

No. 780,109.

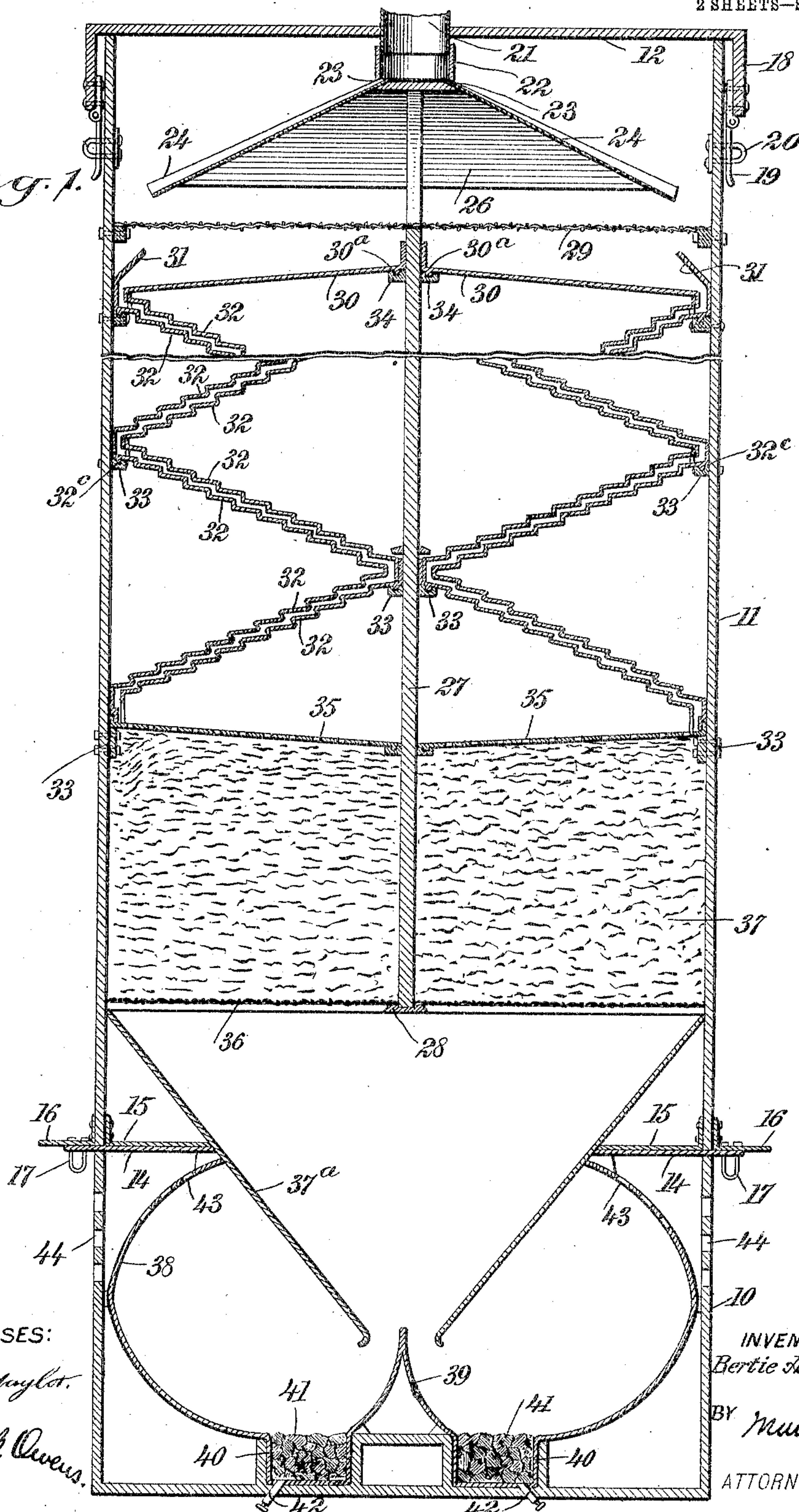
PATENTED JAN. 17, 1905.

B. A. LANGRIDGE.
AMALGAMATOR.

APPLICATION FILED DEC. 4, 1902.

2 SHEETS—SHEET 1.

Fig. 1.



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2 SHEETS—SHEET 2.

Fig. 2.

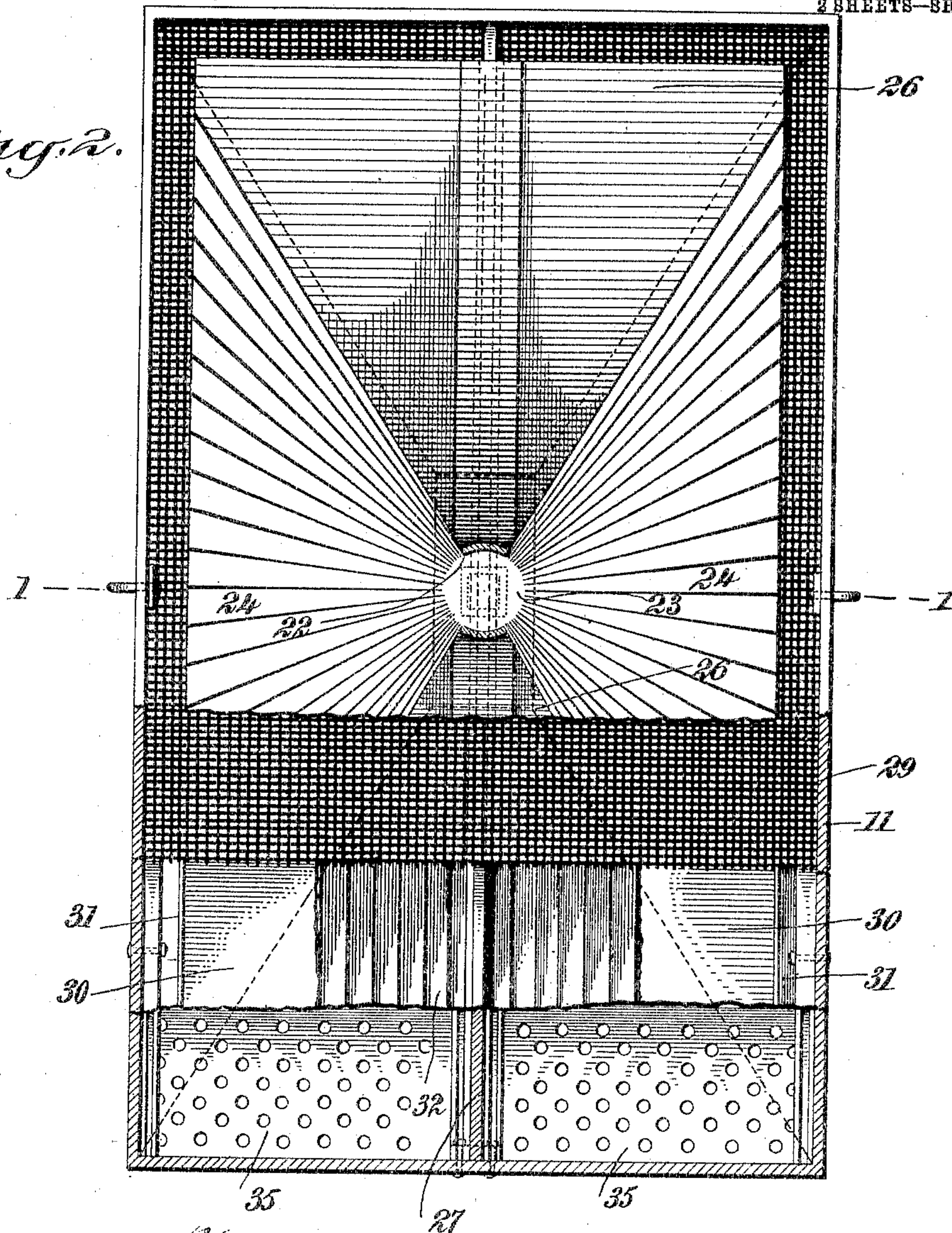


Fig. 3.

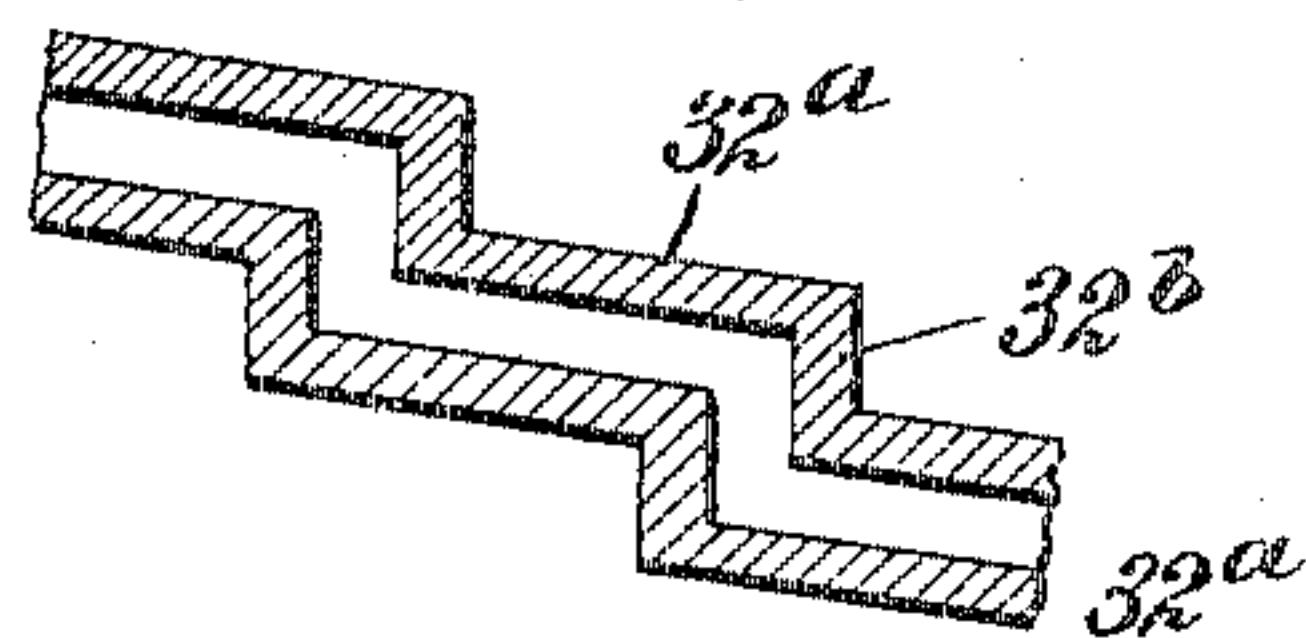
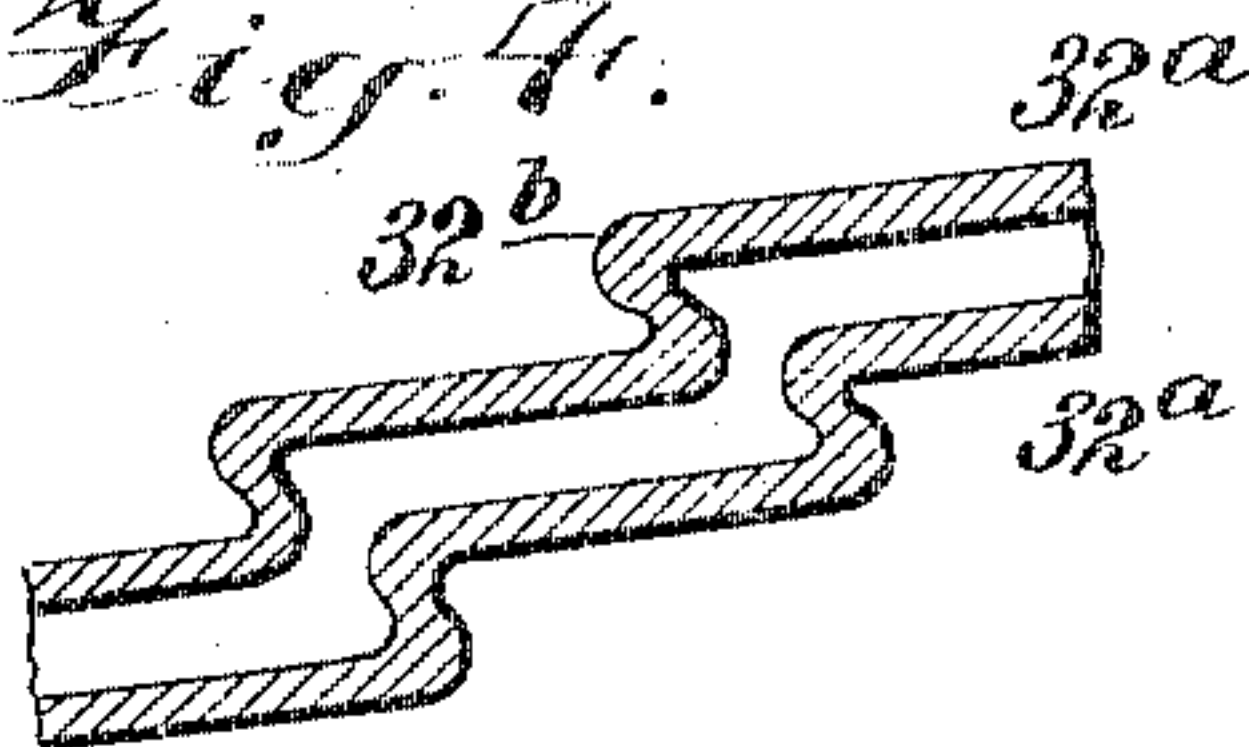


Fig. 4.



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UNITED STATES PATENT OFFICE.

BERTIE A. LANGRIDGE, OF BOULDER, COLORADO.

AMALGAMATOR.

SPECIFICATION forming part of Letters Patent No. 780,109, dated January 17, 1905.

Application filed December 4, 1902. Serial No. 133,869.

To all whom it may concern.

Be it known that I, BERTIE A. LANGRIDGE, a citizen of the United States, and a resident of Boulder, in the county of Boulder and State of Colorado, have invented a new and Improved Amalgamator, of which the following is a full, clear, and exact description.

This invention relates to an apparatus for recovering gold and silver from crushed ores by amalgamating such metals with quicksilver.

In carrying out my invention I provide a casing the closures of which are arranged to be held by lock and key, so that the valuable contents of the amalgamator cannot be taken by unauthorized persons. The top part of the casing is provided with a spreader which distributes the pulp over a sieve or strainer, and from this the pulp falls upon an amalgamated-copper plate. Below this plate are arranged amalgamated-copper riffles of a special construction, to be hereinafter described. In order to insure collecting such particles of the precious metals as may for any reason pass the riffles, I provide a chamber below the riffles, which chamber is filled with soft annealed copper subjected to a quicksilver bath. This provides a large surface over which the gold and silver must pass, and its collection is thus assured. From this chamber the pulp passes through a specially-constructed trap for collecting such quicksilver and amalgam as may become detached in the upper part of the apparatus and thence to the overflow.

This specification is an exact description of one example of my invention, while the claims define the actual scope thereof.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a vertical section of the invention on the line 1 1 of Fig. 2. Fig. 2 is a plan view showing various parts broken away, and Figs. 3 and 4 are detail sections of the riffles.

The casing or exterior walls of the apparatus comprise a base-section 10, a body-section 11, and a cover 12. The casing is preferably of rectangular form, as indicated in Fig. 2, and the base 10 has a top wall 14, on

which bears the bottom wall 15 of the body-section 11. A flange 16 projects outward from the lower edge of the body-section and carries staples 17, which extend through the outer portions of the wall 14 and are adapted to receive locks or other means for fastening the parts 10 and 11 together. The cover 12 has downwardly-extending flanges 18, and these flanges carry hasps 19, coacting with staples 20, by means of which locks may be applied to hold the cover in place. By this means the parts of the exterior casing may be locked securely together so that the amalgamate cannot be taken by unauthorized persons; but when the locks are released the top may be removed and the body-section may be lifted off of the base.

21 indicates a pulp-feed pipe which passes centrally into the top of the casing and has at its discharge end a collar 22, said collar having at opposite sides slits 23, which serve to discharge the pulp upon the spreader-plates 24. These plates are fan-shaped, as best shown in Fig. 2, being fluted or bent, and the bends gradually increasing in depth and width toward the discharge edges of the spreader-plates, so that the pulp which is discharged through the openings 23 is spread out for the entire horizontal length of the casing at each side thereof.

26 indicates two triangular plates which are placed, respectively, between the spreader-plates 24, these parts 24 and 26 forming, essentially, a low pyramid.

27 indicates a partition which extends vertically through the casing, this partition running from a support 28 upward to the plates 26 and serving to sustain said plates and the spreader-plates 24.

Below the spreader-plates 24 is arranged a screen 29, which extends horizontally throughout the entire area of the casing and serves to collect pieces of wood and other debris which may be passed with the pulp into the amalgamator. Below the screen 29 at each side of the partition 27 is an amalgamated-copper plate 30, these plates sloping downward from each side of the partition 27 and discharging at their side edges under shelves 31, respectively, at the sides of the casing and forming

extensions of the riffles. The riffles are arranged at each side of the partition 27 and consist in pairs of plates or riffle members 32, said pairs of plates being arranged in zigzag relation at each side of the partition. These plates are constructed of copper and are covered with quicksilver after the usual practice. The plates 32, forming the riffles, as best shown in Figs. 3 and 4, comprise, essentially, plain portions 32^a, lying at different elevations and forming runs, these runs being separated by shoulders 32^b. The shoulders of the upper plate are set slightly in advance of the corresponding shoulders of the bottom plate, and the members of each pair of shoulders run in essential parallelism. It will be seen that by this construction the pulp and water in rushing over the plain portions 32^a will strike against the upper shoulders 32^b and be thereupon thrown back against the corresponding lower shoulders. This movement of the pulp and water under the force of gravitation causes a most intimate contact between the pulp and the amalgamated-copper plate to insure gathering of all the valuable contents of the pulp. Said intimate contact is due principally to two conditions—to wit, the impact of the rushing water and pulp against the numerous shoulders and the rolling or turning action imparted to the water and pulp as it strikes against the first or upper shoulder and is thrown down and back against the coacting lower shoulder. The shoulders 32^b may be either straight, as indicated in Fig. 3, or they may be in the form of double, compound, or other curves, as indicated in Fig. 4. The curved form I believe to be preferable, since its curves involve to a greater degree the above-referred-to rolling motion of the water and pulp, which action is of much importance to the efficiency of the apparatus. In Fig. 1 both forms are illustrated, and, if desired, in the complete apparatus the riffles may be arranged alternately, one pair having square shoulders and the other pair having curved shoulders. The riffle-plates 32, as shown in Fig. 1, are removably placed in position by means of ledges or shelves 33, fastened to the partition 27 and to the side walls of the body of the casing. The amalgamated plates 30 are also held in position by means of ledges 34, carried on the partition and having grooves which receive tongues 30^a on the amalgamated plates. The cleats or ledges 33 also have grooves which receive tongues 32^c on the bottom riffle-plates 32.

The bottom riffles discharge the pulp upon perforated copper plates 35, arranged one at each side of the partition 27, and below these plates, at the lower edge of the partition, are screens 36, of coarse copper wire or the like. These parts 35 and 36 form chambers, one at each side of the partition 27, and said chambers are adapted to be filled with soft annealed-copper shavings 37. These shavings I first

subject to a quicksilver bath, so that any of the precious metal which might possibly pass the riffles will in moving through the complicated interstices of the shavings be caught therein.

Fastened to the lower portion of the body 11 of the casing is a funnel or spout 37^a, which projects downward through the walls 14 and 15 into the base 10 and has a centrally-located discharge-opening, as shown. In the base 10 is a circular bowl or trap 38, in the center of which is an upwardly-extending conical projection 39, which passes into the discharge-orifice of the funnel 37^a. Therefore the pulp which falls from the screens 36 will in passing through the funnel 37^a strike the projection 39 and be given a curved or swirling movement around the walls of the bowl 38. This swirling or gyratory movement will cause any particles of amalgam which might have become detached from the riffles and shavings and also such particles of quicksilver as may pass from the upper part of the apparatus to settle into boxes 40, which are formed in the bottom of the bowl 38 and are preferably two in number, one at each side of the projection 39. The parts 38, 39, and 40 are constructed of copper, and the boxes 40 are adapted to be filled with small rocks or other refractory material, (indicated at 41.) 42 indicates pipes or other means for taking off such quicksilver and amalgam as may find its way into the boxes 40. In the upper parts of the bowl 38 outlet-orifices 43 are formed. These orifices are adjacent to orifices 44, formed in the base-section 10 of the casing, so that the mud and waste liquid forming the tailings of the operation in the amalgamator may be passed off from the bowl 38. This material being lighter than the amalgam or quicksilver will readily separate therefrom, the amalgam or quicksilver falling into the boxes 40 and being retained by the rocks therein.

The operation of the apparatus will be fully understood by persons skilled in the art and will not require any special description. The various parts 30, 32, and 37^a are suitably amalgamated, so that the gold and silver in passing through the apparatus will adhere to the parts named. These are subsequently removed from the apparatus and subjected to the usual processes, by which the gold and silver are extracted from the amalgam. The copper shavings hereinbefore referred to are turned or cut from soft annealed copper, clean and bright, and before being placed in position in the amalgamator are thoroughly coated with quicksilver. When so coated, they are placed loosely in position so that the pulp after passing the amalgamated plates of the apparatus will fall through the entire mass of shavings, thus bringing the flour-gold into the most intimate association with the amalgamated copper and saving that which otherwise would be lost. It is well known that miners experience great

loss in flour-gold, which ordinarily floats in the pulp, lacking sufficient specific gravity to fall to the bottom; but by means of the amalgamated-copper plates as provided by me this flour-gold may be saved.

Various changes in the form, proportions, and minor details of my invention may be resorted to at will without departing from the spirit and scope thereof. Hence I consider myself entitled to all such variations as may lie within the scope of my claims.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. An amalgamator, comprising an exterior casing having a feed-pipe entering its upper portion, fan-shaped spreader-plates located in the upper portion of the casing and each being fluted or bent from its inner corners outward to its outer edges, said inner corners lying directly adjacent to the inlet-pipe and the flutes or bends gradually increasing in width and depth toward the discharge edges of the spreader-plates, two additional triangular plates located between the spreader-plates at each side of the inlet-pipe, all of said plates forming essentially a low pyramid, and amalgamating devices below the same.

2. An amalgamator, comprising an exterior casing having a feed-orifice in its upper end, means for spreading the pulp, said means comprising two fluted fan-shaped plates having their inner corners adjacent to each other and to the pulp-feed orifices, and two additional plates placed between the first-named plates respectively at the side of the pulp-feed orifices, the whole forming essentially a low pyramid, and amalgamating devices below the pulp-spreading means.

3. An amalgamator, comprising an exterior casing having a feed device in its upper end, means for spreading the pulp, said means comprising two fluted fan-shaped plates having their inner corners adjacent to each other and to the pulp-feed orifice, and two additional plates placed between the first-named plates respectively at the sides of the pulp-feed orifices, the whole forming essentially a low pyramid, and the said fluted fan-shaped plates being bent from their inner corners to their outer or discharge edges, the bends or corrugations gradually increasing in depth and width toward the discharge edges, and amalgamating devices below the pulp-spreading means.

4. An amalgamator, comprising an exterior casing having a feed-pipe entering its upper portion, fan-shaped spreader-plates located in the upper portion of the casing and each being fluted or bent from its inner corners outward to its outer edges, said inner corners lying directly adjacent to the inlet-pipe and the flutes or bends gradually increasing in width and depth toward the discharge edges of the spreader-plates, two additional triangular plates located between the spreader-plates at

each side of the inlet-pipe, all of said plates forming essentially a low pyramid, and amalgamating devices below the same, said amalgamating devices comprising riffles receiving the pulp from the spreader-plates, a mass of finely-divided amalgamated metal placed below the spreader-plates through which metal the pulp is passed, and a trap below said amalgamated metal.

5. An amalgamator, comprising a body or casing having a pulp-inlet at the upper portion, a spreader located below the same, a series of riffles receiving the pulp from the spreader and located below the spreader, a mass of finely-divided amalgamated metal placed below the riffles, and a trap for the amalgam below said amalgamated metal.

6. An amalgamator, comprising an exterior casing or body having an inlet at its upper portion, a spreader located below the inlet, a series of riffles receiving the pulp from the spreader and comprising essentially parallel plates inclined downward from their receiving edges, and said plates having horizontal corrugations therein, a mass of finely-divided amalgamated metal below the riffle-plates, and a trap for the amalgam below said amalgamated metal.

7. An amalgamator, comprising a casing, amalgamating devices in the upper portion thereof, a spout extending downward from the amalgamating devices, a bowl or trap in the lower portion of the casing into which trap the spout projects, said bowl or trap having a tapered projection extending upward toward the mouth of the spout, and a box formed in the bottom of the bowl or trap to receive the amalgam, said bowl or trap being perforated at its upper portion above the mouth of the spout, and the casing being perforated adjacent to the first-named perforations, for the purposes specified.

8. An amalgamator, comprising a casing, amalgamating devices in the upper portion thereof, a spout extending downward from the amalgamating devices, a bowl or trap into which the spout projects, said bowl or trap having a tapering projection extending upward into the mouth of the spout, a box formed in the bottom of the bowl to receive the amalgam, and particles of refractory material placed in said box.

9. An amalgamator, comprising a casing, amalgamating devices in the upper portion thereof, a spout extending downward from the amalgamating devices, a bowl or trap into which the spout projects, said bowl or trap having a tapering projection extending upward into the mouth of the spout, two boxes formed in the bottom of the bowl respectively at the sides of said projection to receive the amalgam and particles of refractory material placed in said boxes.

10. An amalgamator, comprising a casing or body having a central partition extending

vertically therein and a pulp-inlet at its upper portion, spreader-plates below the inlet and extending respectively at the sides of the partition, riffles at each side of the partition
 5 below the spreader, masses of finely-divided amalgamated metal below the riffles and respectively at the sides of the partition, a spout located below the partition and receiving the material from said amalgamated metal, and a
 10 trap into which the spout projects.

11. An amalgamator, having a casing comprising a base-section, a trap therein for the amalgamator, a body-section, means for removably fastening the base and body sections
 15 together, a pulp distributing or spreading means in the upper portion of the body, riffles below said distributing means, a mass of amalgamated-metal particles arranged below the riffles, said riffles and metal particles being
 20 also in the body of the casing, a cover for the body-section, and means for removably fastening the cover in place.

12. A riffle for amalgamators, comprising two riffle members inclining downward from
 25 their receiving ends and arranged one above the other, the lower member having a series of essentially plane portions lying at different elevations and forming runs separated by shoulders, and the upper riffle member hav-
 30 ing shoulders respectively in advance of the shoulders of the lower member, thereby forming pairs of shoulders, and said pairs of shoulders running across the line of movement of the pulp and the members of each
 35 pair of shoulders running in essential parallelism, whereby as the pulp passes down the said plane portions of the lower riffle member it strikes the shoulders of the upper member and is thereby thrown back against the cor-
 40 responding lower shoulders.

13. A riffle for amalgamators, comprising two riffle members inclining downward from their receiving ends and arranged one above the other, the lower member having a series
 45 of essentially plane portions lying at different elevations and forming runs separated by shoulders, and the upper riffle member having shoulders respectively in advance of the shoulders of the lower member, thereby form-

ing pairs of shoulders, and said pairs of
 50 shoulders running across the line of movement of the pulp and the members of each pair of shoulders running in essential parallelism, whereby as the pulp passes down the said
 55 plane portions of the lower riffle member it strikes the shoulders of the upper member and is thereby thrown back against the corresponding lower shoulders, the said shoulders having curved cross-sectional form, for the purpose specified. 60

14. A riffle for amalgamators, comprising two riffle members inclining downward from their receiving ends and arranged one above the other, said members each having essen-
 65 tially plane portions lying at different elevations and separated by shoulders, the shoulders of the upper member lying respectively in advance of the shoulders of the lower member, whereby as the pulp passes down the
 70 plane portions of the lower member it strikes the shoulders of the upper member and is thrown back against the corresponding shoulders of the lower member.

15. A riffle for amalgamators, comprising two riffle members inclining downward from
 75 their receiving ends and arranged one above the other, said members each having essentially plane portions lying at different elevations and separated by shoulders, the shoulders of the upper member lying respectively
 80 in advance of the shoulders of the lower member, whereby as the pulp passes down the plane portions of the lower member it strikes the shoulders of the upper member and is thrown back against the corresponding should-
 85 ders of the lower member, the shoulders of the upper member projecting downward below the plane portions of the lower member respectively in advance of the said shoulders of the upper member. 90

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

BERTIE A. LANGRIDGE.

Witnesses:

JOHN S. KRUM,
 B. K. HANBURY.