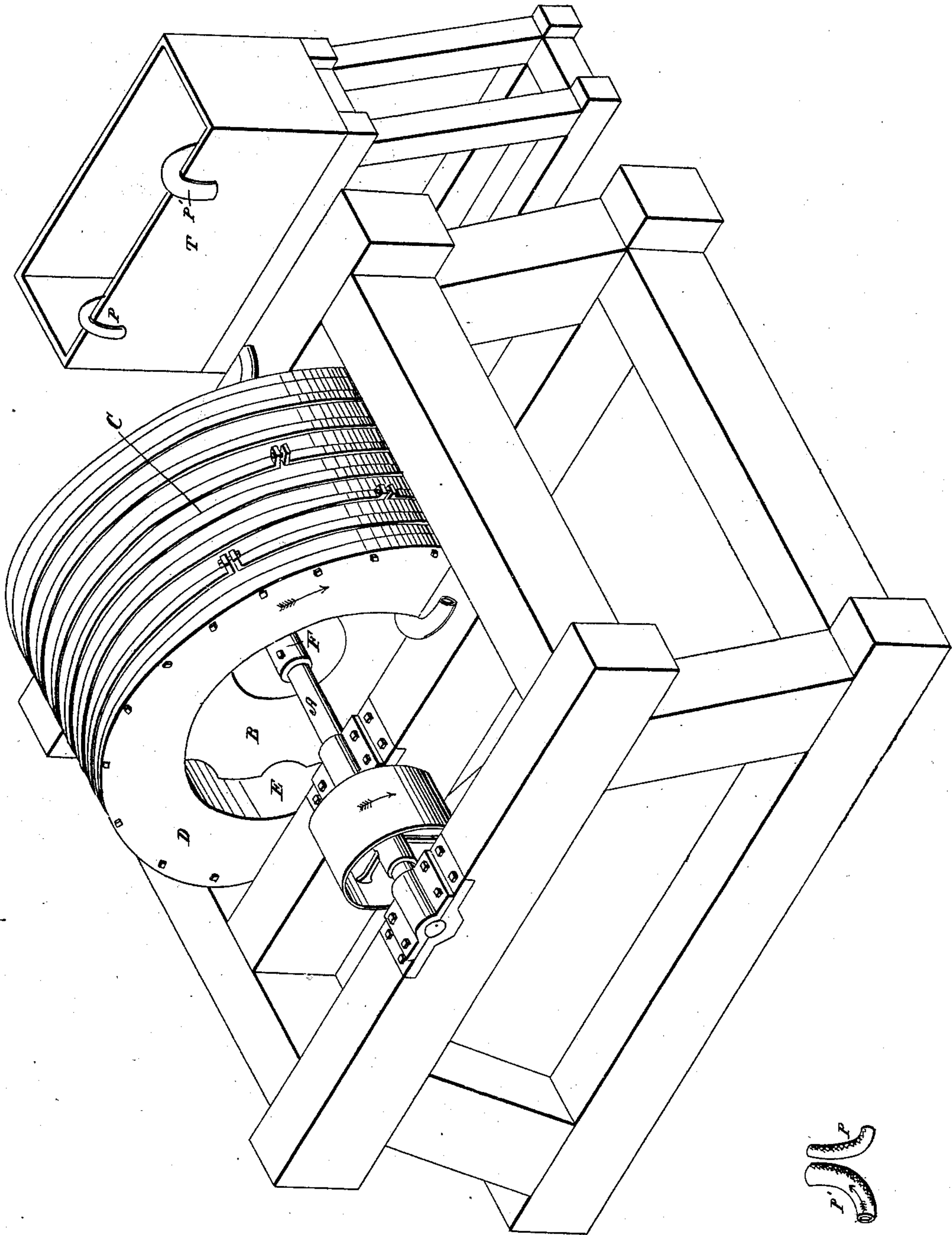


WHELPLEY & STORER.

Amalgamator.

No. 58,010.

Patented Sept. 11, 1866.



Witnesses:

Thos Combs
Charles Bateman



Inventor:

James D. Whelpley
Jacob D. Storer

UNITED STATES PATENT OFFICE.

JAMES D. WHELPLEY AND JACOB J. STORER, OF BOSTON, MASSACHUSETTS.

IMPROVED AMALGAMATOR.

Specification forming part of Letters Patent No. 58,010, dated September 11, 1866.

To all whom it may concern:

Be it known that we, JAMES D. WHELPLEY and JACOB J. STORER, of Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful Amalgamator and Separator; and we do hereby declare that the following full, clear, and exact description of the construction and operation of the same, reference being had to the accompanying drawing, forming a part of this specification, is sufficient to enable others skilled in the art to make and use our invention.

Figure 1 is an isometric view.

In amalgamating the precious metals, or separating them from their gangue after being pulverized for that purpose, great difficulties have been encountered, one of which has been that it required a vast extent of mercurial surface to thoroughly purge the pulp of its precious metal; another, that the resistance of the pulp to the settling of the metal into the mercury was too great to be overcome. One of these difficulties—the expense of great surface—was overcome by Jacob J. Storer, one of the present applicants, in his patent dated November 1, 1864, employing the principle of repetition or reiterated presentation of the same mercurial surface to the gold in every part of the pulp, thus securing large amalgamating-surface at moderate expense. Both difficulties we propose to overcome now.

For this purpose we employ a cylindrical amalgamator revolving at high velocity, the interior surface coated with mercury, and we thus combine the principle of repetition with that of increased weight of the metallic particles due to the generation of centrifugal force by the rapid revolution of the machine.

Our machine is constructed and operated as follows: On a revolving shaft, A, is firmly fixed by a hub, F, a disk, B, to the edge of which is fastened the cylinder C. This cylinder is partially closed at each end by the centrally-perforated disk D, whose greatest circumference is firmly fastened to the edges by cylinder C.

Disk B is pierced at its edges with holes E, or may be replaced by spokes or radial posts. The interior of the cylinder C is lined with copper or other suitable material, and when in

operation the cylinder is made to revolve at a rate at least sufficient to fully overcome the influence of terrestrial gravity on matters contained therein. The maximum velocity is to be limited only by the strength of the machine. Mercury is poured into the cylinder, and by the centrifugal force of the revolving machine is spread over the interior periphery. Pulp (water mingled with powdered ore) is admitted through pipe P and passes upon and over the mercurial surface, partially revolving with it, and spreading over the interior of the cylindrical surface. To favor its passage across the cylinder the holes E are made if we use the disk B. The revolution of the pulp imparts to each particle a centrifugal tendency proportioned exactly to its specific gravity; and as the precious metals are of superior gravity, they, of course, acquire greater centrifugal tendency and force themselves through the pulp, which is of less specific gravity, to the surface of the mercury, the resistance of the pulp being never increased, but relatively diminished by centrifugal action. The rapid revolution and the lateral traverse of the pulp across the machine cause the mercurial surface to be slowly presented many times to the pulp, thus gathering all metal present, so that in this machine we have nearly all the requisites of amalgamation—viz., increased weight to the particles to be amalgamated and repeated presentation of mercurial surface to the same particles.

By virtue of this arrangement in the case of gold and platinum mercury is made to act as a sieve. Each particle of gold or platinum upon touching the mercury will immediately pass through it by reason of its superior specific gravity, and, as no other substance except gold and platinum will do this, a complete separation is effected without the necessity of amalgamating the two metals. We conceive that by this peculiarity of our process an important advantage is attained: First, the particles of fine gold or platinum, from whatever cause, constituting, in fact, the larger part of the yield, amalgamate with less facility than larger pieces, but will pass through a body of mercury when their specific gravity has been sufficiently increased by centrifugal force with

as much facility as pieces of a larger size. Thus a complete separation will be effected by the intervention of a body of mercury, and by means of no other substance, without the immediate effect of amalgamation. The pulp, after crossing the cylinder, is received by a bell-mouthed pipe, P', of greater diameter than pipe P, its bell being presented against the direction of revolution, and the momentum acquired forces the pulp into said pipe, by which it is conveyed away as waste, or, as we prefer, returned to the tank from which it started, to again repeat the operation described.

The ordinary Fribourg barrel is run at such low velocity that the only advantage gained by it is through economical mixing. It revolves at from twenty to forty times a minute, and depends for its effect on the action of terrestrial gravity in constantly retaining the material at the lowest point of the cylinder, while our machine does not begin to act until the force of terrestrial gravity is entirely overcome by centrifugal force.

If run at sufficiently high velocity—say, at from three hundred to one thousand revolutions a minute—this machine may be used as a separator and concentrator of pulverized ores without mercury. It may be built of any suitable material. Our original experimental one was wood, bound with iron and lined with copper, as represented in the drawing; but it might be wholly of metal, if desired.

The rapid passage of the contents of the cylinder past the end of supply-pipe P, which points in the direction of revolution, will create a partial vacuum and convert said pipe P from a simple supply-pipe into an exhaust-pump, while pipe P', which presents its re-

ceiving end in the opposite direction, becomes a force-pump of great power. Pulp then will be rapidly taken from tank T, passed through the amalgamator, and as rapidly returned, while the attendant has only to move discharge-pipe P' to one and another place in the tank to secure thorough mixing of all its contents.

We disclaim in this application the principle of repetition as a simple method of economical amalgamation, but desire to assert, as the cardinal principle of separation, increase of weight of the different ingredients of the pulp in the ratios of their specific gravities by centrifugal force, and, as the combined cardinal principles of amalgamation, a similar increase of weight and the repeated presentation of mercurial surface to the particles to be amalgamated; and therefore

We claim as our invention and desire to secure by Letters Patent—

1. An amalgamator or separator consisting of a hollow revolving cylinder, C, partially closed at the ends by centrally-pierced disks B, and revolved at a rate sufficiently high to more than overcome the influence of terrestrial gravity on matters placed within it, substantially as described.

2. The arrangement of the supply-pipe P and discharge-pipe P', in connection with a revolving cylinder, C, carrying fluid, and a tank, T, to secure the supply and discharge of fluid or pulp, substantially as described, and for the purpose stated.

JAMES D. WHELPLEY.
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Witnesses:

THOS. WM. CLARKE,
CHARLES BATEMAN.