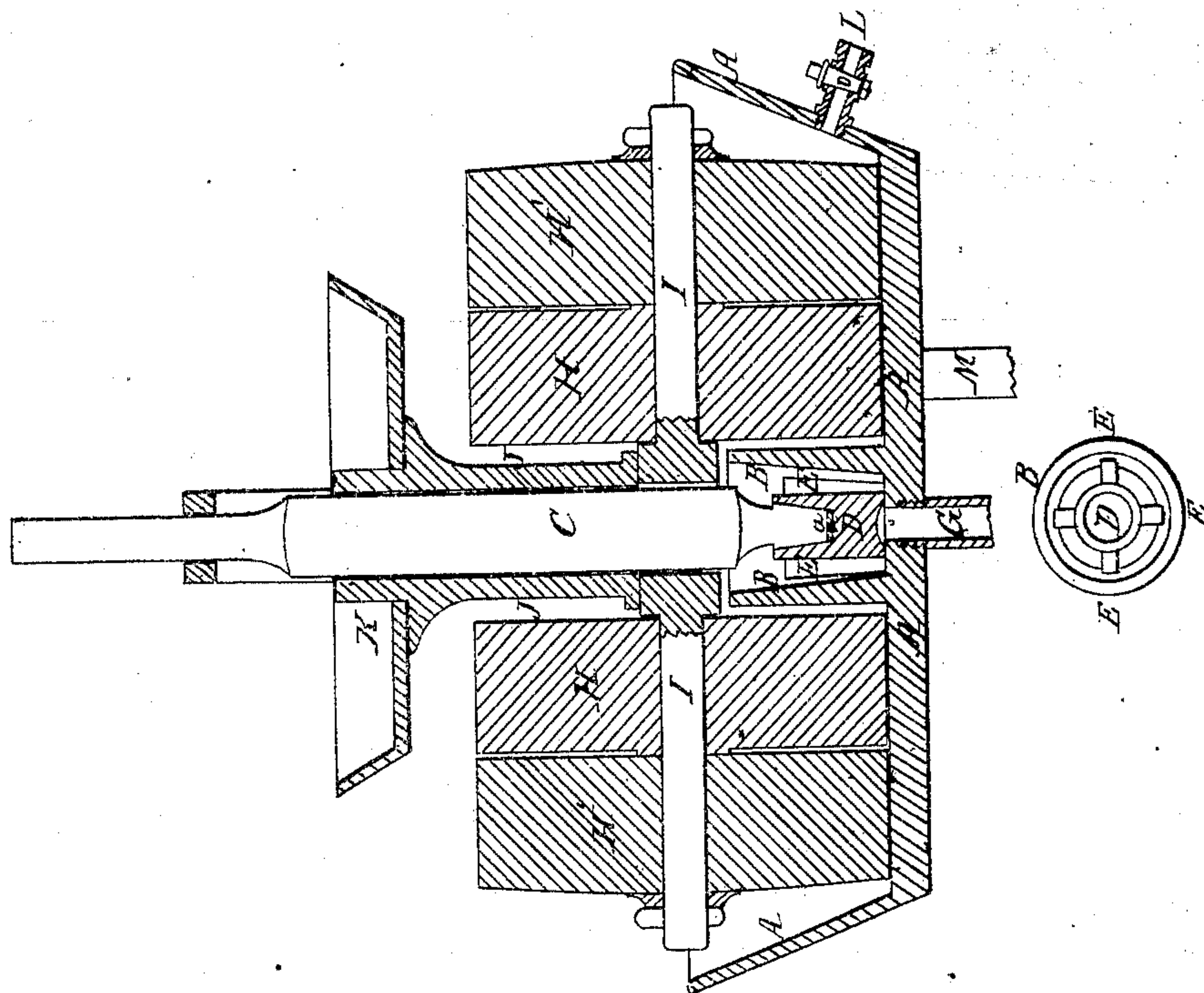


*R. L. Reaney.*  
*Treating Gold.*

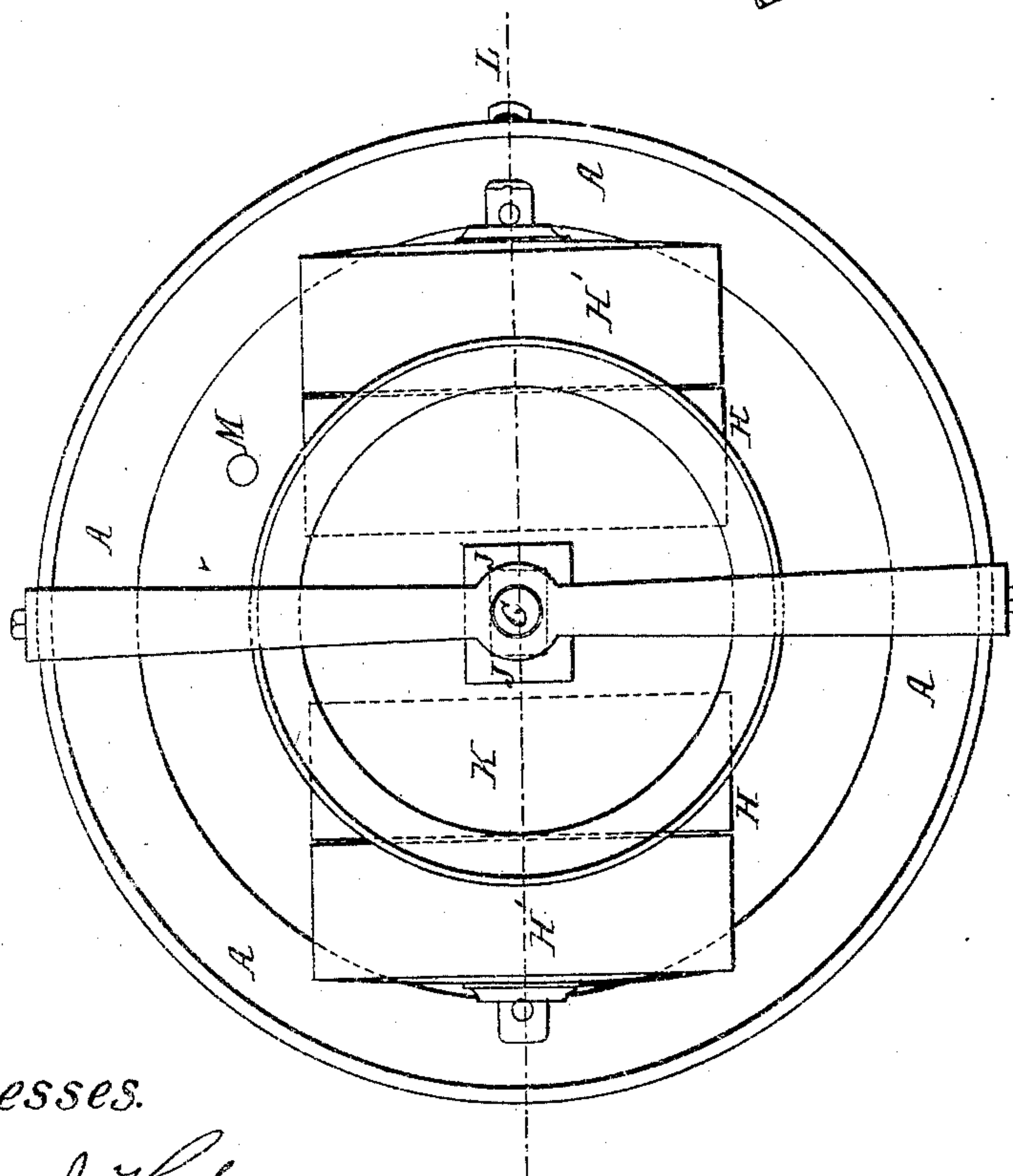
*N<sup>o</sup> 26784*

*Patented Jan 10, 1860*

*FIG. 2.*



*FIG. 1.*



*Witnesses.*

*J. H. K.*  
*James M. Tyson*

*Inventor*

*Robt L Reaney*  
*"*



# UNITED STATES PATENT OFFICE.

ROBERT L. REANEY, OF PHILADELPHIA, PENNSYLVANIA.

## GOLD-SEPARATOR.

Specification of Letters Patent No. 26,784, dated January 10, 1860.

*To all whom it may concern:*

Be it known that I, ROBERT L. REANEY, of the city and county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Machines for Grinding and Separating Gold from Quartz or other Minerals with Which it is Found Associated; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 represents a vertical central section taken through the pans showing the arrangement of rollers and the central overflow, with the inlet and exit pipes. Fig. 2 is a plan view of the apparatus, with the parts arranged in position for operation.

Similar letters of reference indicate corresponding parts in both figures.

My invention combines in one machine three distinct operations, viz: grinding the gold quartz, or other mineral with which gold is found associated, and reducing the same to a pulverulent state, washing and carrying off the lighter particles which are mechanically held in suspension by a stream of water, acting upon them in a peculiar manner, and lastly effecting by means of grinders or crushers (which also act as agitators) and the action of the water upon the quartz, a more perfect amalgamation of the particles of gold than has ever been obtained before, and with great economy of time, labor and space, as hereinafter described.

To enable those skilled in the art to fully understand my invention I will proceed to describe its construction and operation.

A represents a circular iron vessel of any desirable capacity having an inclined or flaring rim proceeding up a suitable distance from the bottom of the pan, in the center of which is a concentric tube or overflow, B, cast solid with the basin and proceeding up from the bottom of the pan but not as high as the outer rim; and surrounding an opening through the center of the bottom of the basin, the relative height and diameter of this overflow tube with the outer rim of the basin will be best determined by practice. Within this tube rests a step block, D, of a less diameter than the bore of the tube, having four wings, E, which keep the block in a steady vertical position, and permit the water a free passage down through the tube.

In the center of this step block is a circular recess and a steel disk, *a*, for the bearing of a square vertical driving shaft, C; this shaft is tapered and rounded off at its lower end, so as to fit into the recess in the step block.

The vertical shaft, C, is supported by a suitable frame at its upper end, and rotated by bevel gearing, belt pulley, or otherwise, and communicates motion to four or more solid cast iron rollers, H H, H' H', running vertically in the water, and which revolve on their own axis around the shaft, C, on the bottom of the pan, A. The horizontal shaft, I, upon which these rollers are hung has a mortise through the square enlargement of its center, through which the square shaft, C, passes, which mortise is made slightly larger than the shaft, C, so as to allow the shaft I to play freely up and down, and also to allow for a slight elevation of either pair of rollers, which is necessary in order that they may adapt themselves to any inequalities in the thickness of the layer of the solid matters upon the bottom of the pan, A.

K is a smaller pan or weight basin supported above the rollers by means of a square case, J, which surrounds the shaft, C, and rests upon the hub or enlargement of the roller shaft, I, and turns with the shafts. This pan may be filled with weights, if it should be found necessary at any time to increase the pressure of the rollers and their crushing action.

L is a valve cock for the admission of water into the basin, A, or for drawing off the water previous to withdrawing the amalgam; another cock (not shown) may be introduced in the side of the pan above the cock, L, for the admission of water if found necessary. G is the tube through which the water and rock detritus pass off, and M, an opening and pipe in the bottom of the pan, A, through which the amalgam is drawn off for straining and distillation to obtain the gold contained therein.

This gives a description of the general form and arrangement of my apparatus, I will now proceed to describe the operation of grinding, washing and amalgamating the ore so as to extract from it the pure metal.

On commencing the operation of separating gold from the quartz, slate, rock, earth, clay, mud, or river mud the apparatus is to be set in motion, and a small stream of warm water allowed to pass into the pan



through the pipe, L. The bottom of the pan is covered with mercury. The gold bearing quartz is then added, having been previously broken by stamps, and reduced to lumps of about one-quarter of an inch in size. I design to employ a device for feeding the sand or ore to the mill, which will consist of a feeding trough or pipe with a valve opening into the pan and operated by the roller, shaft, or otherwise, at each revolution, and allowing a certain portion to fall in the pan as fast as the ore therein is reduced.

The water, which is heated as above stated, passes into the pan just over the surface of mercury and with the aid of the rollers, washes out the lighter particles and carries them over the central tube, B, and down through pipe, G, instead of over the outer rim of the pan; and by this means it is impossible for any particles of the gold or quicksilver to rise to the surface and flow over at this point, whereas if the "overflow" is allowed to take place over the outer rim of the pan, A, a considerable portion of both metals are lost, being carried over by the force of the current created by the motion of the rollers around the interior of the pan, for these rollers will impart to the semi-fluid contents a current setting in the same direction with themselves while the centrifugal force thus generated tends to keep the fluid up against the outer rim of the basin to a height considerably greater than is ever attained by that portion of the fluid lying immediately in contact with the inner rim or overflow tube, B. In fact it is found that the water surrounding this tube is comparatively tranquil, and partakes of the general agitation no more than is necessary for the mechanical suspension of the fine detritus which is carried over by the current.

The advantage derived from the use of heated water, as above stated, is that besides the tendency it has to somewhat soften the soluble matters, thus facilitating their reduction; it also has the more important effect of preventing or of greatly retarding

the division of the mercury commonly called "flowing," which invariably happens when the mass is subjected to much agitation, while by letting the water in low down, it is brought directly in contact with the crushed ore and effects its object in a more efficient manner than when let in from above. The action of the weighted iron rollers upon the quartz for crushing, and the rollers themselves, is similar to those now in common use.

Grains of gold, silver, or other ductile metals, when ground or crushed with quartz or other hard substances, usually flatten under the mill into a solid cake, and thus prevent the grinding surface from coming close enough to crush the stony matrix, or foreign substances to an impalpable powder. But if, when thus crushed as fine as possible the grains of gold are liberated, and separated, the remaining stony matters can then be ground as fine as necessary, and the finest particles of metal even such as are invisible to the naked eye, may be liberated and amalgamated and thus saved. To accomplish the separation of these finer particles my invention is especially intended; and by letting in the heated water just over the surface of the mercury the earthy particles are kept constantly suspended by agitation, in such a manner that while the light and heavy substances are separated from each other by virtue of their respective gravities, the heavy metallic portions will remain to the bottom of the vessel and the light and refuse earth be washed away from the surface in the current of water which constantly passes through the apparatus.

What I claim as my invention, and desire to secure by Letters Patent, is:—

The arrangement of the case J, weight pan K, shaft I, rollers H, H', central overflow tube B, and exit pipe L, as and for the purpose herein shown and described.

ROBT. L. REANEY.

Witnesses:

JOHN J. HESS,  
JESSE M. TYSON.