

(No Model.)

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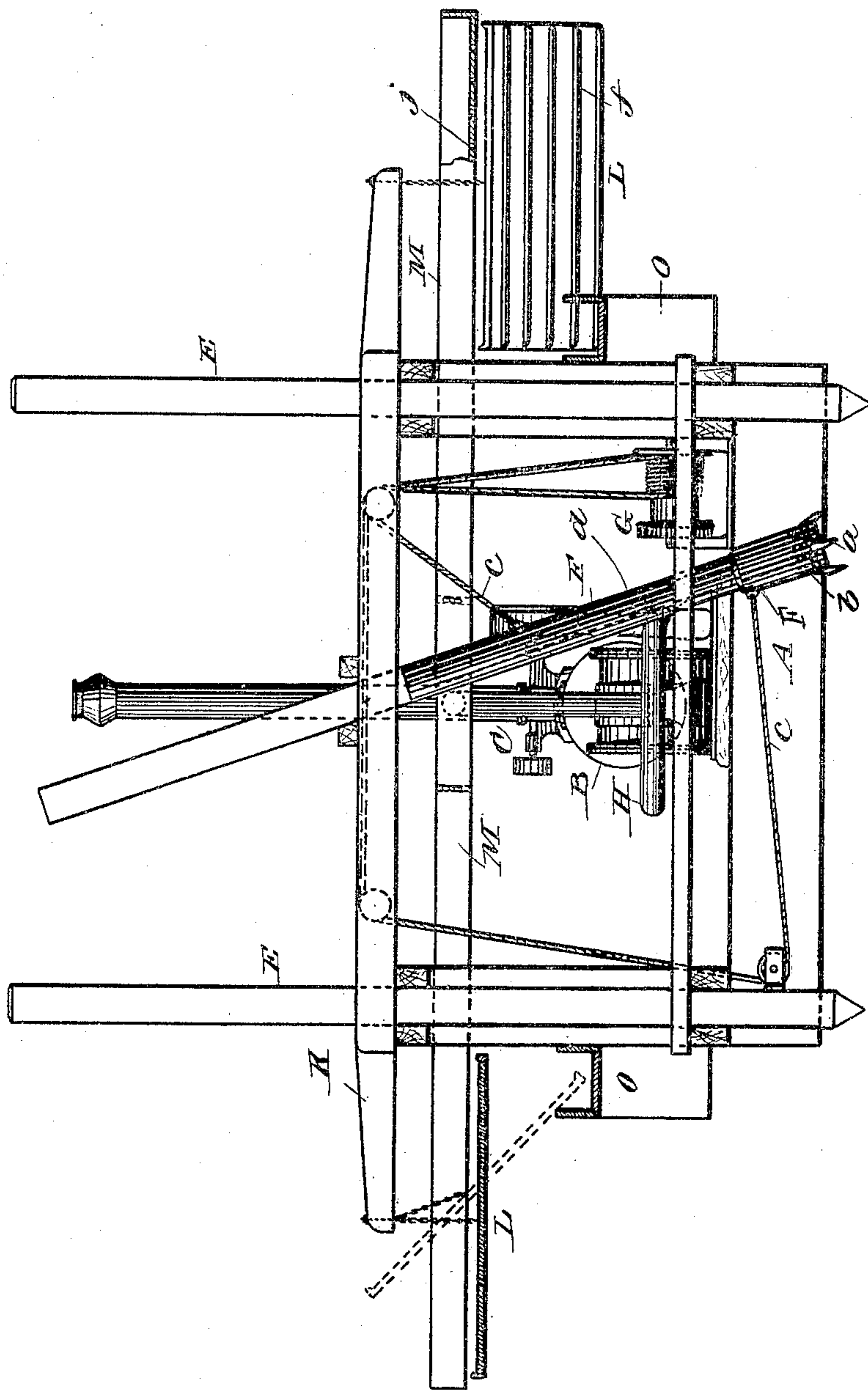
A. McDOUGALL.

APPARATUS FOR CONCENTRATING GOLD BEARING SAND.

No. 604,627.

Patented May 24, 1898.

Fig. 1



Witnesses
Archie G. Reese
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Inventor
Alexander Mc Dougall
By his Attorney
Frank L. Dyer

(No Model.)

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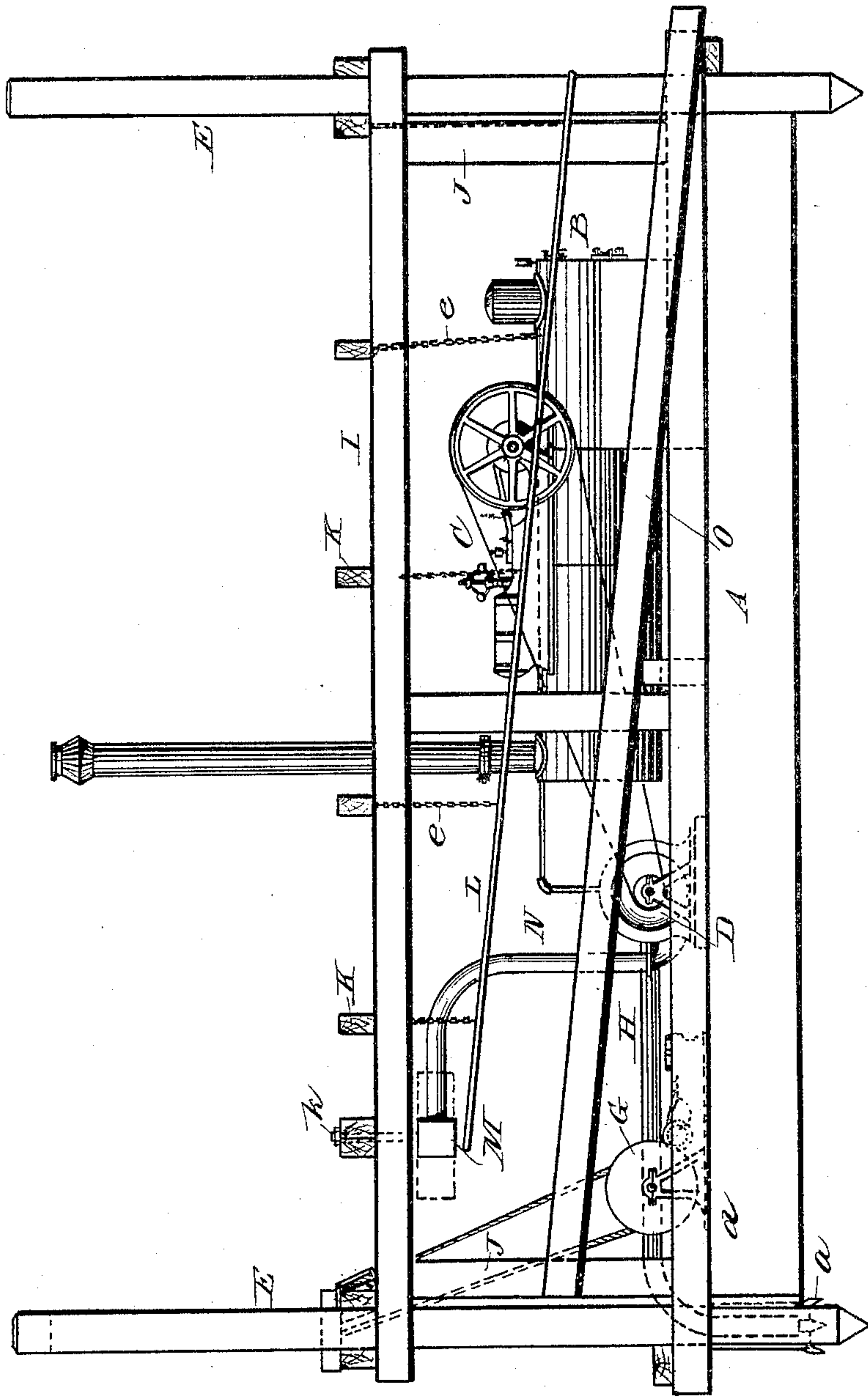
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Fig. 2



Witnesses
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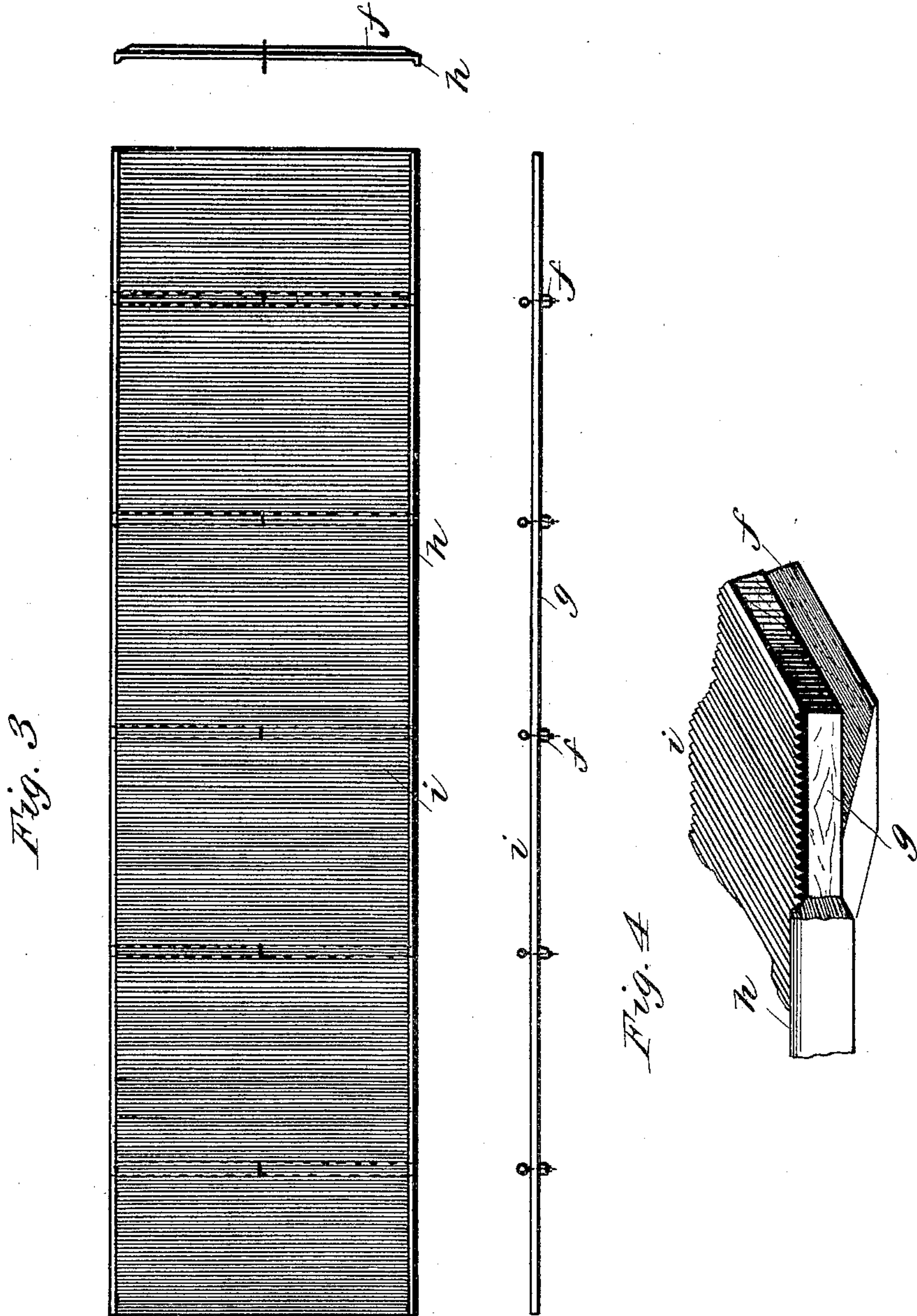
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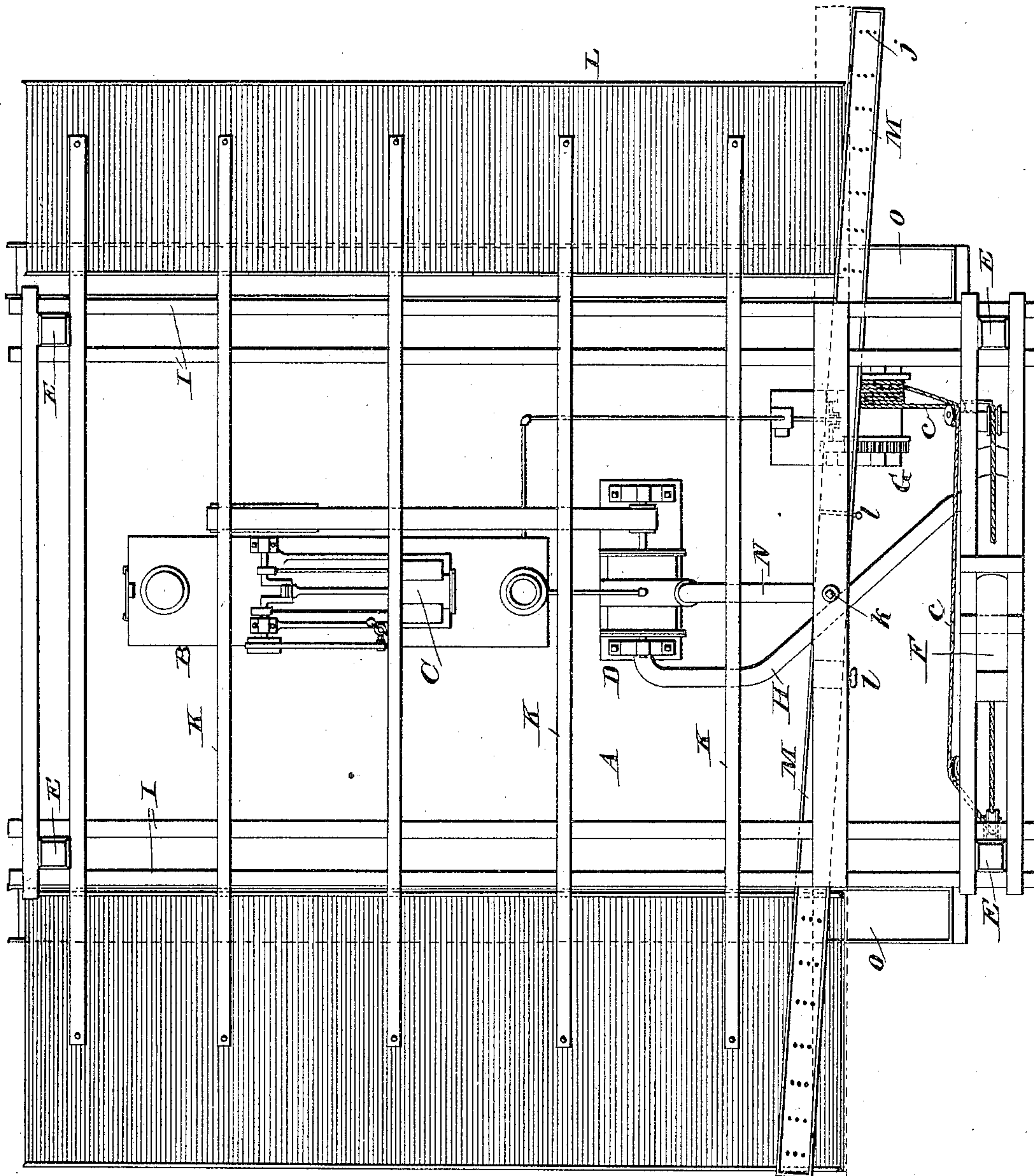
4 Sheets—Sheet 4.

A. McDOUGALL.

APPARATUS FOR CONCENTRATING GOLD BEARING SAND.

No. 604,627.

Patented May 24, 1898.



Witnesses

J. F. Coleman
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Fig. 5

Inventor

Alexander Mc Dougall

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Att'y.

UNITED STATES PATENT OFFICE.

ALEXANDER McDOUGALL, OF DULUTH, MINNESOTA.

APPARATUS FOR CONCENTRATING GOLD-BEARING SAND.

SPECIFICATION forming part of Letters Patent No. 604,627, dated May 24, 1898.

Application filed January 27, 1896. Serial No. 577,059. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER McDOUGALL, a citizen of the United States, residing at Duluth, in the county of St. Louis and State of Minnesota, have invented certain new and useful Improvements in Apparatus for Concentrating Gold-Bearing Sand; and I do hereby declare the following to be a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to various new and useful improvements in apparatus for concentrating gold from gold-bearing sand or gravel preparatory to obtaining the gold therefrom. Preferably my invention has reference to the concentration of gold from gold-bearing sand or gravel obtained from the bottoms of lakes and rivers. In the bottoms of some of the lakes and rivers in the north-western part of the United States free gold is found in paying quantities which has apparently been washed down for centuries from the mountains and which is generally found mixed with a heavy black iron-sand, although in some instances and in certain localities it is found mixed with a lighter gravel.

In Letters Patent of the United States No. 531,740, dated January 1, 1895, and No. 547,496, dated October 8, 1895, I illustrate convenient apparatus for removing this gold-bearing sand from the bottoms of lakes and rivers by means of a centrifugal pump. By means of that apparatus I am enabled to remove large quantities of the sand or gravel in an economical manner and with the expenditure of comparative little power.

The present invention is well adapted for use with that apparatus, and when carried upon the scow with the pumping apparatus a very compact and effective mining apparatus will be produced, since the gold-bearing sand can be removed by the pumps and the gold recovered therefrom by means of my present invention. It is to be understood, however, that my present invention is also capable of use in connection with other forms of apparatus for raising the gold-bearing sand from the bottoms of lakes and rivers, and, furthermore, is capable of use on shore, being supplied with the sand or gravel containing the gold in any suitable and convenient way.

In order that my invention may be better understood, I have illustrated the same in the accompanying drawings in connection with the apparatus described and claimed in my Patent No. 547,496, with which the invention can be conveniently used.

In the drawings, Figure 1 is a front elevation of the apparatus; Fig. 2, a side view thereof; Fig. 3, plan, side, and end views of one of the shaking platforms; Fig. 4, an enlarged detailed view of the same, and Fig. 5 a plan view of the apparatus.

In all of the above views corresponding parts are represented by the same letters of reference.

A is a scow on which is mounted a boiler B and an engine C, the latter operating a centrifugal pump D.

E E E E are four skids at the corners of the scow for anchoring the same at the desired locality.

F is a swinging pipe provided with heavy teeth *a* at its lower end and with perforations *b*, said pipes being swung back and forth by means of cables *c c*, operated by means of a small steam-winch G. The suction-pipe H of the pump D is mounted within the pipe F, extending out through a slot *d* therein.

The elements above mentioned are fully described and their uses explained in my last patent referred to.

Extending from the front to the back of the scow A and supported at each side thereof is a heavy beam I, carried on supports J J, and extending across the said side beams are smaller beams K, which carry in this instance the shaking platforms at each side of the scow. These shaking platforms L, which in the case of a six-inch pump for sand should be about ten feet wide and thirty feet long, are carried, preferably, from their central parts by means of suitable connections, such as chains *e*, secured to the ends of the cross-beams K. I prefer to use chains for this purpose, as thereby the necessary movements to the platforms can be obtained, and at the same time the position and inclination of the platforms can be adjusted; but it is to be understood that any other suitable means can be employed. I prefer also to support the platforms from their centers, as shown, as thereby the platforms can be tilted when the

gold is to be recovered therefrom; but, instead, said platforms may be supported at their sides or from beneath, suitable provision being made, if desired, to allow them to be tilted.

In order to allow for the proper adjustment of the platforms L, one or more links of the chains *e* may be taken up, or each chain may be provided with a turnbuckle, or some other effective and simple adjusting device may be employed. Each platform L consists of a light framework *f*, to which is secured a flat surface *g*, composed of thin boards and provided with short sides *h*, which may extend about an inch, more or less, above the surface *g*.

Secured to the surface *g* of each platform is a roughened or corrugated surface *i*, by means of which the heavy particles of sand and the gold will be caught without, however, preventing the passage over them of the water and the lighter particles. Preferably this surface consists of a great number of minute ridges or creases which extend at right angles to the direction of flow of the materials and between which are formed minute pockets or troughs which receive the gold and very heavy materials. In Fig. 4 the approximate size of these ridges is shown. The preferable kind of surface I employ for this purpose is made of sheet-rubber, having fine ridges something like the common variety of door-mat now in use, which answers the purpose very well and which is cheap and durable. It is to be understood, of course, that any other roughened or corrugated surface may be employed for this purpose.

M is a trough or chute extending across the scow, preferably directly beneath the beams I I and immediately above the elevated ends of the platforms L L. Preferably this trough or chute extends the entire width of the said platforms, and it is provided with openings or holes *j* above said platforms, so as to allow the water, gold-bearing sand, and other materials to escape onto said platforms. This trough is pivoted at its central part at *k* in any suitable manner, so that it may be swung to either of the positions shown in dotted lines in Fig. 3, to be thereby removed from above one or the other of the platforms L, whereby said platforms may be tilted for the removal of the gold when desired.

The discharge-pipe N of the pump D connects with the trough M at its central part, and proper provision is preferably made to allow for the discharge from the pump to be deflected toward one side or the other of the scow, so that while one of the inclined platforms is receiving the discharge from the pump the other platform may be tilted for the recovery of the gold, as shown in Fig. 1. For this purpose a simple form of valve *l* may be mounted in the trough M at each side of the discharge-pipe N.

When the gold is to be recovered from the platforms L, I prefer to tilt them as shown

in dotted lines at the left of Fig. 1, and in order to receive from the platform so tilted the gold which is caught thereby I prefer to mount beneath the same a trough O, secured to the scow and connecting at its lower end with any suitable receptacle for receiving the gold.

In order to more perfectly effect the separation of the gold and the heavier particles of sand, particularly the black iron-sand, when the latter is present, from the water and lighter materials, I prefer to give to the platforms L a vibrating or shaking motion, which may be either a motion sidewise or up and down or circular or tilting motion. With the apparatus shown this motion is preferably a sidewise motion, and the platform by any suitable means may be moved outward from the scow a few inches and be allowed to return by gravity, so as to strike the side of the scow and slightly jar it. I find that this motion very effectively aids the correct operation of the apparatus.

I do not illustrate in the drawings any form of device for effecting the shaking of the platforms, as this result can be carried out by the simplest mechanical contrivances.

By extending the trough M over the elevated ends of the platforms L said platforms are kept in their proper horizontal positions, so that they cannot be accidentally tilted, and by swinging said trough to either of the positions shown in Fig. 2 the said platforms will be free to be tilted for the recovery of the gold therefrom, as will be explained.

The operation of the device shown in the drawings and that which I prefer to use in practice is as follows: The engine C being set in motion so as to operate the pump D, the pipe F is swung by means of the cables *c c* back and forth, the lower end being in contact with the bottom of the lake or river. The teeth *a* on said pipe loosen the sand or gravel, which is drawn by suction, together with a large proportion of water, through the holes *b*, and is forced by the pump through the discharge-pipe N into the trough M. Preferably this discharge is directed toward one or the other of the platforms, although it may of course be distributed onto both of them. By directing it upon only one of the platforms, however, I obtain the advantage of being enabled to operate the device continuously, since the other platform may be tilted, as shown, for the recovery of the gold therefrom. The discharge from the pump D passes through the holes *j* onto the platforms L and flows gently down the same, the water of course escaping immediately and flowing overboard. The flow of the water down the platforms L, over the corrugated surface *i*, washes along with it all of the lighter materials and carries them off and leaves behind in the ridges or creases the gold and the very heavy materials, such as the black iron-sand referred to.

Although the gold and heavier materials are gradually forced downward, this move-

ment is so slow and gradual that a very great quantity of the gold-bearing sand can be passed over the platforms before the valuable materials which are saved reach the lower ends thereof.

By giving to the platforms a shaking motion, preferably a side wise motion, as explained, the materials are kept constantly in agitation, so that the separation of the gold from the lighter materials is more readily and expeditiously effected. After this operation is continued sufficiently and preferably until the gold caught by the platforms is distributed almost throughout its entire length a small quantity of clear water is forced down the platforms, so as to wash off any remaining light materials, and the discharge of the pump is then directed to the other platform, where the operation is repeated. The trough M is now swung out of the way of the first platform without, however, effecting the proper distribution of the materials upon the second platform, and the first platform is then tilted to the position shown in dotted lines in Fig. 1. The gold which has been caught and retained within the creases or ridges of the corrugations *i* is then removed into the trough O in any suitable way, such as by scrapers or by washing the same with a hose, or, instead, the corrugated surface may be removed and the gold recovered therefrom in any suitable way, a fresh surface being replaced for further operation. The materials in the trough O thus recovered from the platforms which will contain a very high percentage of free gold may be then treated for the recovery of the gold by amalgamation or by any suitable mechanical or chemical process.

Although I prefer to carry out in my apparatus a mechanical process, pure and simple, such as I have above explained, it is entirely possible to employ the same in connection with a chemical process of any character. For instance, a suitable amount of quicksilver may be placed upon the corrugated surface with which the gold collected thereon will immediately amalgamate in the ordinary and well-known manner, after which the amalgam thus obtained is treated for the recovery of the gold therefrom.

Before claiming my invention I desire to have it understood that the specific apparatus above described is capable of many changes without departing from the spirit of my invention. For instance, instead of employing a corrugated surface, as explained, any other suitably-roughened surface may be used, and instead of using a rubber corrugated surface the surface may be made of other materials. I use rubber preferably, however, since it is cheap, effective, is of a color strongly contrasting with the gold, and makes the platforms water-tight.

It is to be further understood that the discharge of the pump D may be distributed upon the platforms in other ways and that instead of a centrifugal pump any other suitable kind

of a pump may be used. Furthermore, the platforms may be suspended from the sides or from beneath, and instead of tilting them for the recovery of the gold the gold may be recovered from the platforms while the platforms are in their operative positions.

It is further to be understood that the specific form of inclined platforms which I have shown for the recovery of gold is not restricted for use in connection with a scow or with the specific form of dredging apparatus explained, but may be equally well employed on shore and be supported by means of any suitable suspension-frame, in which case the platforms may be supplied with gold-bearing sand pumped up from the bottoms of lakes or rivers or with gold-bearing sand obtained in a dry state and with which a suitable proportion of water has been admixed.

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

1. In an ore washer or concentrator, the combination of a scow, a pump carried on the scow, the suction-pipe of said pump being arranged to remove the gold-bearing sand or gravel, an inclined tiltable platform carried on said scow, having a corrugated or roughened surface, and a trough movably mounted above and normally engaging said inclined platform, receiving the discharge of said pump and normally holding the platform with its minor axis horizontal, but adapted to be moved out of its engagement therewith to allow the platform to be tilted, substantially as set forth.

2. In an ore washer or concentrator, the combination of a scow, a pump carried on the scow, the suction-pipe of said pump being arranged to remove the gold-bearing sand or gravel, an inclined tiltable platform carried on said scow at each side thereof and having a corrugated or roughened surface, and a trough pivotally mounted above and normally engaging said inclined platform, receiving the discharge from said pump, and normally holding the said platforms with their minor axes horizontal, but adapted to be swung out of its engagement with either of said platforms to allow it to be tilted, substantially as set forth.

3. In a mining apparatus of the character described, the combination of a scow, a superstructure carried on said scow, an inclined platform suspended from said superstructure by flexible connections whereby the same may be tilted, a chute mounted below one edge of said platform, a trough mounted on said platform above the upper end of said platform but movable away from the same, and a pump carried on the scow, the suction-pipe of said scow being arranged to remove the gold-bearing sand or gravel and discharge the same to said trough, substantially as and for the purposes set forth.

4. In a mining apparatus of the character described, the combination of a scow, a su-

perstructure carried on said scow and extending over the side of the scow, an inclined platform carried by flexible connections on the end of said superstructure outside of the
5 scow, a trough pivoted to said superstructure and normally arranged over the upper ends of said platforms, but movable alternately out of engagement therewith, and a pump carried on the scow, the suction-pipe being

arranged to remove the gold-bearing sand or gravel and discharge the same to said trough, substantially as and for the purposes set forth.

This specification signed and witnessed this 18th day of January, 1896.

ALEXANDER McDOUGALL.

Witnesses:

W. P. MOSHER,

CHAS. W. LELAND.