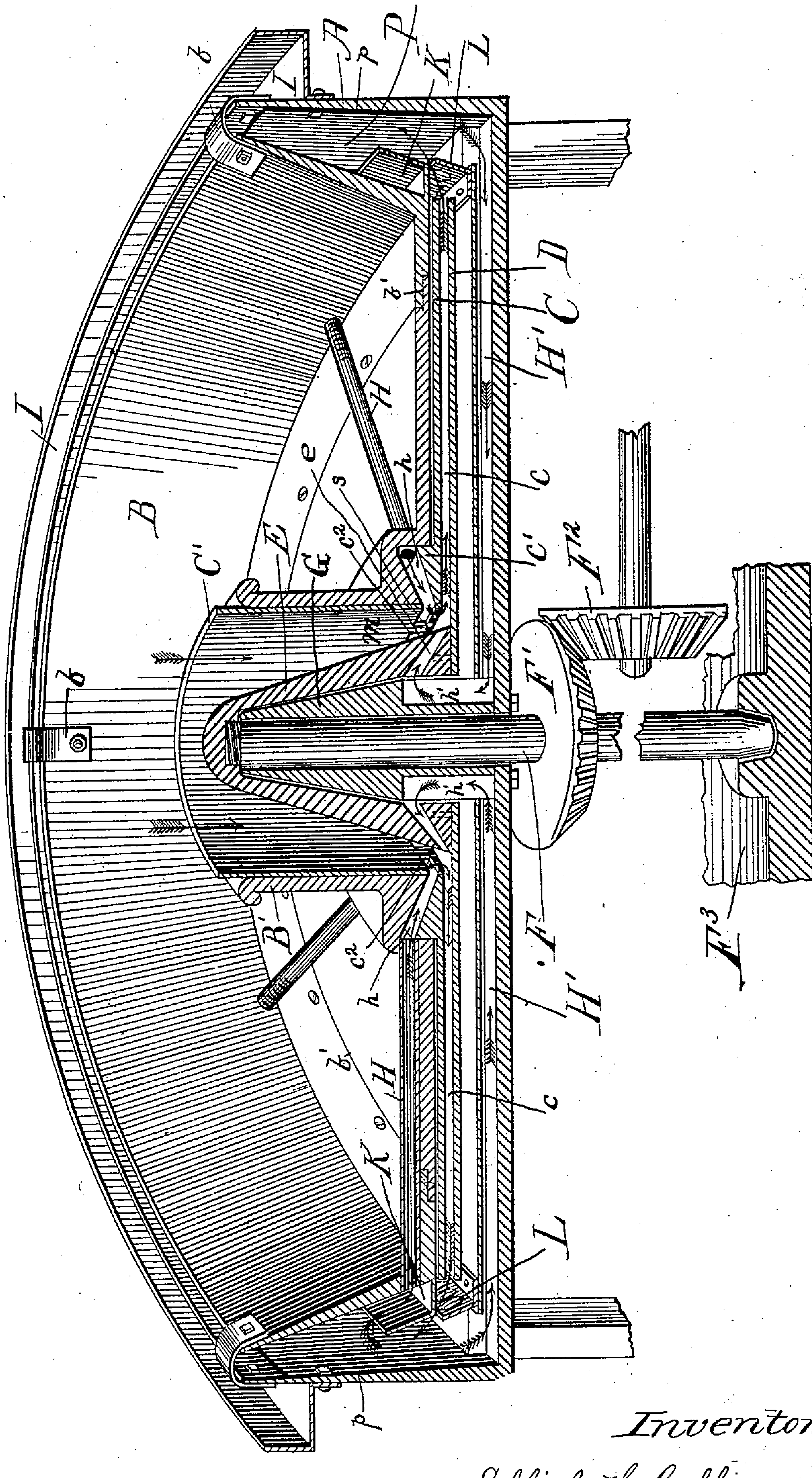
(No Model.) 2 Sheets—Sheet 1.

E. H. GOLLINGS.

AMALGAMATING APPARATUS.

No. 287,431. Patented Oct. 30, 1883.

Fig. 1.



Witnesses.

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By Munday Evarts & Adcock his Attys.

N. PETERS, Photo-Lithographer, Washington, D. C.

(No Model.) 2 Sheets—Sheet 2.

E. H. GOLLINGS.

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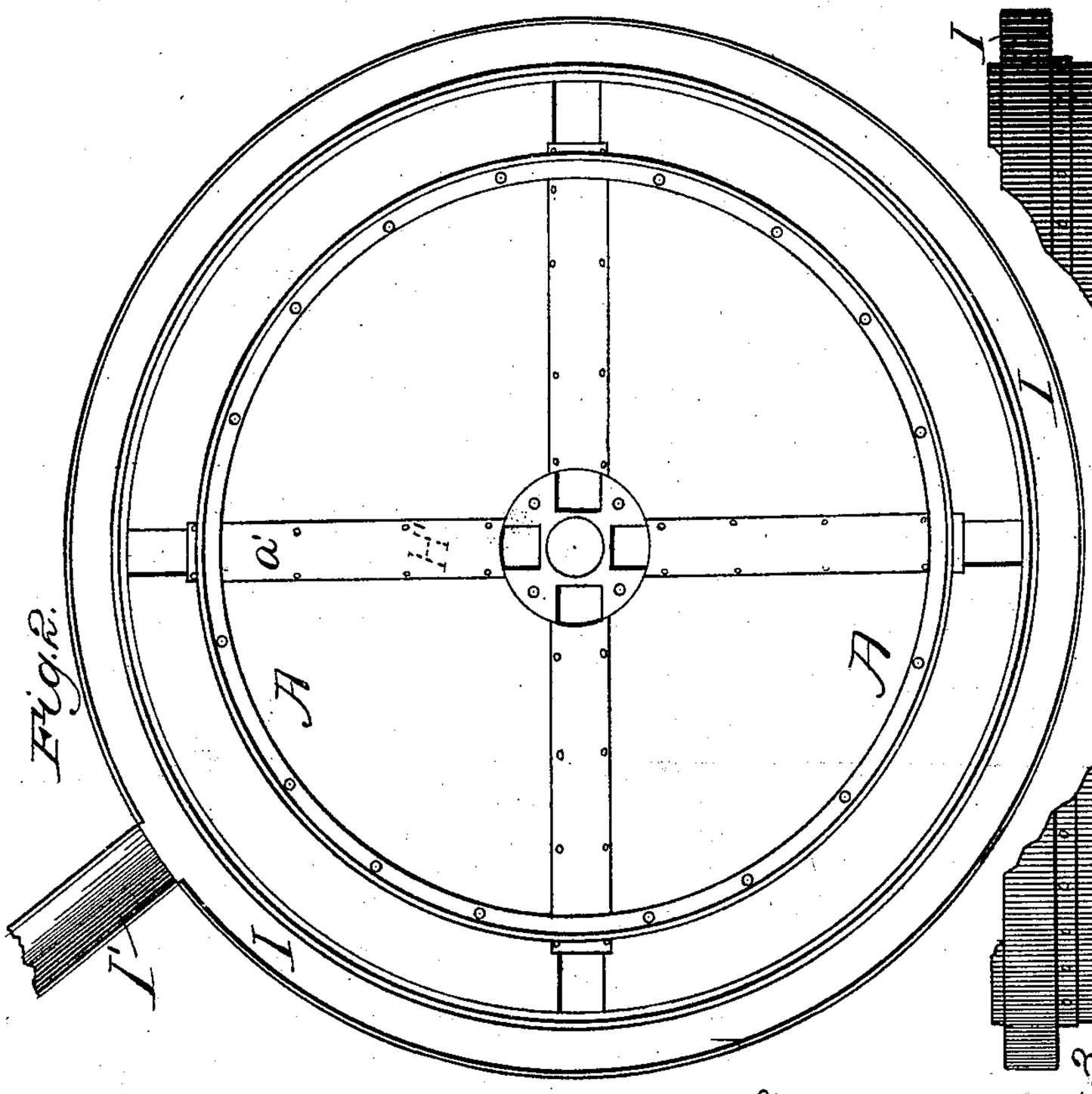

Fig. 2.

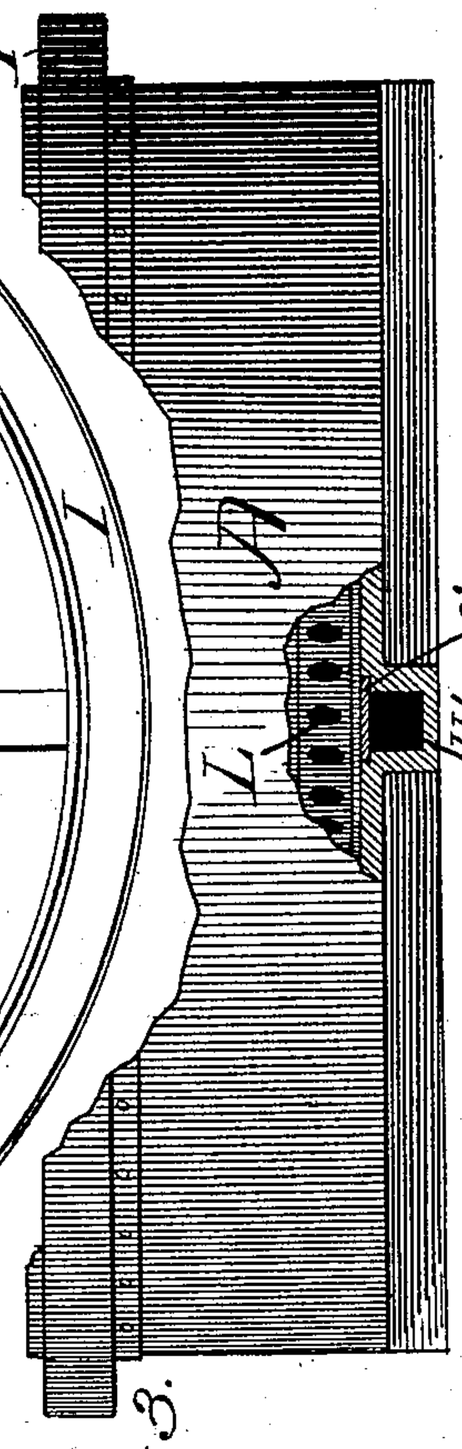

Fig. 3.

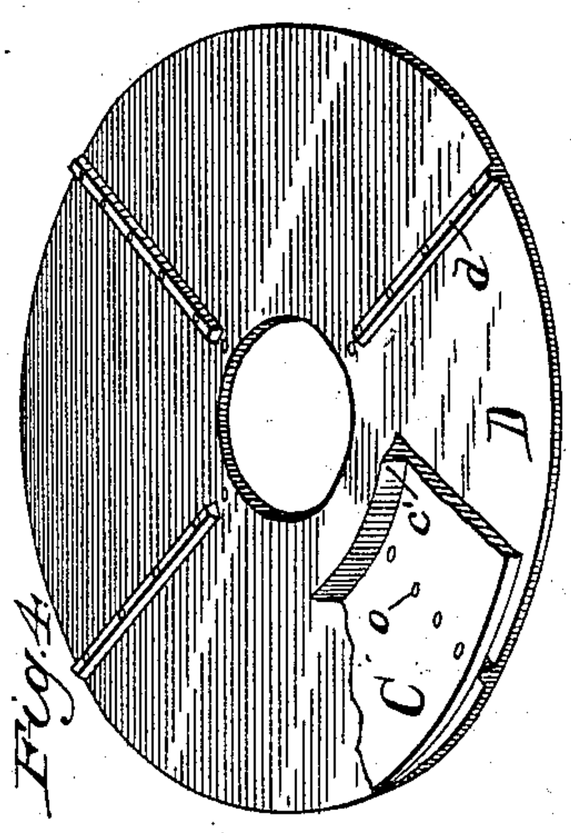

Fig. 4.

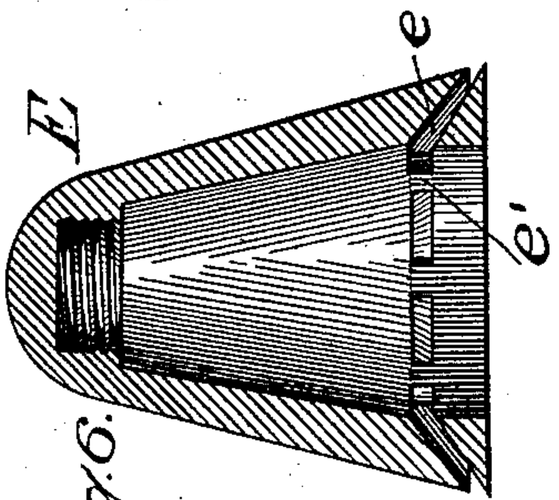

Fig. 6.

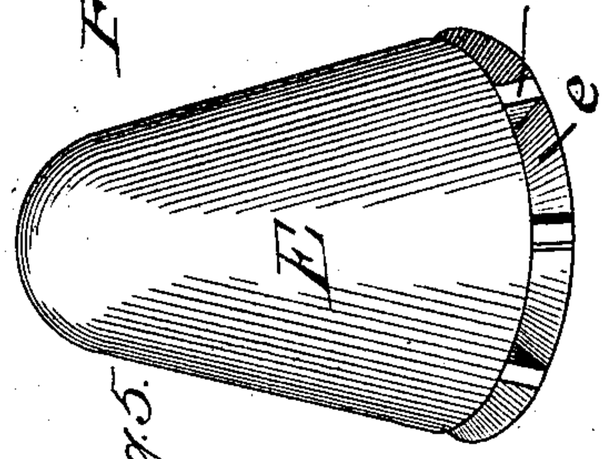

Fig. 5.

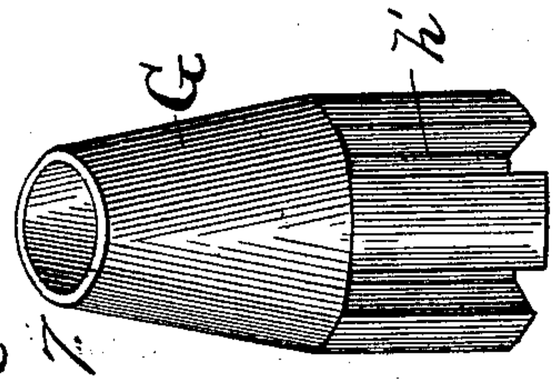

Fig. 7.

Witnesses.

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UNITED STATES PATENT OFFICE.

ELLICK H. GOLLINGS, OF LEWISTON, IDAHO TERRITORY, ASSIGNOR TO HIMSELF, AND CHARLES H. SMITH, OF CHICAGO, ILLINOIS.

AMALGAMATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 287,431, dated October 30, 1883.

Application filed April 16, 1883. (No model.)

To all whom it may concern:

Be it known that I, ELLICK H. GOLLINGS, a citizen of the United States, residing at Lewiston, in the county of Nez Perces and Territory of Idaho, have invented a new and useful Improvement in Amalgamating Apparatus, of which the following is a specification.

This invention relates to improvements in apparatus for recovering gold or silver from sand or crushed ores; and it consists in the novel features hereinafter set forth.

In the drawings which form a part of this specification, and in which similar letters of reference indicate like parts, Figure 1 is a perspective sectional view of my invention. Fig. 2 is a plan view of the stationary bottom plate. Fig. 3 is a side elevation thereof, broken away to show the return-passage and covering plate. Fig. 4 is a view of the lower rotating disk, showing the ribs. Figs. 5 and 6 are respectively perspective and sectional views of the exterior revolving thimble, and Fig. 7 is a perspective view of the cone-shaped stationary sleeve.

In said drawings, A represents a circular pan, and B a concentric pan placed within the first-named pan, and supported therein by straps *b*. Between the bottoms of these pans are two amalgamated surfaced rotating disks, C and D, which are preferably connected together, so as to rotate in unison, by any suitable connecting devices, such as rivets *o*. Both are supported by a conical thimble, E, secured to the upper end of a vertical shaft, F, operated by gears F′ F² and stepped in a block or bed, F³. The thimble rests upon a conical bearing, G, which also serves as a lateral bearing for the shaft F, and is bolted to the outer pan, A, as shown. Surrounding the thimble at a short distance therefrom is a rim, B′, cast upon or attached to the inner pan, and within this rim is another moving rim, C′, attached to the upper disk, C, by screws *s*, so as to be carried thereby. Into the space or chamber *m* between this latter rim and the thimble the gold-bearing earth or sand is fed, and it passes from thence into the shallow space *c* between the rotating disks. The mercury is fed into the same space, *c*, at the opening from the feed-chamber *m* by means of the passages H and H′—that is to say, mercury is first placed in the outer pan until it rises within the annular chamber P between it and the inner pan to a height sufficient to give the pressure requisite to insure its backward flow from said space to the junction of the feed-throat and the disk-space *c*, and then by the rotation of the disks it is caused to circulate in an endless path in one direction from the feed-throat between the disks into the annular chamber P, and thence back again to the feed-throat through said passages H and H′. The passages alluded to, through which this return flow of the mercury takes place, are part of them above and part below the rotating disks, those above being formed of the pipes H, located and supported in the upper pan and connecting with passages *h* between the rim B′ and the thickened center *c′* of the upper disk, openings *c²* being made in the inner rim, C′, to register with said passages *h*, and the lower passages, H′, being formed in the body of the lower pan, and connecting with passages *h′* in the sleeve-bearing G. The passages *e* in the thimble register with the passages *h′*.

With the apparatus thus constructed the operation is substantially as follows: The earth or sand and the mercury are brought together in the feed-throat, and are drawn from thence into the disk-space *c* by the centrifugal action of said disks, and are discharged thereby into the space P. While undergoing this centrifugal operation the mercury and sand are of course intimately commingled, and when they reach the space P the sand is given an opportunity to rise to the surface of the body of mercury in said space, and may be thence withdrawn either by washing it off, or it may fall over by gravity into the surrounding trough I. From space P the mercury flows back to the feed-throat in obedience to natural laws, as already stated, and comes in contact with and acts upon fresh material. The centrifugal action of the disks creates a constant current, and the mercury is made to do duty so long as it remains fluid. Such of the mercury as becomes amalgamated with the gold will either seek the bottom of the space P or be caught in a settling-trough, K, attached to the inner pan, as shown.

Of course it will be understood that the return-passages described may be used in such number as is found desirable, and that either the upper or the lower ones may be dispensed with, as judgment may dictate.

It is a fact with which many miners are conversant that if sand, either wet or dry, be admitted below the surface of a body of mercury confined in a vessel, the inner sides of which are not of such material as mercury adheres to, the sand will cling to the vessel and refuse to rise through the mercury to the top, as its lighter gravity would seem to require. My theory of this is that the pressure upon the sand by the mercury causes such friction between the sand and the sides of the vessel that the former cannot rise, but is caused to form a rough coating to the vessel. This in turn serves to retain the particles which come afterward in the same manner, and as the sand gradually accumulates in this way it soon fills the chamber. To obviate this difficulty I line the inner surface of the rim of the outer pan with some metal, *p*, to which mercury will adhere, and preferably some metal which it will not consume or dissolve, and thereby prevent the adhesion by the sand to the vessel. I find that copper answers very well. The other vertical parts of the chamber P may be lined in the same way, if thought desirable.

At the opening from the space *c* into the chamber P, I prefer to place a perforated deflector, L, which will serve to direct the mercury and sand upward to some extent, and at the same time will allow them to flow horizontally, whereby the major part of the mercury is prevented from being agitated to an undesirable degree by the centrifugal force of the disks. It also distributes the sands more thoroughly. The under disk is provided with radial ribs *d*, which compel the mercury to travel with it as it rotates. One of the disks may be stationary, if preferred, and in such case the ribs should be upon the moving disk, and should vary somewhat from the true radial.

The passages *e* in the thimble are made as wide horizontally as strength in the divisions *e'* will permit. The passages H' are preferably formed in the body of the outer pan, and they are covered by metal plates *a'*, properly secured thereto.

For convenience in clearing out the apparatus, I make the inner pan of two parts, with the joint in the bottom at the point indicated by *b'*, a lap-joint being preferably employed. This enables me to remove the outer part and get at the chamber P with but little trouble. The pipes H are joined to the pan B and rim B' by joints, which permit them to be loosened readily. The outer fan may of course be provided with a tap for drawing off the mercury at any convenient point. The trough I has an outlet, I', whereby it may be flushed out.

I make the surfaces of the centrifugal disks of amalgamated metal for the same reason that the side of the chamber P is thus made, and thereby insure a smooth and easy flow of the mercury and sand therethrough. The thickened center *c'* of the upper disk affords a shoulder fitting snugly against the rim B', and prevents the too free escape of the mercury into the space above said disk at the joint between the disk and the rim. The orifices of the return-passages, at the feed-throat end thereof, are contracted, so that they can pass less mercury than the capacity of the passages themselves. In this way I insure the presence at the orifices of all the mercury they can pass, and thus prevent any possible entrance of sand or water into said passages.

I claim—

1. The combination, in amalgamating apparatus, of the feed-throat, the centrifugal disk or disks rotating without grinding contact, the chamber into which the mercury is discharged by the disks, and independent return-passages for conducting the mercury back to the feed-throat, substantially as specified.

2. The combination, in amalgamating apparatus, with the centrifugal devices rotating without grinding contact, and the annular chamber into which the mercury and sand are discharged by said centrifugal devices, of independent return-passages adapted to conduct the mercury back from said chamber to the center of the centrifugal devices, substantially as specified.

3. The combination, in amalgamating apparatus, of the feed-throat to which the sand and mercury are admitted, the two centrifugal disks rotating in unison without grinding contact, having the shallow space *c*, opening from the throat at the center, and a chamber into which the mercury and sand are discharged by said centrifugal devices, substantially as specified.

4. In combination with the non-grinding centrifugal devices of an amalgamator of the kind herein shown, an annular separating-chamber, P, adapted to permit the separation of the mercury and the sand, and provided with a side surface to which mercury adheres, and with openings or exits for each of the separated materials, substantially as specified.

5. In combination with the non-grinding centrifugal devices of an amalgamator of the kind herein shown, an annular separating-chamber, P, adapted to permit the separation of the mercury and the sand, and provided with separate exits for both, substantially as specified.

6. The combination of the outer and inner pans, the disks, the actuating-shaft, the bearing-sleeve, and the thimble, substantially as specified.

7. The amalgamating apparatus consisting of the outer and inner pans, the disks, the actuating-shaft, the thimble, the bearing-sleeve, and the return-passages, substantially as specified.

8. The combination, with the disks and their actuating-shaft, of the thimble and the sleeve,

both sleeve and thimble having registering passages therethrough, substantially as specified.

9. The combination, with the disks and chamber P, of the annular perforated deflector L, substantially as specified.

10. The inner pan, made in two parts for the purpose specified, in combination with the other parts of the apparatus, substantially as set forth.

11. In amalgamating apparatus, the thimble having the opening *e*, the sleeve-bearing having the passages *h'* communicating with the openings *e*, and the return-passage H', communicating with the passages in the sleeve, substantially as specified.

12. The return-passages provided with contracted orifices at the feed-throat, substantially as specified.

Dated Chicago, Illinois, March 29, 1883.

ELLICK H. GOLLINGS.

Witnesses:

H. M. MUNDAY,

T. EVERETT BROWN.