

No. 615,414.

Patented Dec. 6, 1898.

I. STEAD.  
MINING DREDGE.

(Application filed June 24, 1898.)

(No Model.)

Fig. 1.

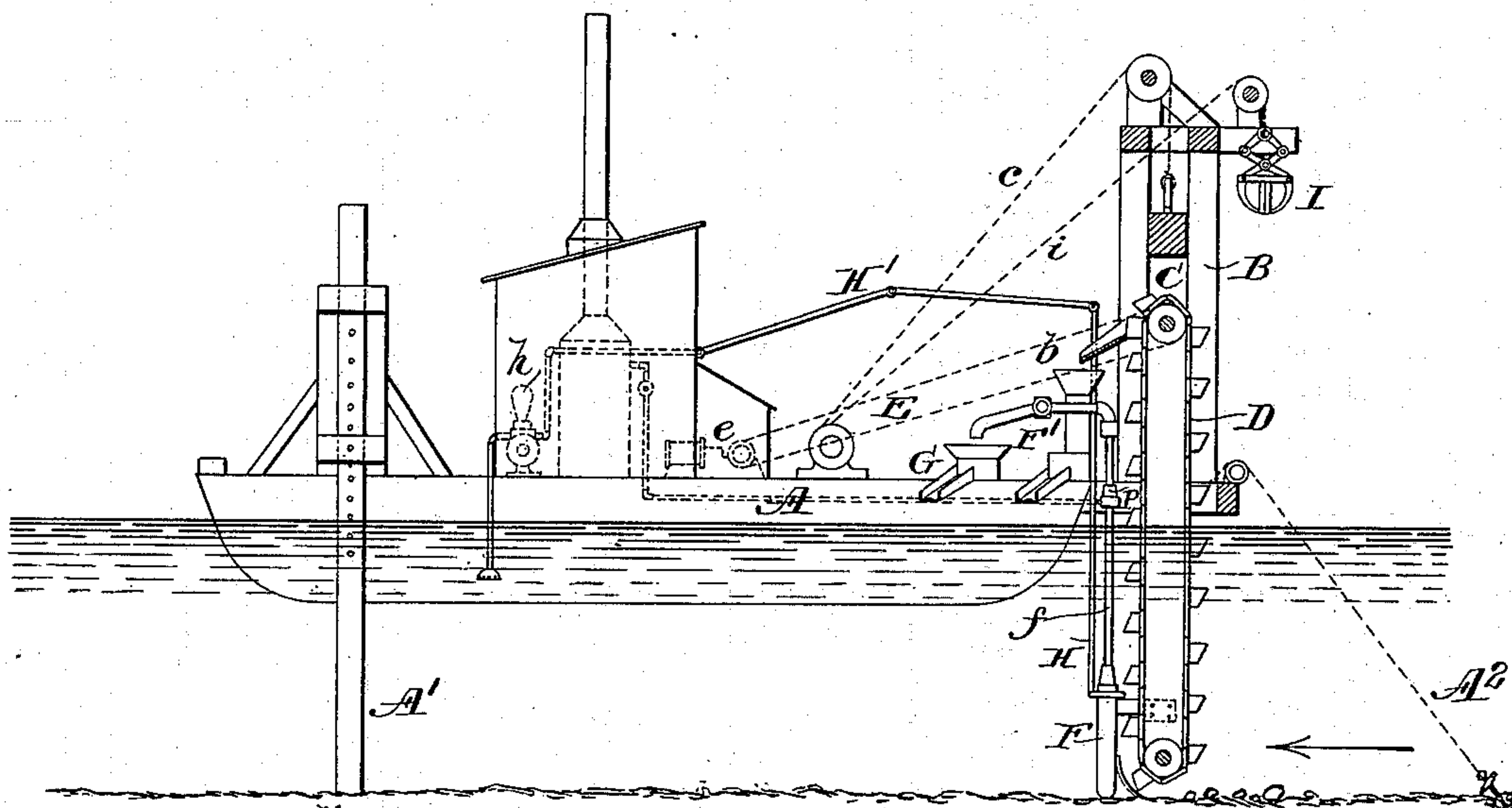


Fig. 2.

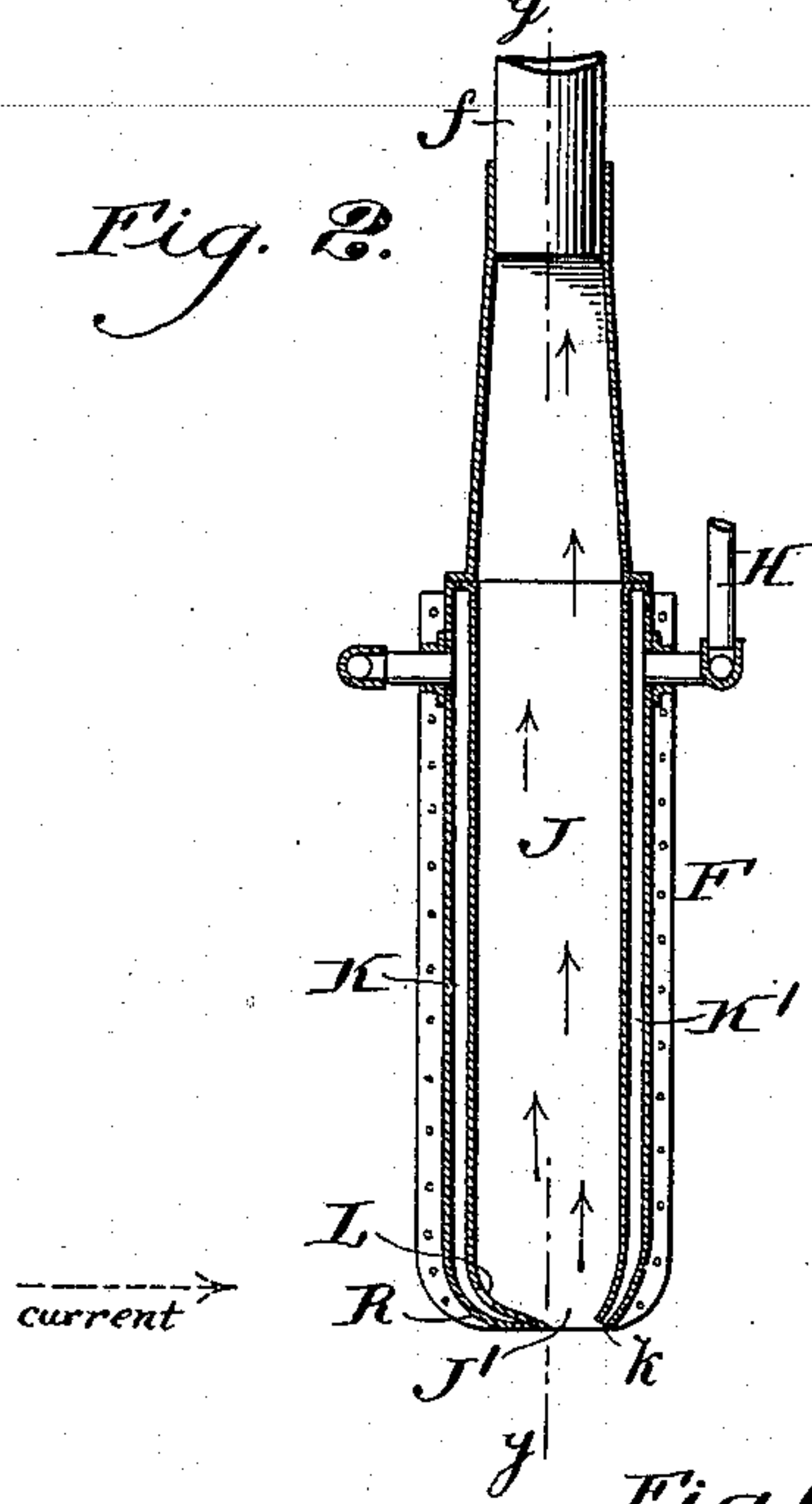


Fig. 3.

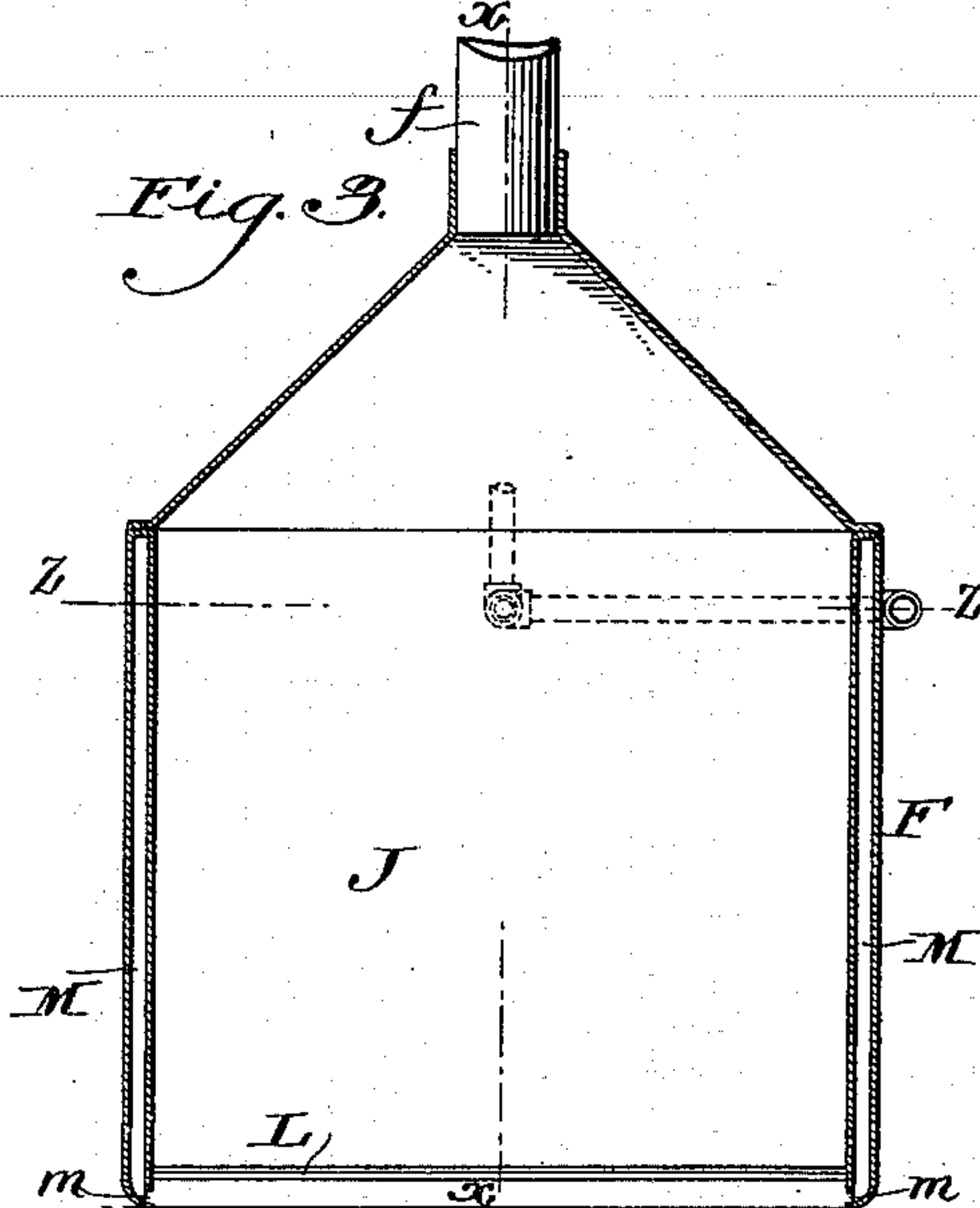
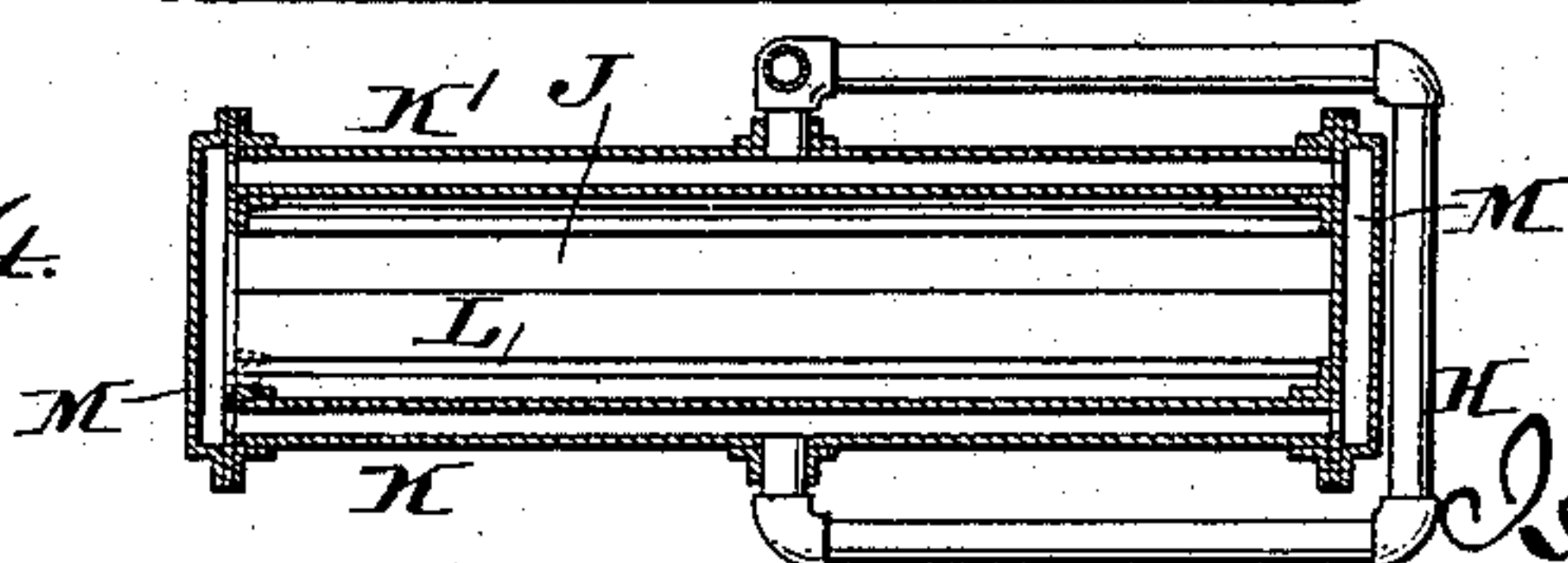


Fig. 4.



Witnesses.

Henry Dunning  
Thos. H. Craun

Inventor.

Isaac Stead

By   
Attorney.



# UNITED STATES PATENT OFFICE.

ISAAC STEAD, OF PHILADELPHIA, PENNSYLVANIA.

## MINING-DREDGE.

SPECIFICATION forming part of Letters Patent No. 615,414, dated December 6, 1898.

Application filed June 24, 1898. Serial No. 684,344. (No model.)

*To all whom it may concern:*

Be it known that I, ISAAC STEAD, of the city and county of Philadelphia, State of Pennsylvania, have invented an Improvement in Mining-Dredges, of which the following is a specification.

My invention has reference to mining-dredges; and it consists of certain improvements which are fully set forth in the following specification and shown in the accompanying drawings, which form a part thereof.

My invention is especially adapted to that class of mining which comprehends the treatment of ore deposited upon the bed-rock.

15 In carrying out my invention I treat the earth deposits simultaneously to the action of a conveyer which disturbs and breaks up the bottom formations and also to the action of a hydraulic scouring and lifting apparatus 20 which raises the finer particles above the surface and discharges them into proper sluices or means for separating the precious metals from the refuse. The means for breaking up or disturbing the deposit on the bottom of the 25 river is preferably formed in the shape of an endless chain of buckets, so that while performing their duty of disturbing the bottom of the river they also raise or elevate large masses of the same and deposit them in suitable means for separating the precious metals 30 contained in the elevated materials from the earthy substances. Furthermore, by employing buckets any small stones which might interfere with the proper operation of the hydraulic devices are elevated or removed from 35 the path of the latter, so as to in no wise interfere with or obstruct the proper operation of the said hydraulic apparatus.

40 The hydraulic apparatus which I prefer to employ consists of means reaching down to the bed-rock and having suitable passages for causing water under high pressure to flow into the hydraulic apparatus, so as to induce the earth to be put into motion and 45 forced upward. Broadly considered, this hydraulic device may be operated separately or in conjunction with the elevator mechanism, for in some special cases, where the bottom is exceedingly soft and is free from stones, this 50 device of itself will be found amply sufficient.

The various features of construction which embody my improvements will be better un-

derstood by reference to the accompanying drawings, in which—

Figure 1 is a side elevation of a mining-dredger, with portions in section, illustrating my improvements. Fig. 2 is a longitudinal sectional elevation through my improved hydraulic elevating device on line *xx* of Fig. 3. Fig. 3 is a transverse sectional elevation thereof, taken on line *yy* of Fig. 2; and Fig. 4 is a cross-section thereof, taken on line *zz* of Fig. 3.

A is a boat or raft of any suitable construction adapted to support the necessary dredging apparatus, boilers, and pumps. This boat may be located in position and adjusted, so as not to drift, by means of suitable adjustable posts *A'* or by means of an anchor, (indicated at *A*<sup>2</sup>.)

At the forward part of the boat a framework is erected, having vertical guides *B*, in which a vertically-adjustable frame *C* is guided and elevated or lowered by any suitable windlass device *c*. This vertically-adjustable frame extends down into the water toward the bottom of the river and has journaled in it the shafts of the endless chain of buckets *D*, the latter being adapted to reach to the bottom of the river and disturb the deposits thereon and, if desired, elevate portions thereof to the surface and discharge them into suitable separating devices *b*, which permit the settling of the heavy particles of gold or precious metal, while the dirt and refuse flow overboard. It is immaterial to my invention what the detailed construction of this conveyer *D* may be. Furthermore, the buckets may simply be required to disturb the earth on the bottom of the river without elevating it, if so desired. This endless conveyer is operated by a suitable engine *e* and sprocket-chain *E*; but the particular means of operating it is unimportant and may be varied.

Arranged immediately in the rear of the endless conveyer or chain of buckets and on a level with the lower portion thereof is a hydraulic elevating mechanism *F*. (Shown in detail in Figs. 2, 3, and 4.) This hydraulic device is preferably secured to the frame *C*, so that when the latter is raised or lowered the hydraulic device is also raised or lowered, as both the hydraulic device and the buckets



are intended to treat the materials at the bottom of the river down to bed-rock, and therefore the bottom-operating surface or portion of each of these parts is intended to be on the same or substantially the same level.

The hydraulic device consists of a compartment J, open at the bottom, as at J', and connecting at the top with an upright pipe *f*, adapted to discharge into a suitable separator G by means of an adjustable pipe-connector F'. The separator G, like the separator *b*, is simply designed to act by gravity to cause a separation of the heavy particles from the lighter silt or other earthy deposits brought up from the bottom, which will wash overboard. The bottom of the hydraulic device is made rectangular and preferably of considerable width, and its forward edge, or that directed toward the downcoming stream, is provided with a transverse nozzle *k*, directed obliquely downward and backward, so as to force water under high pressure upon the bed-rock, upon which the device is adapted to rest. This nozzle *k* communicates with a compartment K', which in turn receives water from the downwardly-extended water-pipe H. The rear part of the compartment J, adjacent to the bottom, is curved, as at R, and directed toward the nozzle *k*, the object being to cause the water discharged from the nozzle *k* to pass upward into the chamber J. This action is facilitated by an upwardly-directed nozzle or aperture L, opening from a compartment K and directing a stream of water under pressure inwardly and upwardly into the compartment J. The water thus forced into the compartment J under pressure induces an upward flow, carrying with it all the disturbed light particles of material which find their way into the open space at the bottom of the compartment J. The water is fed to the nozzles under pressure by the operation of a pump *h*, which communicates with the pipe H through a flexible pipe connection H' of any suitable construction.

To facilitate the action of the jets of water upon the earthy bottom and to more fully induce the upward flow of the said materials, I provide lateral nozzles *m m* on each side of the compartment J and interposed between the nozzles *k* and L, Fig. 3, so that the water from these jets *m* will force the materials toward the center and greatly aid the upward tendency, since they will carry the said material above the forward and curved edge R and into a position to be acted upon by the nozzle L. In the particular construction illustrated I have shown these end nozzles *m* as communicating with end chambers M, which receive their supply of water from the chambers K K'; but I wish it to be understood that it is not essential at all that the nozzles *m*, *k*, and L shall open from compartments other than mere pipe communications, as it is within my invention to supply the water under pressure to these nozzles in any manner, as will be self-evident.

In cases where the lift is considerable I may employ an inspirator P in the discharge-pipe *f*, which acts on the well-known injector principle and operated by steam.

In some cases the bottom of the river contains boulders or stones of a size which cannot be handled by the buckets D, and in those cases it is necessary to provide additional means for their removal. To secure this, I arrange upon the framework B a suitable grappling-tongs I, of any well-known construction, operated by cables *i*, so that said tongs may be lowered for the purpose of removing the serious obstruction, and thus permitting the gradual advance of the dredging apparatus. Any suitable character of tongs may be employed for this purpose.

I do not limit myself to the details of construction, as it is self-evident that these may be greatly varied without departing from the spirit of the invention, which resides, first, in the combined arrangement of the hydraulic elevating device for the finer particles, with the disturbing-conveyer arranged immediately in front of the hydraulic device, and, secondly, in the particular construction of the hydraulic elevating device, whereby they properly treat the materials to be acted upon to the action of strong currents of water.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a floating mining-dredge, the combination of a hydraulic lifting device adapted to act upon the material at the bottom of the river and vertically adjustable, a mechanical device arranged immediately in front of the hydraulic device for breaking up or disturbing the solidity of the river-bottom, upright guides on the dredge, and a movable frame adapted to said guides carrying both the hydraulic lifting devices and mechanical device.

2. In a floating mining-dredge, the combination of a hydraulic lifting device adapted to act upon the material at the bottom of the river, a mechanical device arranged immediately in front of the hydraulic device for breaking up or disturbing the solidity of the river-bottom consisting of an endless chain of buckets, and means for simultaneously raising or lowering the operative lower ends of the hydraulic device and the disturbing device whereby their position may be varied to suit the depths of the river and bottom but maintained relatively the same.

3. In a dredging device, the combination of a hydraulic lifting device, with an endless conveyer provided with buckets arranged immediately in front of the hydraulic lifting device, a grappling device adapted to be adjusted vertically immediately in front of the conveyer and suitable separating means arranged at an elevation above the river-level to receive the elevated materials and separate the gold from the earthy substances.

4. In a dredging device, the combination of a hydraulic elevating device, with an end-



less conveyer provided with buckets arranged immediately in front of the hydraulic elevating device, suitable separating means arranged at an elevation above the river-level to receive the elevated materials and separate the gold from the earthy substances, a vertically-adjustable frame carrying both the endless conveyer and the hydraulic elevating devices, and means for lifting or lowering the said frame.

5. In a mining-dredger a hydraulic elevating device comprising a compartment open on the bottom and connecting at the top with a discharge-pipe leading above the river-level and adapted to reach close to the bottom of the river and in which the forward lower edge of said compartment immediately at the bottom is provided with a hydraulic nozzle directed obliquely downward and the rear edge is also brought down to the bottom and curved under and forward at the same level as the nozzle.

6. In a mining-dredger a hydraulic elevating device comprising a compartment open on the bottom and connecting at the top with a discharge-pipe leading above the river-level and adapted to reach close to the bottom of the river and in which the forward lower edge of said compartment is provided with a hydraulic nozzle directed obliquely downward and the rear edge curved under and forward and provided with an upwardly-directed nozzle for forcing water into the interior of the chamber and in an upward direction located at a distance from the said inwardly-directed rear edge.

7. In a mining-dredger a hydraulic elevating device comprising a compartment open on the bottom and connecting at the top with a discharge-pipe leading above the river-level and adapted to reach close to the bottom of the river and in which the forward lower edge of said compartment is provided with a hydraulic nozzle directed obliquely downward and backward and the rear edge curved under and forward and provided with an upwardly-directed nozzle for forcing water into the interior of the chamber and in an upward direction located at a distance from the said inwardly-directed rear edge, and also provided with lateral nozzles adapted to direct currents of water toward each other and transversely to the direction of the first-mentioned nozzle.

8. In a mining-dredger, a hydraulic elevating device for raising materials from the bottom of the river consisting of a chamber substantially flat and open at the bottom and having its lower edge provided with a series of inwardly-directed nozzles, in combination with means for elevating or lowering the said chamber or nozzles to cause them to follow the bottom of the river, and suitable pumping devices for forcing the water through the nozzles under high pressure.

In testimony of which invention I hereunto set my hand.

ISAAC STEAD.

Witnesses:

J. W. KENWORTHY,  
WM. W. EVANS.