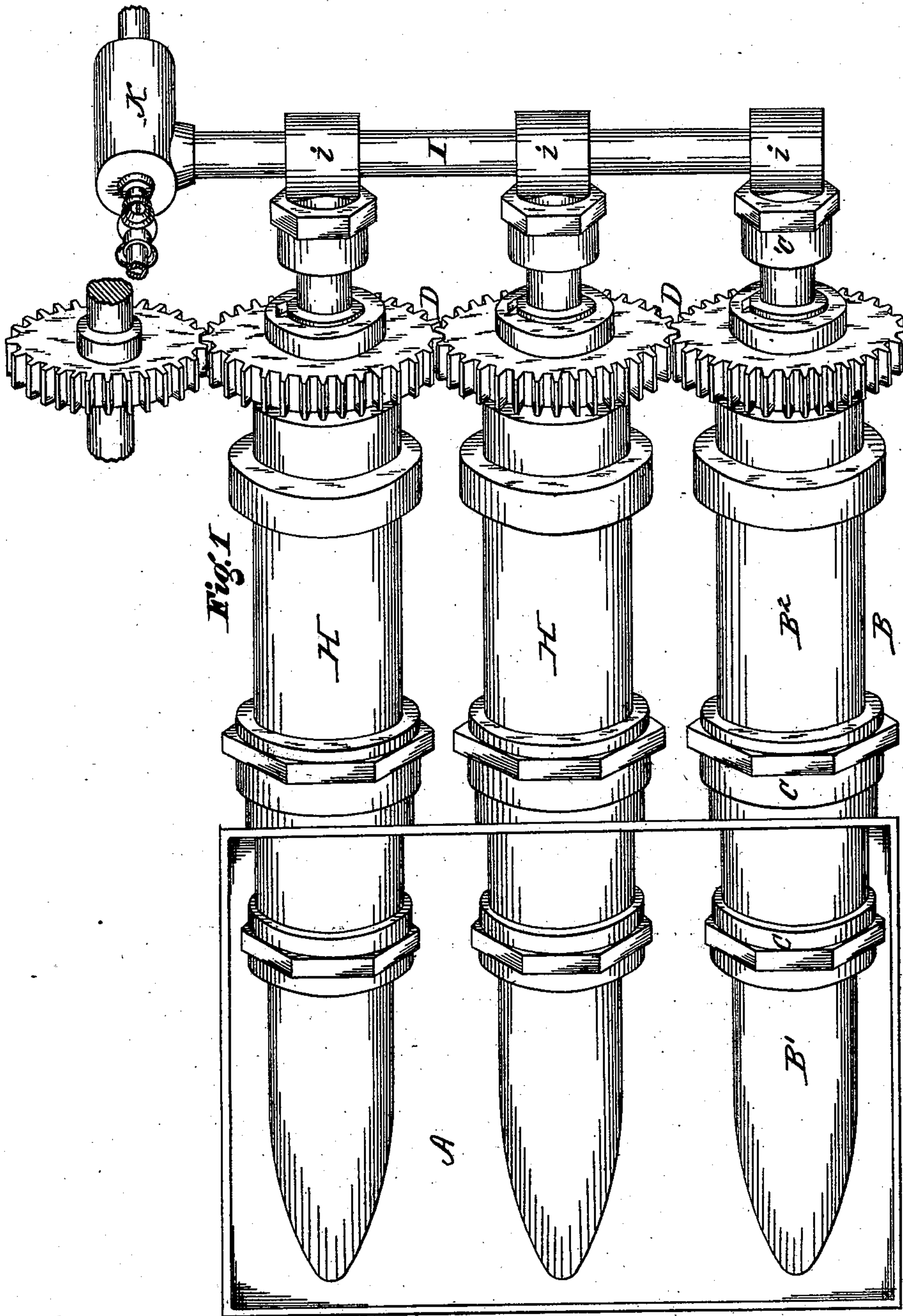


C. E. & R. E. BALL.  
Amalgamator.

No. 227,718.

Patented May 18, 1880.



WITNESSES:

*S. J. VanStavoren*  
*M. A. Connolly.*

INVENTOR

*Chas. E. Ball*  
*R. E. Ball*

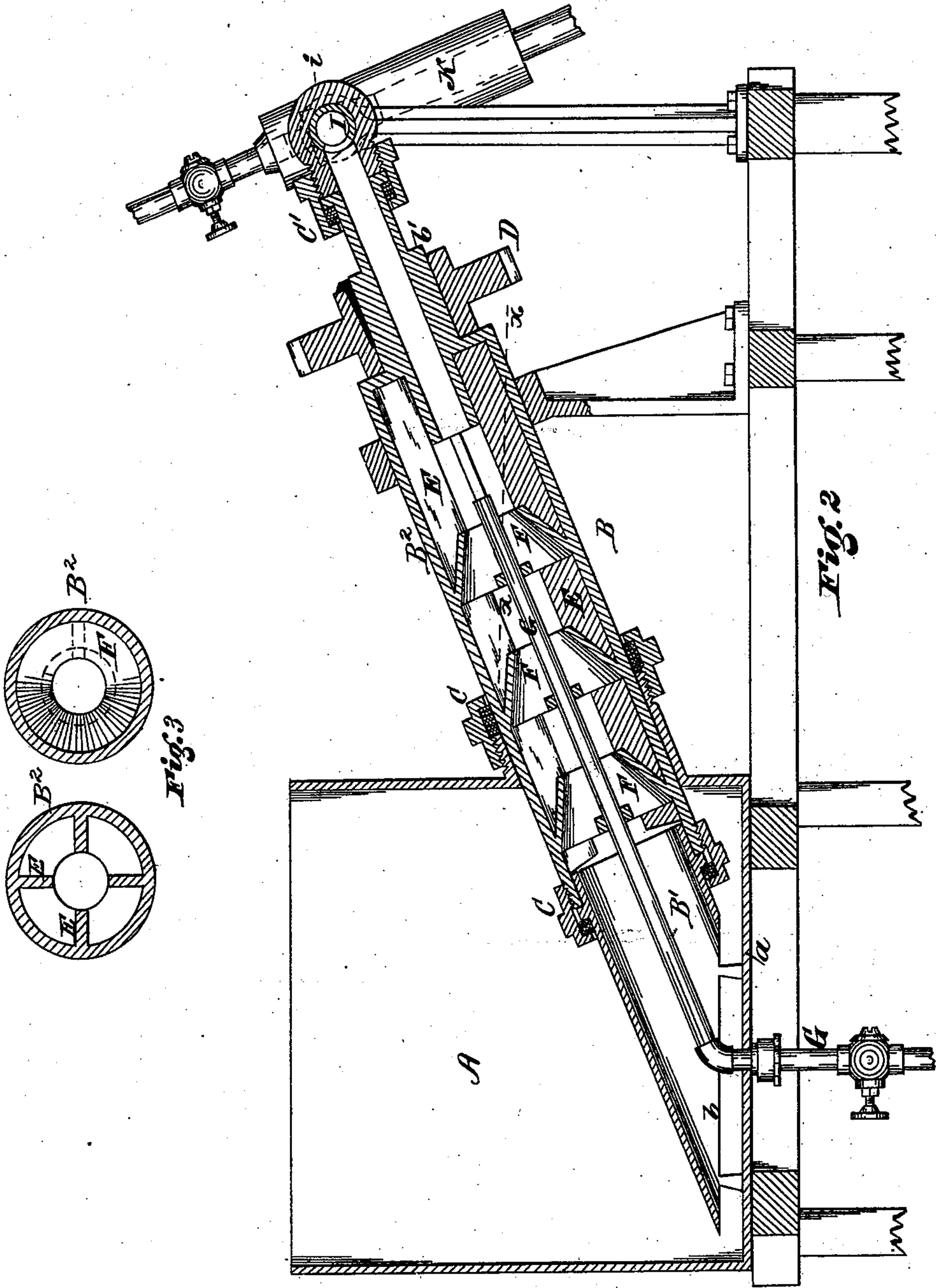
ATTORNEYS.

*by Connolly & Pore*

O. E. & R. E. BALL.  
Amalgamator.

No. 227,718.

Patented May 18, 1880.



WITNESSES:

*E. J. VanStavoren*  
*Wm. L. Connolly*

INVENTOR

*Chas. E. Ball*  
*R. E. Ball*

ATTORNEYS.



# UNITED STATES PATENT OFFICE.

CHARLES E. BALL, OF PHILADELPHIA, PENNSYLVANIA, AND R. EDWARD BALL, OF JAMAICA, NEW YORK.

## AMALGAMATOR.

SPECIFICATION forming part of Letters Patent No. 227,718, dated May 18, 1880.

Application filed February 5, 1880.

*To all whom it may concern:*

Be it known that we, CHARLES E. BALL, of the city and county of Philadelphia, State of Pennsylvania, and R. E. BALL, of Jamaica, in the county of Queens and State of New York, have invented certain new and useful Improvements in Amalgamators; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification, in which—

Figure 1 is a plan view. Fig. 2 is a vertical longitudinal section, and Fig. 3 a sectional view of cylinder.

Our invention has relation to vacuum-amalgamators, and has for its object to provide means whereby the transit of the gangue through the suspended quicksilver may be retarded, so as to increase the period of time during which amalgamation transpires.

Our improvements consist, principally, in the provision of an amalgamating-chamber composed of a tube or cylinder capable of being revolved on its longitudinal axis, and provided with deflectors or sinkers so constructed and arranged as to cause the gangue in its travel through the mercury to be frequently submerged.

Our improvements further consist in the combination, with such inclined rotary cylinder, of a feeding-tank, which receives the mercury and gangue, and an ejector or suction device for lifting the mercury out of said tank into said cylinder and causing the gangue to pass through the same.

Our invention further consists in certain details of construction and combination, hereinafter set forth, having reference, principally, to the combination, with a single feeding-tank and two or more amalgamating-chambers, of one ejector, as hereinafter specified.

Referring to the accompanying drawings, A indicates a tank or receptacle, of any convenient construction, adapted to hold mercury.

B is one of a number of inclined cylinders, whose lower end rests in said tank A slightly above its bottom, being chamfered at *b*, as shown. Said cylinder is formed in two sec-

tions, B' B<sup>2</sup>, the former being stationary and fixed to the bottom *a*, while the latter is journaled in stuffing-boxes or bearings C C', so as to be capable of rotation on its longitudinal axis.

D is a pulley on the upper diminished end or tubular journal, *b'*, of the cylinder B to receive a belt for causing the rotation of said cylinder. E E are radial blades extending lengthwise of the cylinder B, and F F are conoidal deflectors fixed at intervals in the cylinder, the blades E being cut away, as shown, for their reception.

G is a water-pipe entering through the bottom *a* of tank A, and proceeding thence upwardly through the middle of the cylinder, a space being left between its periphery and the inner edges of blades E, and said pipe terminating within said cylinder near its upper end.

H represents another cylinder like the cylinder B and its appurtenances in all respects; and there may be as many more of these cylinders and their parts as convenience of operation, economy, or necessity may require.

I is a pipe communicating, by means of T-couplings *i i*, with the tubular journals *b' b'* of the amalgamating-cylinders; and K is a steam-ejector or suction appliance for creating exhaust in said pipe and in the amalgamating-chambers.

The operation is as follows: Sufficient mercury is, in the first place, supplied to the tank A, so that when lifted by suction or exhaust it will nearly fill the cylinders, or up, or about up, to the level indicated by the line *x x*. The ejector is now started, lifting the mercury into the cylinders and holding it suspended there, a thin sheet of the metal, however, remaining spread upon the bottom of the tank. The gangue, in the form preferably of pulp or slime, is now fed to the tank A, and rises, by reason of its inferior gravity and the action of the ejector, through the mercury suspended in the amalgamating-cylinders. Were the latter stationary and unprovided with means of producing submergence, the gangue would immediately seek the surface of the mercury and float thereon in contact with the upper sides of the cylinders until it emerged there-



from. To avoid this is the object of making the cylinders rotary and providing them with the blades and deflectors already described. The rotation of the cylinders has the effect of  
 5 submerging the gangue, which is pushed down into the mercury before the blades E E, and, rising in advance of said blades, passes through the conoidal deflectors F from one compartment to another of the amalgamating-chamber until it emerges above the level of the  
 10 mercury. The gangue is thus frequently submerged in the mercury in its ascent, and is compelled to follow a tortuous track, the retardation having the effect of prolonging the  
 15 period of amalgamation, and thereby more thoroughly extracting the metals in the gangue than would be possible if the passage of the gangue were direct and unimpeded. The waste which rises above the mercury is diluted by water issuing from the pipes G, and  
 20 the liquid mass is thence drawn by the action of the ejector through the pipe I and discharged.

It is obvious that under some circumstances  
 25 the deflectors and sinkers may be dispensed with, and the tubes or cylinders allowed to remain stationary but inclined, and advantageous results be obtained. Thus mercury can be raised practically by suction, exhaust, or  
 30 vacuum but twenty-six inches in a vertical straight tube. Now, if ore pass directly up through mercury so suspended in such tube it will of course travel through but twenty-six inches of mercury, and this it will do very  
 35 quickly, allowing but short distance and time for amalgamation; but if said tube be inclined so as to give a rise of, say, but one inch to the foot, the body of mercury will be twenty-six feet long, or practically, as regards the travel  
 40 of the ore through it, that many feet in height. By means, therefore, of an inclined chamber we

increase the distance through which the ore will have to pass in mercury, prolong the period allowed for amalgamation, and hence improve results.

What we claim as our invention is—

1. In an amalgamating apparatus, an inclined rotary cylinder or tube provided with suitable blades for moving around its longitudinal axis material fed into it, whereby  
 50 gangue, in its passage through a body of mercury suspended therein, may be frequently submerged, in combination with an ejector or suction apparatus, and a reservoir from which the material is drawn, as and for the purpose  
 55 set forth.

2. The amalgamating cylinder or tube B, made in two sections, B' B<sup>2</sup>, the former being fixed and the latter capable of rotation, and provided with radial blades E and conoidal  
 60 deflectors F F, substantially as shown and described.

3. In combination with a single tank, A, two or more amalgamating-chambers communicating separately therewith, a pipe, I, common to both or all of said chambers, and one  
 65 ejector for producing exhaust in said chambers, substantially as shown and described.

4. An amalgamating-chamber consisting of an inclined tube, cylinder, or like vessel, in  
 70 combination with a suction or exhaust device for holding mercury in suspension in said vessel, substantially as specified.

In testimony that we claim the foregoing we have hereunto set our hands this 28th day  
 75 of January, 1880.

CHAS. E. BALL.  
 R. EDWARD BALL.

Witnesses:

SAMUEL KILPATRICK,  
 J. PERCIVAL MICHELACHE.