(No Model.)

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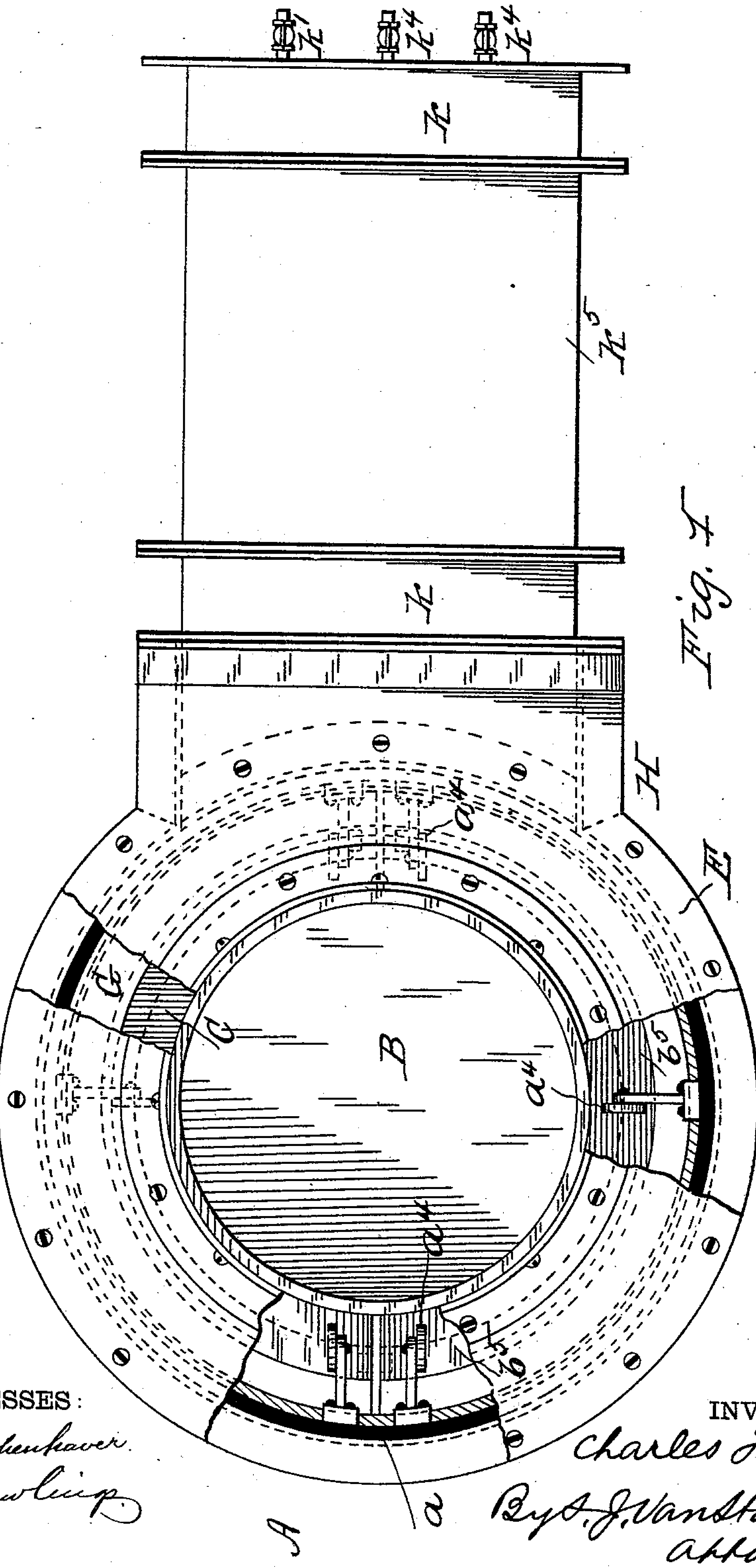
C. F. PIKE.

ORE WASHER OR CONCENTRATOR.

No. 529,187. Patented Nov. 13, 1894.



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(No Model.) 4 Sheets—Sheet 2.

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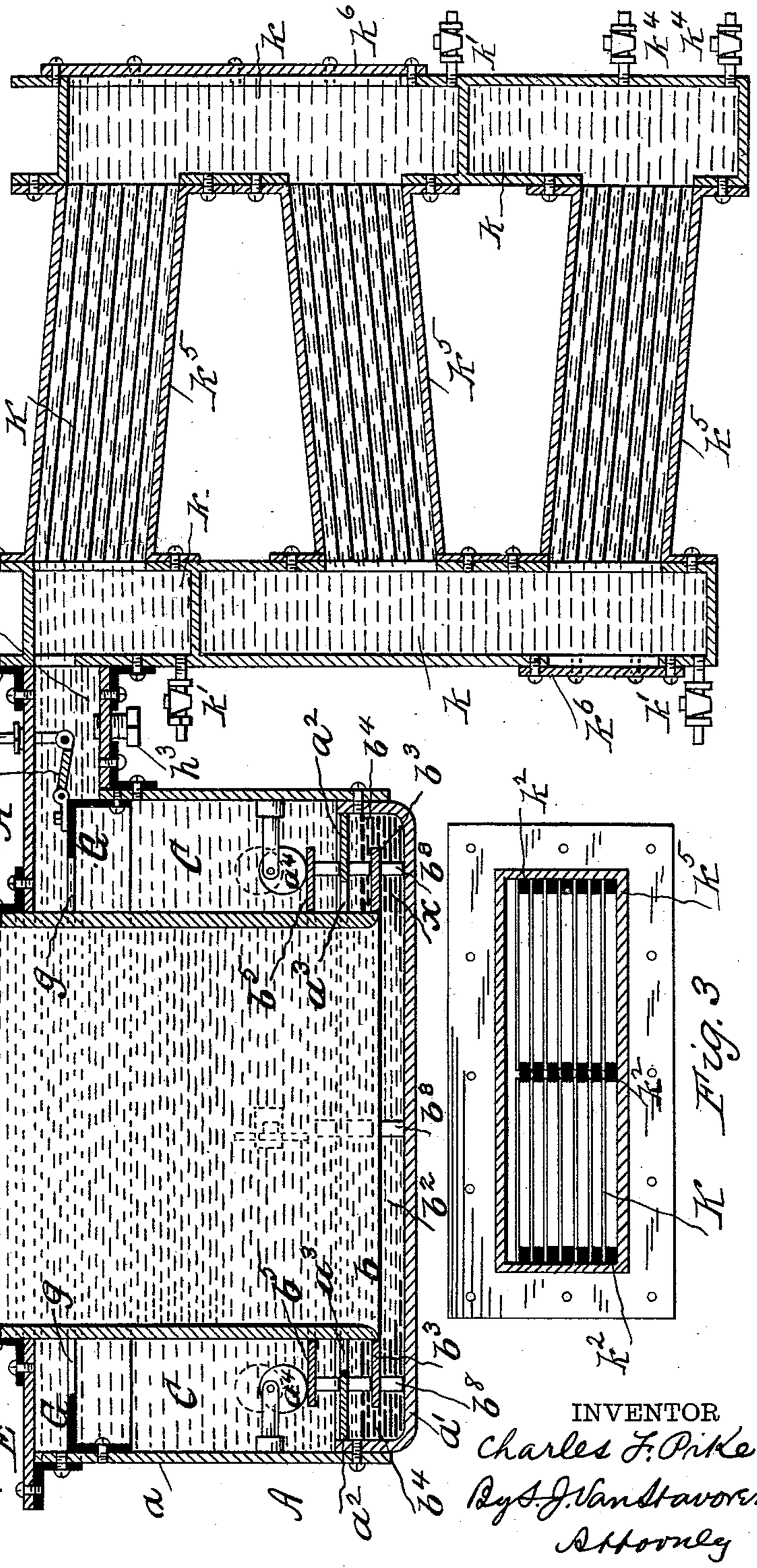

Fig. 2

Fig. 3

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Fig. 5

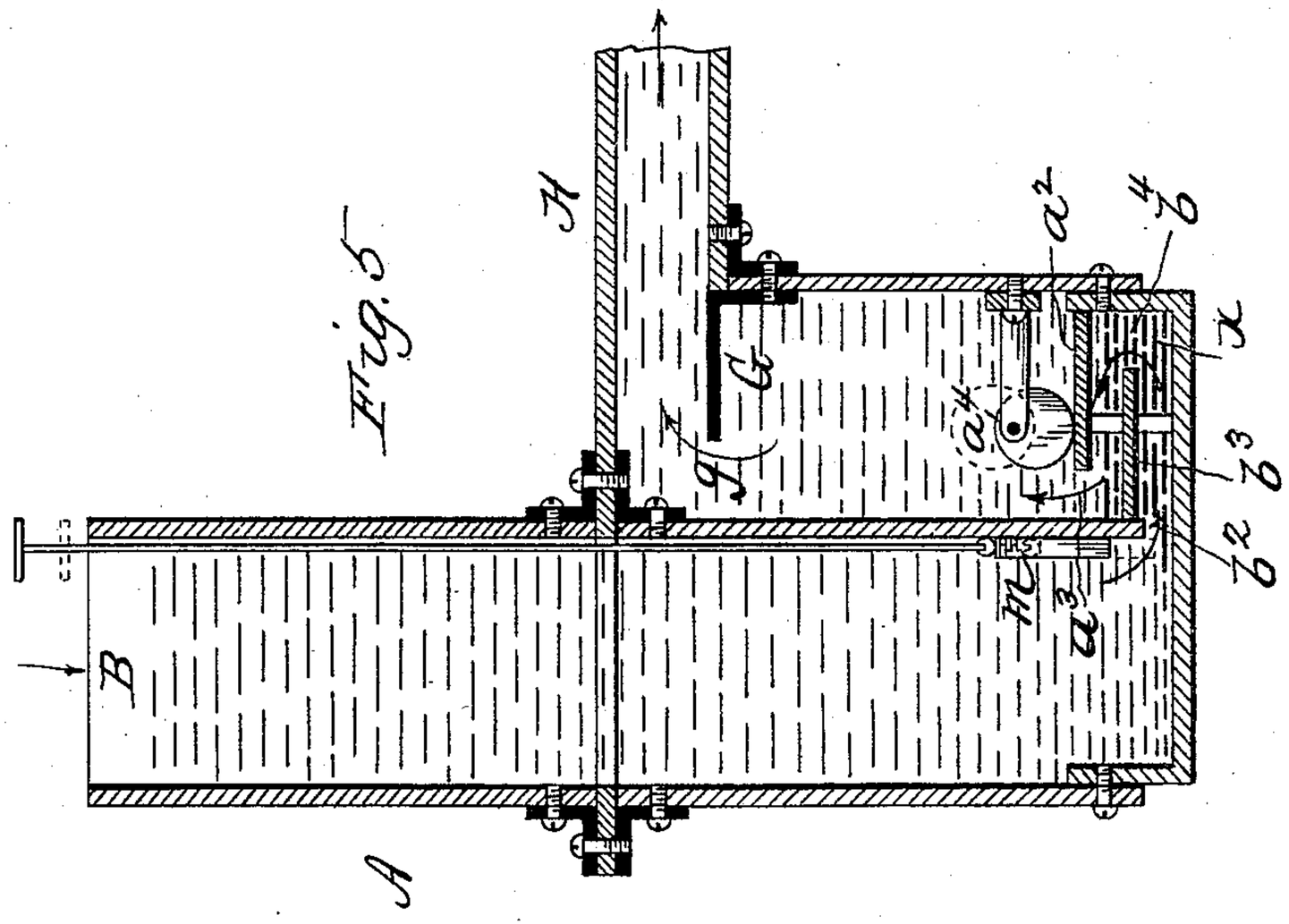
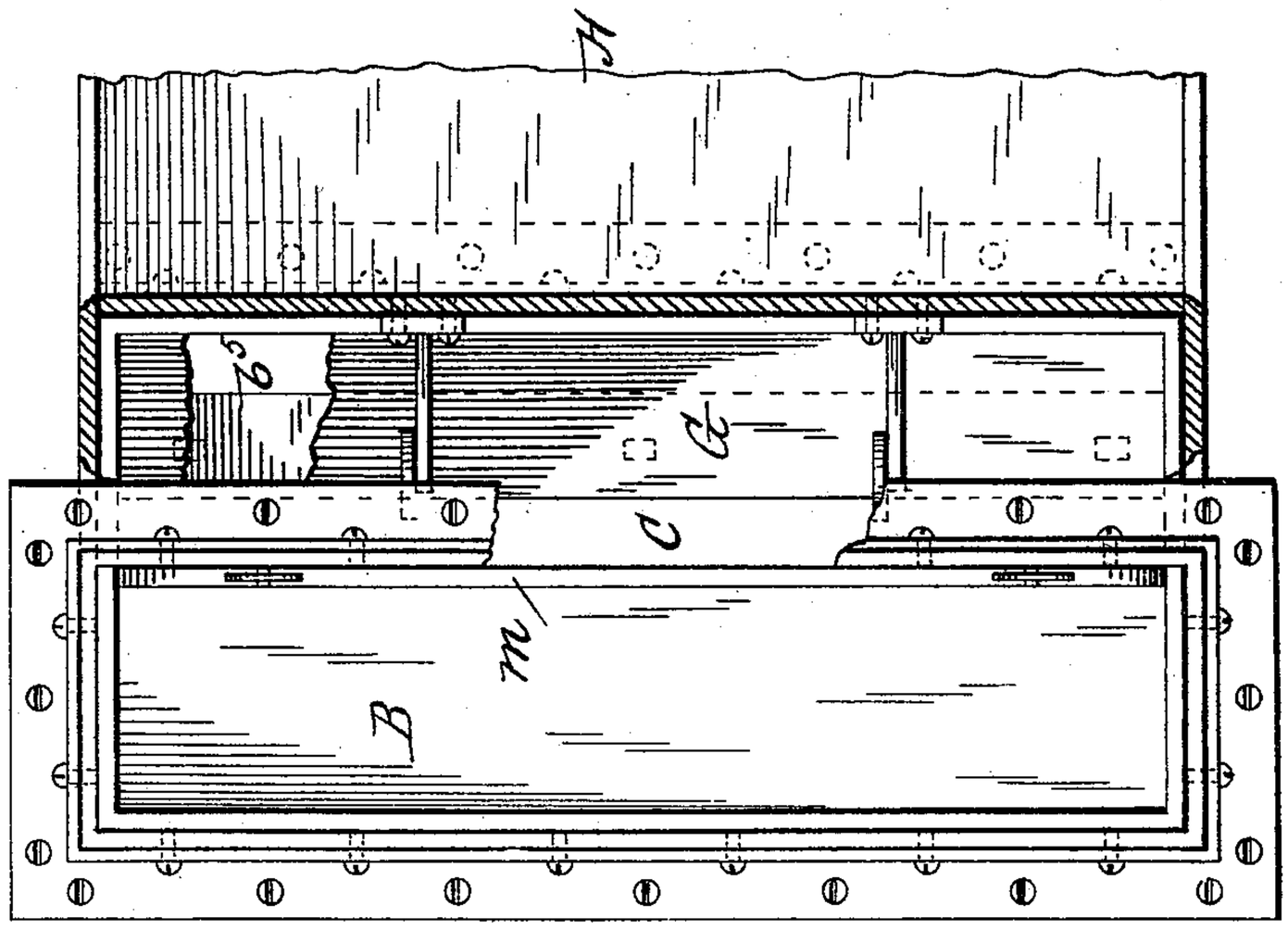


Fig. 4



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(No Model.) 4 Sheets—Sheet 4.

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ORE WASHER OR CONCENTRATOR.

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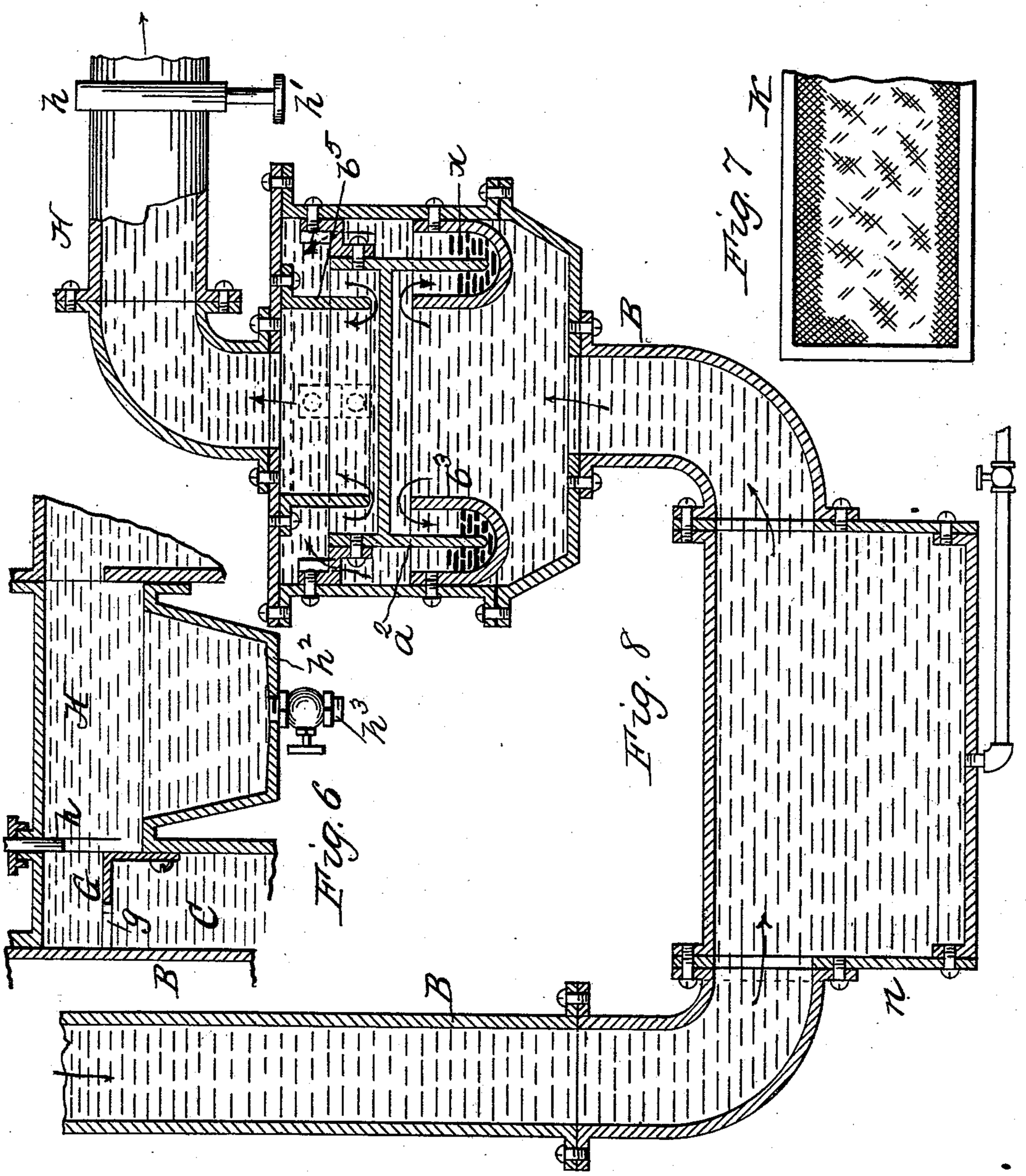

Fig. 7

Fig. 8

Fig. 9

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UNITED STATES PATENT OFFICE.

CHARLES F. PIKE, OF PHILADELPHIA, PENNSYLVANIA.

ORE WASHER OR CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 529,187, dated November 13, 1894.

Application filed September 23, 1893. Serial No. 486,325. (No model.)

To all whom it may concern:

Be it known that I, CHARLES F. PIKE, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Ore Washers or Concentrators; and I 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 appertains to make and use the same.

My invention has relation generally to ore washers and amalgamators of the type wherein the ore or gangue is fed into a vessel and brought into contact with a column of mercury under suction or vacuum, and particularly to that form of the same shown, described and claimed in another pending application filed by me June 10, 1893, Serial No. 477,165. In these forms of amalgamators as heretofore constructed, the contact of the ore with mercury has been effected by forcing the former through a high column of the latter. It is well known that the higher the column of mercury the more perfect the vacuum and consequently the greater the velocity of the flow of ore through the column. This high velocity of flow through the column, flours the mercury and produces a waste of the same.

My invention has for its object to avoid such disadvantage, or in other words to prevent flouring of the mercury or reduce it to a minimum. To this end I employ a low column or a layer of mercury and feed to and through it a maximum volume of ore or gangue with a minimum velocity of flow. To the accomplishment of this result I provide a large feed supply pipe or chute for the washer and amalgamator and a small height or column of mercury. This affords a large supply or feed at a low velocity of travel which affords ample time for all the metal in the ore to separate from the waste products and contact with the mercury for concentration purposes, prevents flouring of the mercury or the same is reduced to a minimum as is also the consumption of power required for operating the apparatus.

My invention accordingly consists in the combinations, constructions and arrangements of parts as hereinafter more particularly described in the specification and pointed out in the claims.

Reference is had to the accompanying drawings, wherein—

Figure 1 is a plan, partly sectional, of a form of washer and amalgamator embodying my improvements. Fig. 2, is a vertical longitudinal section of the same. Fig. 3, is a cross-sectional view of a gang of amalgamating plates with separating strips. Fig. 4, is a plan partly broken away, of an oblong form of washer instead of the circular form as shown in Figs. 1 and 2. Fig. 5, is a vertical section of part of the same. Fig. 6, is a sectional view partly broken away, showing a settler-box in the line of the pipe or conduit between the mercury column amalgamator and the amalgamating plate part of the same. Fig. 7, is a plan partly broken away, showing a form of blanket or textile-plate for substitution for the amalgamating plates, and Fig. 8, is a sectional elevation showing a modification of my improvement.

"A" represents the washer and amalgamator comprising an initial chamber, which may be of any suitable configuration and construction. In Figs. 1 and 2, it is indicated as being of a cylindrical form composed of sheet metal but any other suitable material may be substituted. It consists of an outer casing a having within a centrally located feed tube B of a large area in cross section, the lower edge b of which extends nearly to the bottom a' of casing a and is suitably secured in position as hereinafter described so as to leave an annular passage b^2 between said edge b and the casing bottom a'. The exterior periphery of the edge b terminates or is provided with a laterally outwardly projecting flange b^3 which approaches but does not extend to the wall of casing a, leaving a passageway or channel b^4 between the edge of said flange and casing wall. Above flange b^3 and secured to said casing wall is another like flange a^2 which approaches but does not extend to the wall of the feed tube B, so as to provide an annular channel or passage way a^3 between tube B and the inner edge of flange a^2. Above the latter is another flange b^5 secured to tube B and corresponding to flange b^3. These flanges b^3, a^2 and b^5 overlap each other so as to form tortuous or cir-

cuitous passage b^4, a^3 from a tube B to the chamber C between said tube and casing a. If desired, the flanges b^3, a^2 and b^5, may be loosely inserted in their positions and rest upon feet b^8 and are held down by any suitable construction of fastening devices a form of which is indicated at a^4, Figs. 1, 2, 4 and 5. The top of casing a is closed by a lid or cover E to which is secured the tube B, so that both may be readily removed for access to chamber C, or for repairs or other purposes.

Below the top or lid E, is located in chamber C, an inwardly projecting flange G between the inner edge of which and the tube B, is an annular channel or passage way g. This flange G contracts the exit or top of chamber C and tends to form an arresting plate for checking the upward flow from said plate to permit the settling of any mercury or metal mechanically carried along with the waste matters passing up through chamber C. The latter is provided with a large elongated exit H at one side which has an area in cross section approximating to that of the feed pipe B. If desired such exit may be provided with a cut off plate or valve suitably formed and supported as indicated at h provided with suitable adjusting mechanism h' for varying the volume of outflow and the velocity of the same from exit H. The latter leads to a second amalgamator which is composed of a series of gangs of amalgamating plates, K, for separating the flow of the gangue into several or a number of thin streams so as to bring each particle of light metal into contact with said plates for amalgamating purposes. As shown, the gangs K are arranged successively to incline in opposite directions.

At the initial end of the gangs as well as at their exit ends, is a pocket or chamber k common to all the plates of a gang, the chamber at the exit end of a gang and the inlet end of a succeeding gang being a common chamber for both. These pockets K may be of any suitable form or construction, and are provided with draw off cocks k'. The pockets are provided for producing repeated commingling of the divided streams or flow of gangue as they escape from a gang of plates and for redividing the common flow repeatedly into streams as they enter the successive gangs to more thoroughly agitate, divide and separate the metal from the waste matters and bring it in contact with the plates K. The latter are separated by division strips k^2, k^2, of wood or other suitable material located at their side extremities. The middle strips k^2, also form parting strips between two sections of a plate K when a plate is composed of sections. See more plainly Fig. 3. In the last pocket k are flow-escape cocks k^4 at different levels for regulating the degree of suction or flow through the apparatus in a manner as described in said above named pending application.

A comparatively thin stratum or shallow column of mercury x is placed in the bottom of chamber C which extends under suction just above the first flange b^3 more or less as the demands of service require, thereby providing a low column of mercury. As the area of feed is large and the column of mercury low, the velocity of the flow through the mercury is also low, and the metal in the ore has ample time to separate from it and contact with the mercury during its passage through the same. Should any of such metal escape or particles of the same and mercury be carried along with the flow, their travel will be checked by the flange G, and they will tend to descend into the mercury. Should any light particles of mercury pass out of exit H, they will be caught in the pockets k. The same results are effected with the oblong form of vessel A, as shown in Figs. 4 and 5. In this form the flanges b^3, a^2 are straight oblong plates instead of an annular form as in Figs. 1 and 2. With this form a gate or cut off m is provided in tube B, for varying the volume of flow to chamber C. The same cut off but in an annular form may be applied to the feed tube shown in Figs. 1 and 2.

The chamber C or casing a will have in practice any suitable form of draw off cock or gate.

Instead of having the feed-tube B with a downward flow as in Fig. 2, it may enter the casing a from below, to have an upward feed as shown in Fig. 8, and the flanges b^3, a^2 and a^4 are correspondingly altered in form and arranged to suit said upward flow to provide a feed of large sectional area with low velocity and a low column of mercury.

If desired, a suitably located settling chamber may be interposed in the line of the feed tube B, as indicated at n, Fig. 8, to admit of any heavy particles of metal separating from the ore or gangue before entering the chamber C. So too, a pocket or settling chamber may be located in the line of exit H, as indicated at h^2, Fig. 6, to permit any sand or analogous material to settle there and thereby be prevented from entering into gangs of amalgamating plates K to scratch and rub the same. Said chamber has a draw-off plug or cock h^3.

In cases where the ore or gangue is flowed through repeated washers, the intermediate feed pipe B will come thereinto virtually deprived of all waste matter except water, or in other words, such feed will practically be water and powdered metal. When this is so, suitably formed gangs of blankets or other textile material may be substituted for either all, or part of the amalgamating plates K. A form of the same is shown in Fig. 7.

It will be noted that the pockets k form sectional tubular columns or ends joining the casings k^5, inclosing the plates K, and these sections are provided with suitable removable caps or covers k^6 through which the plates are inserted into position and withdrawn therefrom.

I do not herein desire to claim broadly amal-

gamating plates arranged in gangs, and having a pocket at either end, as this forms the subject-matter of another application, original Serial No. 477,165, filed June 10, 1893, renewed April 17, 1894, Serial No. 507,941.

What I claim is—

1. The combination of tubular casings having edge flanges, and a catch pocket, bolted to said flanges, and common to a series of plates in said casings, substantially as set forth.

2. The combination of the sectional tubular uprights, *k*, *k*, having inlet and outlet ports, and the tubular casings, k^5, k^5, having their opposite ends respectively connected with the inlet and outlet ports of said uprights, and a cross partition below one of the inlet ports of each upright, substantially as set forth.

3. In an ore washer and amalgamator, the combination of sectional tubular ends *k*, *k*, having draw-off cocks, removable caps or covers, and inlet and outlet ports, tubular casings k^5 joining said ends, and gangs of catch-plates K in casings k^5 substantially as set forth.

4. In an ore washer and amalgamator, the combination of sectional tubular ends *k*, *k*, having draw-off cocks, removable caps or covers, and inlet and outlet ports, tubular casings k^5, joining said ends, and gangs of textile catch-plates K in casings k^5 substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES F. PIKE.

Witnesses:
JOHN RODGERS,
LOUIS E. PIKE.