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C. F. PIKE.

ORE WASHER OR CONCENTRATOR.

No. 529,188. Patented Nov. 13, 1894.

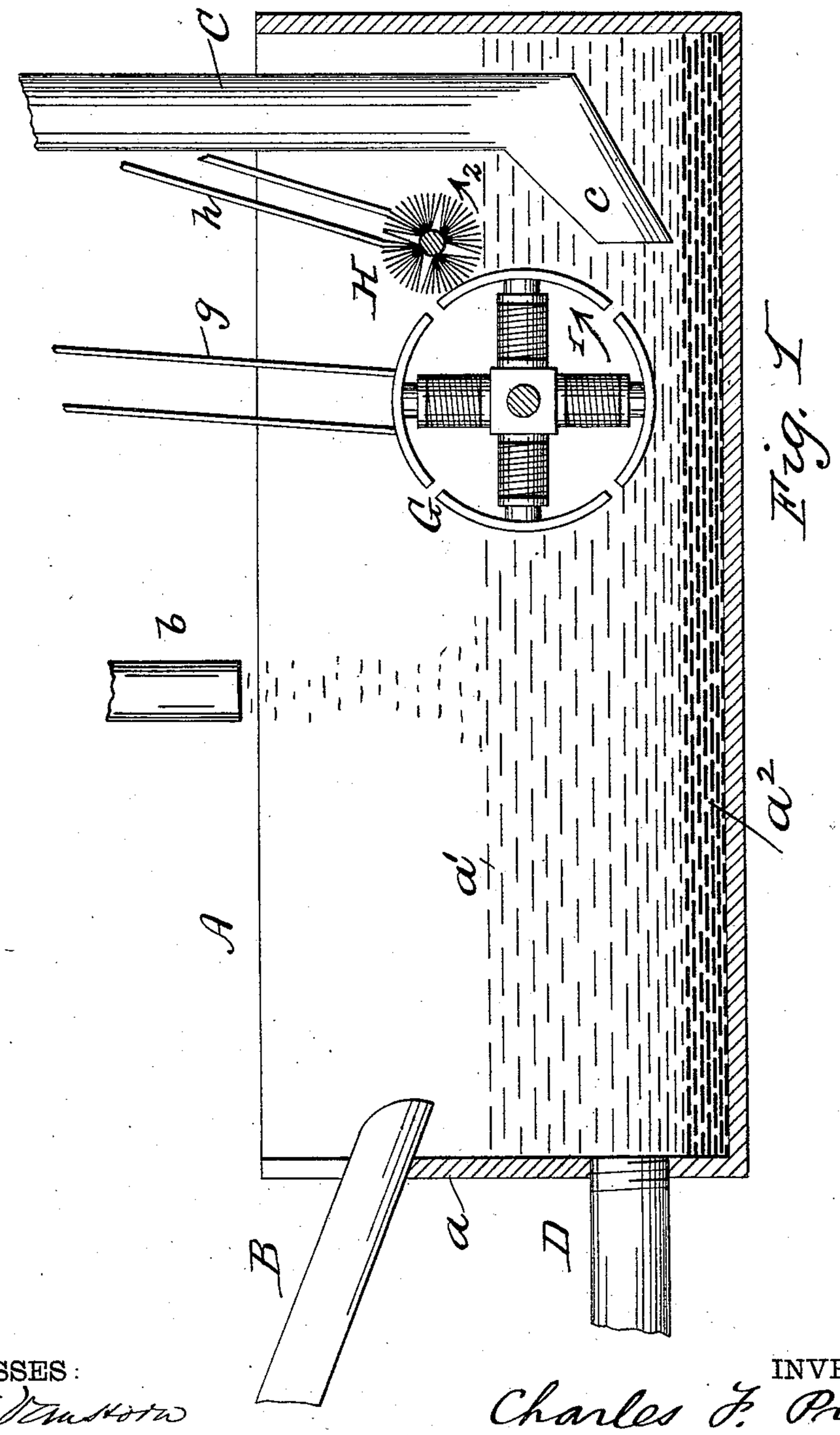

Fig. 1.

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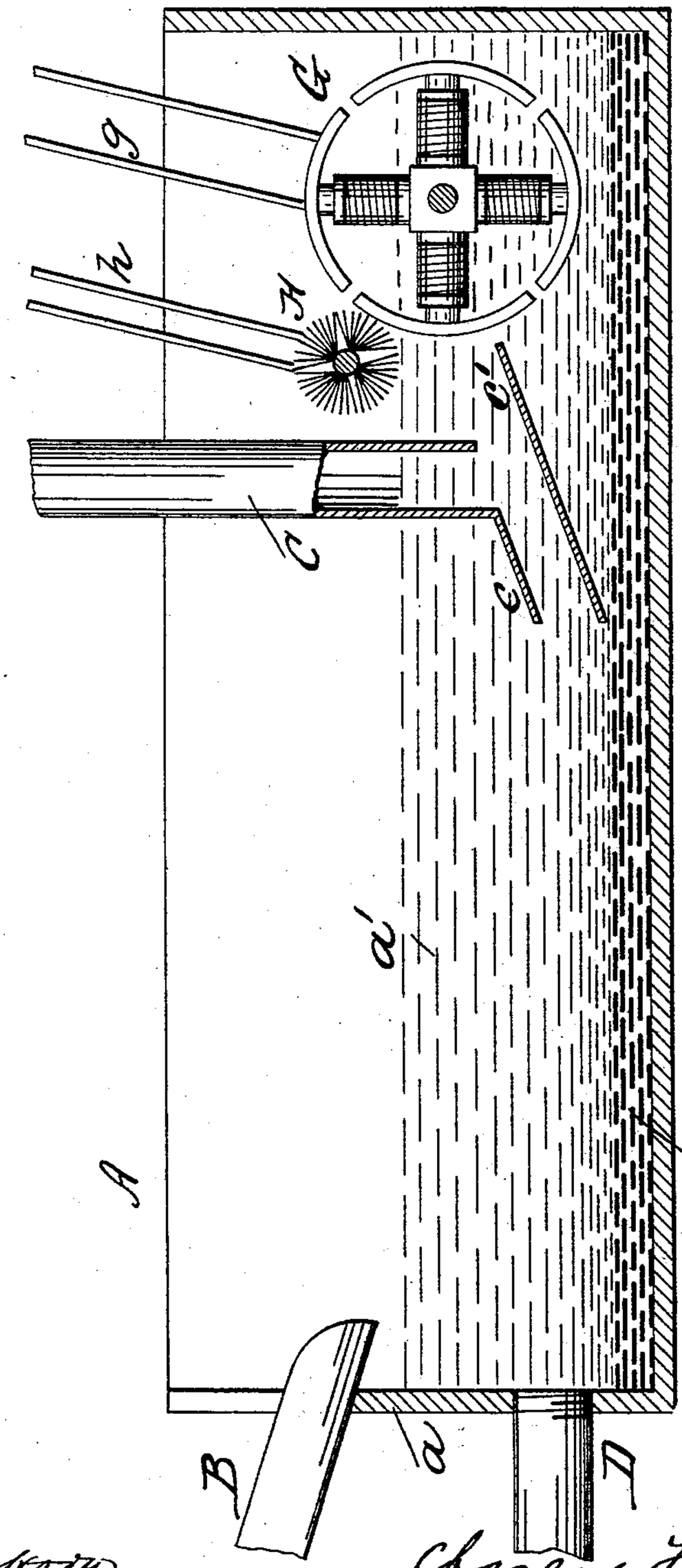

Fig. 2.

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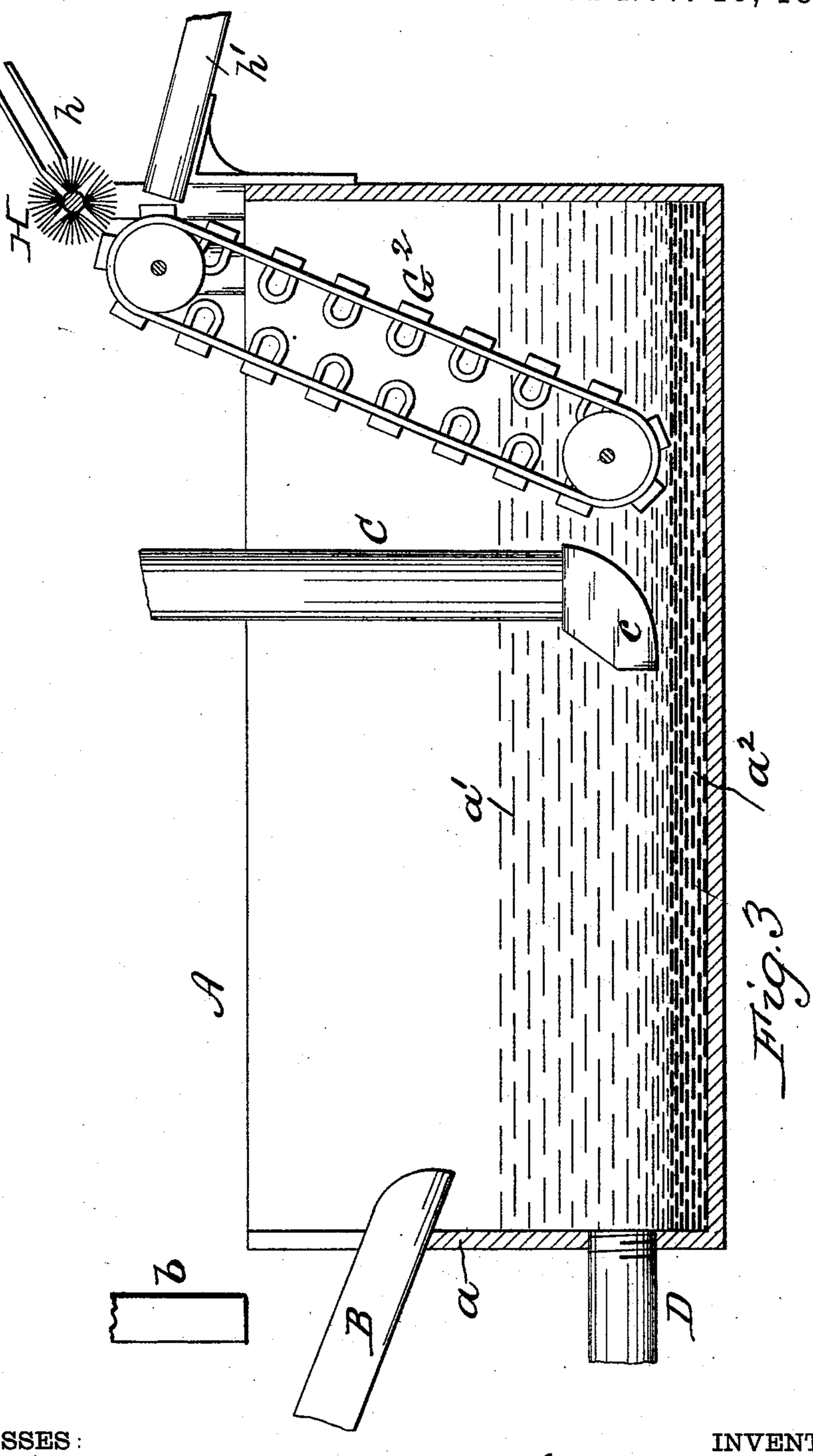

Fig. 3

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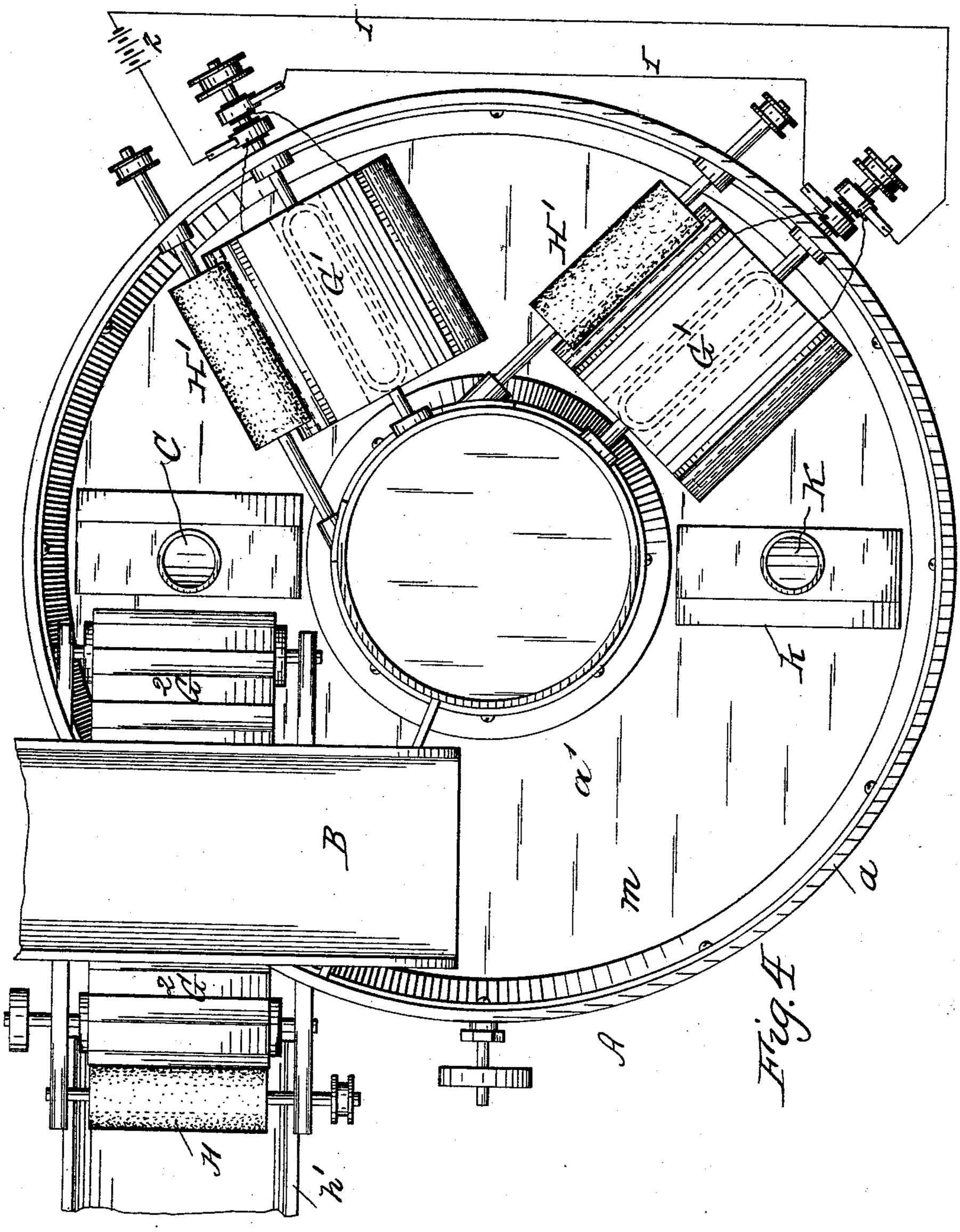

Fig. 4.

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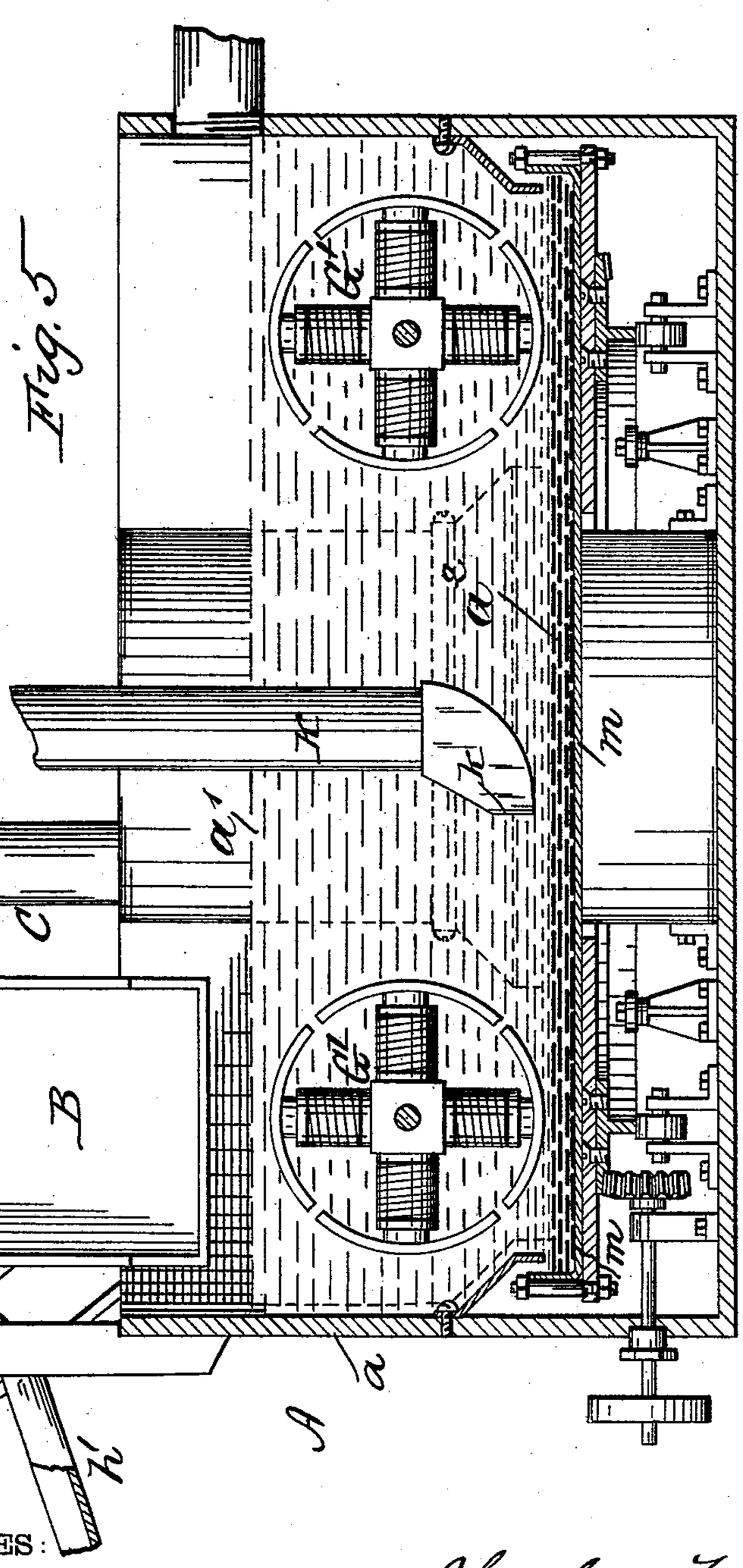
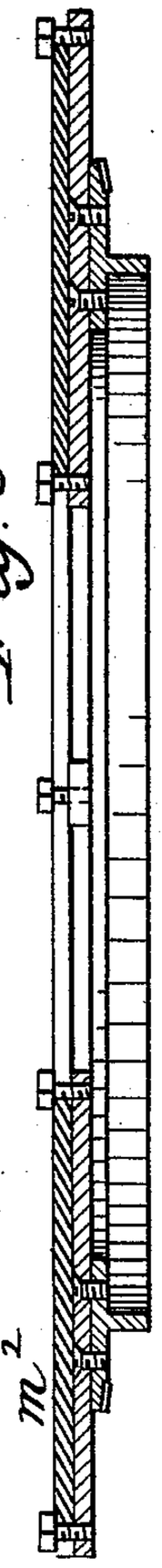
No. 529,188. Patented Nov. 13, 1894.





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UNITED STATES PATENT OFFICE.

CHARLES F. PIKE, OF PHILADELPHIA, PENNSYLVANIA.

ORE WASHER OR CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 529,188, dated November 13, 1894.

Application filed July 26, 1894. Serial No. 518,629. (No model.)

To all whom it may concern:

Be it known that I, CHARLES F. PIKE, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Ore-Washers or Concentrators; 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 has relation to ore-washers or concentrators, and particularly to that form of the same having a vessel containing a body of mercury or an amalgam-plate, a feed-device, a suction discharge-device and magnetic-devices in advance of or adjacent to the discharge-device for acting upon the black-sand particles in the ore; and it has for one of its objects an improved construction and arrangement of magnetic devices adjacent to the discharge-device whereby the black-sand particles are attracted to and raised from the mercury or amalgam-plate by the magnetic-devices and are by the latter either separately discharged from the washer, or are caused to be deposited within the influence of the suction or lifting force of the discharge-device for removal by it from the washer along with the light or other waste-matters of the ore. In the one case the black-sand particles are discharged from the washer as a clean or approximately clean by-product and in the other they form part of the common discharged waste-matters. The object of magnetically raising the black-sand particles from the mercury or amalgam-plate, especially from the former, is that the suction force in the discharge-device does not need to be of the maximum degree which would be required if such suction force were employed to first lift the sand particles from the mercury and then effect their discharge from the washer. On the contrary, the degree of such force may be reduced to a minimum or such that will discharge such particles along with the lighter waste-matters, and hence any tendency of such force to lift and discharge the mercury is avoided. A further object of the same is to more effectually keep the surface of the mercury or amalgam plate clean and bright to increase the effectiveness of the concentrator or washer.

A further object of my invention is to provide improved construction of magnetic devices intermediate of the feed and discharge devices of the washer for successively raising the black-sand particles from the mercury or amalgam plate and subsequently scattering or dispersing the same within the washer for facilitating the separation of any particles of segregated precious metal from the black-sand and of their free descent to the mercury or amalgam plate for recovery.

My invention has for its still further object the provision of a secondary discharge-device interposed between the feed-device and main-discharge device, which secondary discharge-device is used for removing from the washer the very light waste materials instead of keeping them in the washer for removal along with the heavier waste-matters by the main-discharge device. The removal of the lighter waste-matters separately from the heavier waste-matters not only diminishes the amount of work to be done by the main discharge-device but also admits of conveying such light waste-matters and any contained float metal directly to the amalgamating devices for expediting the operation of the apparatus.

My invention accordingly consists of the method of washing or concentrating ore, and to the combinations, constructions and arrangements of parts as hereinafter more fully described in the specification and pointed out in the claims.

Reference is had to the accompanying drawings, wherein—

Figure 1 is a sectional elevation of a form of washer or concentrator embodying part of my improvements. Fig. 2 is a like view, showing a modification of construction and arrangement of parts shown in Fig. 1. Fig. 3 is a similar view, illustrating still another modification and showing the use of the magnetic devices for not only lifting the black-sand from the mercury or amalgam-plate but also for separately discharging it from the washer. Fig. 4 is a plan of an ore-washer or concentrator having a rotating mercury-containing vessel embodying my invention in its

complete form, and showing the black-sand particles separately removed from the washer by magnetic devices. Fig. 5 is a distorted sectional elevation of Fig. 4, and Fig. 6 is a sectional elevation of rotating amalgam-plates for use in lieu of the rotating mercury containing chamber shown in Fig. 5.

A. represents an ore-washer or concentrator of any suitable or desirable form of which the receiving vessel *a* containing a body of water *a'* superposed above a body of mercury a^2 may be provided for as the requirements of service demand.

In Figs. 1 to 3 inclusive the vessel *a* is represented as a stationary vessel of oblong form having a feed device or flume B, a water supply *b*, a suction discharge-device C, of any suitable kind, preferably that derived from a rotating suction pump which is not shown in the drawings, as different forms of the same are well known, and a supply of mercury a^2 on the bottom of vessel *a*. Below the feed-device B is a jet-tube or tubes D located above the level of mercury a^2 for conveying the ore or causing it to travel through the washer from the feed to the discharge devices. Adjacent to the inlet end of the suction-discharge C is a rotating magnetic device G^2 which may be of any suitable construction and be composed of either electro or permanent magnets as desired and is driven by a belt *g* or other power transmitting device.

In Fig. 1. the rotating magnets G are shown mounted in the washer A in advance of the inlet end *c* of the suction discharge C and are driven so as to rotate in the direction of arrow 1 or toward the said suction device inlet-end *c* for attracting the black-sand particles from the mercury. The magnets G may be so mounted that their poles may be above or level with the surface of the mercury or they may dip into or move through the same. These sand-particles are carried by the magnets G to the wiper or brush H suitably rotated by belt *h* as indicated by arrow 2 to forcibly sweep said sand particles from the magnets beyond the field of force of the same toward the suction discharge inlet end *c* into which they pass and are discharged from the washer.

In Fig. 2 the magnets G are located to the rear of the discharge-device C and it is provided with a rearwardly extending catch plate *c'* upon which the sand particles fall after being wiped off from the magnets G for discharge from the washer.

In Fig. 3 the magnetic device G^2 is in the form of an endless traveling belt shown located to the rear of discharge device C, said belt passing to the top of the machine, whereat is located the wiper H for discharging the sand particles on the magnets into a chute *h'*. In this form of construction the magnets also serve as a separate discharge device for the black-sand particles which if saved will form a comparatively clean by-product. If desired, this form of traveling belt magnetic device G^2 may be located in advance of the suction discharge C.

In Figs. 4 and 5 I have shown my improvements in their complete form in connection with a rotating mercury containing vessel *m* in the receiving vessel *a*, said rotating vessel *m* carrying the ore from the feed B to the main discharge device C. Referring more particularly to Fig. 4, it will be noticed that in advance of the feed flume or device at any desired distance therefrom is located the secondary suction discharge device K. In practice the inlet end *k* thereof is preferably located considerably above the level of the mercury so that it will discharge only the very light waste-matters, or those from which the heavy particles of metal have escaped and which contain float or flour gold. This light waste-discharge being removed from the washer not only relieves the main discharge C of an unnecessary amount of work to be done, but also admits of conducting such light waste-matters with the contained float or flour gold directly to suitably constructed amalgamating apparatus, instead of passing the same along with the bulky or heavy waste-matters discharged through the main suction device C and subsequently separating such light waste material for amalgamating treatment.

In Fig. 4, interposed between the secondary and main discharge devices, are rotating magnets G' suitably mounted on the walls of the stationary vessel *a* as illustrated. These magnets G' may be in all respects constructed and arranged for operation and have wipers or brushes H' as already described for magnets G and wipers H. These magnets G' may be so arranged that their peripheries may be above or adjacent to the surface of the mercury in vessel *m* or may dip into the same as the requirements of service demand. They are employed to attract the black-sand from the surface of the mercury to keep it clean and bright, while the brushes H' subsequently remove such black-sand from the magnets G' and disperse or scatter the same in vessel *a* beyond the influence of the field of force of said magnets to admit of any segregated metal escaping therefrom and falling to the mercury for amalgamation. In Fig. 4 is also shown the belt form of magnets G to the rear of the main discharge C for removing from the surface of the mercury the black-sand not discharged by the main suction device C.

Any system of circuit connections 1—1 Fig. 4, may be used for the magnets G' when they are electro-magnets, and such circuit will have a suitable source of supply 2.

If desired, all of the foregoing described magnets may have in their circuits, circuit-breakers for making them successively active or inactive, and continuous or alternative currents may be used. If desired, however, they all may be permanent magnets.

Instead of using a mercury containing ves-

sel m as shown in Figs. 4 and 5, amalgam plates may be substituted, as shown at m^2 Fig. 6.

As it is obvious that the constructions and arrangements of parts herein described may be variously changed without departing from the spirit of the invention, I do not limit myself to the same as shown and set forth. Thus for instance a traveling belt of amalgam plates may be substituted for the rotating plates m^2, and magnets G G′ may be active during a part of their revolution and inactive during the remaining part.

I do not desire to broadly claim herein a magnetic separator adjacent to the inlet of the suction-discharge, as this forms the subject matter of another application filed April 6, 1894, Serial No. 506,651.

What I claim is—

1. In an ore washer and amalgamator, the combination with a receiving vessel containing an amalgamating surface, and a superposed body of water, a feed device, a suction-discharge distant from said feed device, and means for moving the ore from the feed device to said suction-discharge, of an auxiliary suction discharge located between the feed and main suction-discharge, for the purpose set forth.

2. In an ore washer or amalgamator, the combination with a receiving vessel containing a body of water, a feed device, a suction-discharge distant from said feed device, and a movable amalgamating surface immersed in the water, said surface adapted to convey the ore fed thereto to the suction-discharge, of revoluble magnets between the feed and suction-discharge and adjacent to the inlet of the latter and to the amalgamating surface, and means for clearing the said magnets of magnetic material adhering thereto, substantially as and for the purpose set forth.

3. In an ore washer or concentrator, the combination of a receiving-vessel, a feed-device, a rotating or traveling amalgam surface, a suction-discharge and a magnetic discharge-device, substantially as set forth.

4. In the art of working placer gravel, the method, which consists in feeding the material through a body of water onto an amalgamating surface and removing the magnetic and non-magnetic constituents of said material separately from said surface, substantially as and for the purpose set forth.

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

CHARLES F. PIKE.

Witnesses:

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JOHN RODGERS.