into the sluice-box, and means for operating the dredging-buckets and the water-elevating mechanism, substantially as described.

13. In a dredging-machine, the combination with a suitable scow or float, of an endless chain of dredging-buckets, a telescoping trough for receiving the dredged material from the buckets, a sluice-box provided with riffles for receiving the dredged material from the trough, a water-elevating mechanism arranged to discharge water into the sluice-box at different points, means for operating the dredging-buckets and the water-elevating mechanism, and a disengaging clutch mechanism for throwing the water-elevating mechanism into and out of operation, substantially as described.

14. In a dredging-machine, the combination with a suitable scow or float, of an endless chain of dredging-buckets, a trough for receiving the dredged material from the buckets, a sluice-box provided with riffles for receiving the dredged material from the trough, an endless chain of buckets for elevating water above the sluice-box at a point below where the dredged material enters the same, a trough for conveying the water from the said elevator to the sluice-box, means for transmitting motion to said buckets and to the dredging-buckets, and means for throwing the operating mechanism into and out of operation, substantially as described.

15. In a dredging-machine, the combination with a suitable scow or float, of an endless chain of dredging-buckets, a trough for receiving the dredged material from the buckets, a sluice-box provided with riffles for receiving the dredged material from the trough, an endless chain of buckets for elevating water, a trough leading therefrom to the sluice-box, a pump also for discharging water into the sluice-box, and means for operating the dredging-buckets and the water-elevating mechanism, substantially as described.

16. In a dredging and mining machine, the combination with a suitable scow or float, of an endless chain of dredging-buckets, a trough for receiving the dredged material from the buckets, a series of sluice-boxes provided with riffles for receiving the dredged material from the trough, said sluice-boxes communicating one with the other and inclined, a water-elevating mechanism for raising water above the sluice-boxes, a trough directing said water into one of the sluice-boxes at different points, and means for operating the dredging-buckets and the water-elevating mechanism, substantially as described.

17. A dredging and mining apparatus comprising in its construction a suitable scow or float, a vertically-arranged horizontally-revoluble mast, a yard-arm mounted in said mast and carrying an endless chain of dredging-buckets, a trough for receiving the dredged material from the buckets, a sluice-box provided with riffles for receiving the dredged material from the trough, means for elevating water and discharging it into the sluice-box, paddle-wheels mounted on a shaft and extending from each side of the scow or float, a dam pivoted to said shaft and forming raceways for conducting the water to the paddle-wheels, means for raising and lowering the dam, gearing connected with the shaft of the paddle-wheels for transmitting motion to the dredging-buckets, driving mechanism running from said shaft and transmitting motion to the water-supplying mechanism, and a steering apparatus, substantially as described.

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

MAURICE STEINBERG.

Witnesses:

W. W. BROWNE,

J. I. MANDEL.