

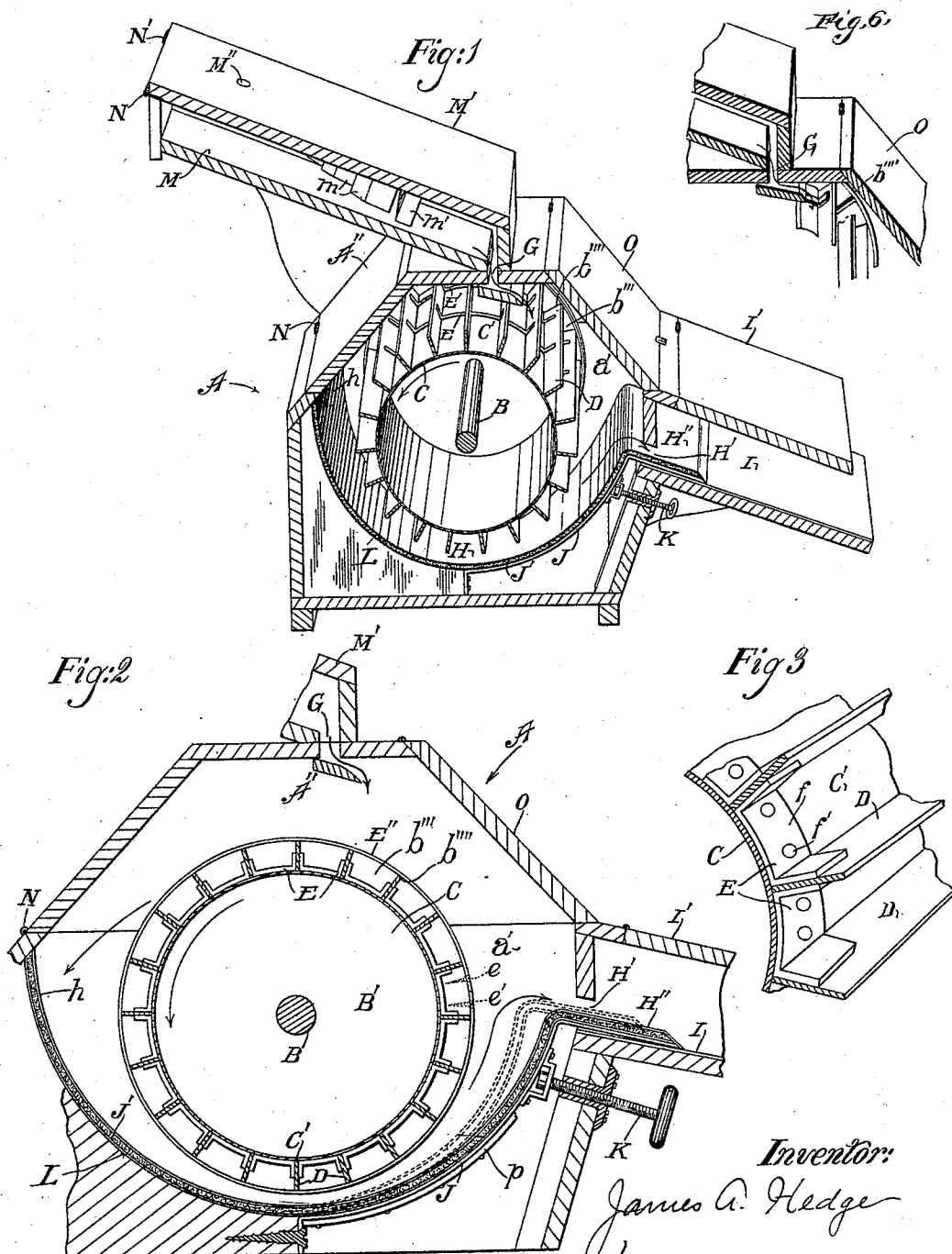
(No Model.)

2 Sheets—Sheet 1.

J. A. HEDGE.
AMALGAMATOR.

No. 581,159.

Patented Apr. 20, 1897.



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UNITED STATES PATENT OFFICE.

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AMALGAMATOR.

SPECIFICATION forming part of Letters Patent No. 581,159, dated April 20, 1897.

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To all whom it may concern:

Be it known that I, JAMES A. HEDGE, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented new and useful Improvements in Amalgamators, of which the following is a specification.

My invention relates particularly to those amalgamators which are provided with a revoluble cylinder.

One object of my invention is to provide improved means for feeding to the amalgamator the material to be amalgamated, whereby practically every portion of the material is brought into intimate contact with the amalgamating-plate before it is discharged from the cylinder, and also to provide means whereby when the material is discharged from the cylinder it will be brought into violent contact with a second amalgamating-plate, and then, while being constantly agitated, carried across the entire face of such plate before it is finally discharged from the machine, thereby insuring that every particle of free metal in the gangue shall be brought into such intimate contact with the amalgamating-surface as to insure its amalgamation.

Another object of my invention is to simplify the construction of the amalgamating-cylinder and at the same time to produce a cylinder which is easily made and can be conveniently taken apart if necessary, and one which, while being particularly rigid and durable, will at the same time be extremely light and easy of manipulation.

A further object of my invention is to provide means whereby, when the bottom of the trough in which the cylinder rotates becomes filled or clogged with heavy particles of gangue which cannot be carried out by the current produced by the rotation of the cylinder while the device is in its ordinary working position, the front wall of the trough can be adjusted to bring it nearer to the periphery of the cylinder, whereby the rotation of the wings acts as a positive element to cause such a rapid current to discharge from the machine as to effectively carry out any heavy matter, which heretofore could not be removed except by removing the cylinder from the trough and scooping the gangue out by means of shovels or otherwise.

My invention also comprises various other features of construction and combinations of parts hereinafter fully set forth and claimed.

The accompanying drawings illustrate my invention.

Figure 1 is a perspective sectional view of a device embodying my invention, 1 1, Fig. 4, indicating the line of section. Fig. 2 is a fragmental sectional view showing the cylinder, the semicylindrical amalgamating-plate, and the means for adjusting the same. Fig. 3 is a fragmental perspective view illustrating my improved supports for removably securing the wings upon the cylinder. Fig. 4 is a plain front elevation of a machine embodying my invention with portions of the case removed to expose the interior. Fig. 5 is a fragmental section of one end of the cylinder in place within the case of the amalgamator. Fig. 6 is a detail view showing the radial seats for the amalgamating-strips forming wings for the cylinder.

In the drawings, A represents, in general terms, the amalgamator, which comprises a case A', which is provided with vertical end walls *a* and *a'*. Within this case is arranged a shaft B, and secured upon the shaft is a revoluble cylinder C, which, as shown, consists of an amalgamating-plate C', bent into cylindrical form and having each end closed by means of an internal wooden head B', which is slipped inside of the cylinder and secured thereto by screws *c*, as shown in Fig. 5. The outer face of one internal head B' is provided with a transverse groove *b* and the shaft is perforated, and through the perforation is inserted a pin *b'*, which projects beyond each side of the shaft. The shaft is passed through the central opening in the head B' and the pin *b'* is seated in the groove *b*. Then a packing *b''* is placed around the shaft, and the second head B'', which is provided with a projecting rim or flange *b'''*, which embraces the end of the cylinder-plate C', is slipped upon the shaft and is tightly forced against the head B' and secured by suitable means, such as the screws shown, thus compressing the packing and forming a hermetical closure between the shaft and the head. By this construction of the cylinder formed of an amalgamating-plate and the wooden heads secured in the ends of the cyl-

- inder I make a cylinder which is very light and cheap—one in which the heads can be quickly secured in place or removed when it becomes necessary to replat the cylinder.
- 5 By using the wooden heads, which are fitted snugly into the ends of the cylinder, when the heads become wet they swell and form a perfect hermetical closure, which prevents the entrance of water into the cylinder.
- 10 When the cylinders are made of a body of wood covered with a sheet of amalgamating-plate, I find that the wood becomes saturated with water and causes the plate to sweat and become discolored when the machine is left
- 15 standing for any length of time, while my improved hollow cylinder will remain bright and clean for any length of time. The projecting flange b''' of the outer head is provided with radial slots b'''' , as shown in Fig. 1, which are adapted to receive and seat the ends of longitudinal strips D, which are formed of amal-
- 20 gamating-plate and are arranged projecting radially from the cylindrical plate C' to form wings therefor. Intermediate the ends of these strips I provide two series of supports E and E'. Each series consists of individual U-shaped supporting members formed of strap metal, preferably strips of amalgamating-
- 25 plate, each having its base f' curved inward to fit upon the outside of the curved plate C' and having its side members arranged projecting radially from the cylinder and forming supports for the flat strips or wings D. These brackets or supports are arranged just
- 30 far enough apart to allow the strips D to fit tightly between the side members and thus be retained in position. The supports are secured to the cylindrical plate by rivets f'' or other suitable means. By this construction
- 35 I provide very simple, cheap, and efficient means for holding the wings in position, and also avoid all round pins or similar round projections, from which it is extremely difficult to clean amalgam. A ring E'', formed
- 45 of a strap of amalgamating-plate, is secured upon each of the heads of the cylinder after the straps D are in position in the slots in the flanges of the heads, thereby forming a closure for the slots and preventing the removal of the straps D therefrom until the
- 50 rings have been removed from the head. One end of the strap E' is secured to the head by a screw e . Then the strap is bent tightly around the head and the other end secured thereto by a screw e' , so that it can be easily
- 55 removed when it is desired to remove the wings D in order to clean up the amalgam. I provide improved means for feeding the gangue to the cylinder. In all devices of
- 60 this class of which I am aware it is the custom to feed the gangue into the casing at the rear of the cylinder and to depend upon the agitation of the water in the amalgamating-chamber to carry the gold-bearing particles
- 65 into contact with the amalgamating-plate. I arrange my improved feed to discharge the gangue upon the cylinder at a point in advance of the highest point of the cylinder—that is to say, the upper half of the cylinder moves from the front of the machine toward the rear—and I feed the gangue upon the cylinder at a point in front of a vertical line passing through the axis of the cylinder, so that the feeding takes place at a point in advance of the highest point of the cylinder.
- 70 The effect of this is that when the gangue, mixed with water, passes through the feeding-slot G and falls upon the cylinder it flows into the space between the wings, and the rotation of the cylinder causes the gangue to be thoroughly distributed over the surface of the cylinder, and as the cylinder turns toward the rear the material slides outward upon the faces of the wings, carried there by centrifugal force, and is brought into intimate
- 80 contact with the amalgamating-cylinder and the radial wings, and is finally thrown from the cylinder outward tangentially, where it strikes upon the upper portion of the curved amalgamating-plate II, which forms the bottom of the amalgamating-chamber and has its rear portion h extended considerably above a horizontal line drawn from the bottom of the discharge-outlet II' of the chamber.
- 85 This violent impact of the gangue with the amalgamating-plate insures the thorough amalgamation of any particle of free gold which may possibly have escaped coming into contact with the plate C' and the wings D. The front edge of the plate II is bent outward to form a discharge lip or spout II'', and an apron-plate I is arranged with its edge extending beneath this lip to receive the discharge from the machine.
- 90 In running material through the machine the lighter particles of the gangue are quickly carried from the machine by the current of water passing therefrom, which is assisted by the agitation caused by the revolution of the cylinder and its projecting wings. The heavier or coarser matter, however, accumulates in the bottom of the amalgamator, and after a certain period of time it has heretofore been necessary to remove such matter from the amalgamating-chamber, or the operation is seriously impeded. Heretofore it has
- 95 been necessary to remove the cylinder from the machine in order to allow the accumulation of heavier matter to be shoveled or scooped from the amalgamating-chamber. I provide suitable means whereby I can adjust the distance between the front of the amalgamating-plate and the cylinder, so that by decreasing the distance between the two I increase the velocity of the water flowing from the machine and cause the wings D to act as a positive element to discharge the heavier matter from the machine. That is to say, when the machine is in its ordinary working position it is often desirable that a considerable space exist between the cylinder C and the front portion of the amalgamating-plate
- 100 105 110 115 120 125 130

H; otherwise the current will be so rapid that the gangue will be carried from the machine too rapidly to effect thorough amalgamation.

The means which I have invented to remedy these objections comprises the simicylindrical plate H, having its rear portion rigidly secured to the case and having its front portion arranged to slide back and forth to adjust it toward and from the cylinder to thus regulate the distance between them. In order that the plate may curve and adjust itself to the curve of the cylinder as the top of the plate is forced in toward the cylinder, I provide suitable flexible metallic brackets J, which are secured at one end to the frame of the machine, and to the upper end of each of such straps I journal the end of an adjusting-screw K, which screws through a portion of the casing of the machine and by screwing in and out causes flexure of the bracket and the plate H. In order to avoid all chance of leakage from the amalgamating-chamber, I arrange upon top of the brackets J a sheet of zinc L, and upon the zinc I place a blanket J', and upon this blanket rests the amalgamating-plate H. The various parts are secured together, but by such means as are ordinarily employed to allow slight movement of the various layers of a laminated structure relative each other, whereby they can adjust themselves to the different curves produced when the adjusting-screws K are operated to force the tops of the flexible brackets in toward the cylinder. In order to form a tight closure between the ends of the plate H and the ends *a a'* of the casing, between which ends the plate snugly fits, I provide suitable elastic packing, such as the rubber strip *p*, arranged at each end of the plate H and adapted to expand and press against the ends *a a'* of the casing, and to thus form a slidable hermetical closure between the plate H and the ends of the casing to allow the plate H to be adjusted without allowing any leakage of material from the amalgamating-chamber.

My improved feed-distributor consists of an inclined table M, which is attached to the upper portion A' of the case, which upper portion is hinged by hinges N to the rear of the lower portion of such casing. This manner of hinging allows the upper portion of the casing to be lifted up to permit the cylinder to be removed from the machine. This inclined feed-table M is provided with a cover M', and to this cover I secure feed-blocks *m m'*, which when the cover is in place rest upon the table. These blocks are arranged in two series *m m'*. The series *m* are arranged diverging downward from the mid-line of the table to distribute the matter fed upon the center of the table toward the outer sides thereof, but the series *m'* are arranged parallel with the length of the table and simply serve to more evenly spread the matter across the entire face of the table before it is discharged from thence through the slot G onto the amalgamating-cylinder. The lid M' is hinged to the upper

end of the table, and a suitable opening M'' is provided near the mid-length of the lid, through which the gangue, mixed with water, is fed when the machine is in operation. Before a clean-up the lid M' is raised, thus lifting the blocks from the table and permitting the table to be thoroughly cleaned. In order to allow convenient access to the cylinder without raising the hinged upper portion of the casing, which cannot be done while the machine is in operation, I hinge to the front of the hinged upper portion of the case a door or lid O, which can be opened when it is desired to inspect the machine while in operation.

The amalgamating-plate I is covered by means of a hinged lid I'.

In practice the cylinder C is rotated by means of a belt Q, or any other suitable means of applying power, in the direction indicated by the arrow in Fig. 1, and the gangue, mixed with water, is introduced through the opening M'' onto the table M. The diverging blocks *m* spread it, only allowing a sufficient quantity to escape between each pair of blocks to cause the gangue to be evenly and thoroughly distributed from the center of the table to the outer sides thereof. The gangue then passes on down between the blocks *m'* and on downward through the slot G and is discharged through the slot and upon the cylinder C, where it falls between the wings D. The rotation of the cylinder causes the material to be evenly spread upon the surface of the cylinder, and also causes the material to shift after it has been deposited upon the surface thereof and to thus bring every particle into intimate contact with the cylinder. As the material is carried on toward the rear of the machine it is thrown by centrifugal force outward, rubbing over the wings D in its passage, finally being thrown with considerable force from the cylinder and striking against the rear portion *h* of the plate H, which projects above the water-line. The constant rotation of the cylinder causes the wings to create a current in the water in the chamber, which carries the gangue downward beneath the cylinder and toward the front of the machine. During its passage it is thoroughly agitated and stirred up and brought into contact with the plate H, so that before it is finally carried from the machine by the current of water flowing therefrom every particle of free gold has been amalgamated. To insure that no loss shall occur in any event, I provide an apron-plate I, over which the gangue passes before it finally escapes from the machine.

It sometimes occurs that amalgam gathers upon the bottom of the plate H to such an extent as to either necessitate cleaning the said plate or the grinding away of the amalgam by the rotation of the cylinder. Thus if the gangue is very rich it either becomes necessary to clean up frequently or to provide means for raising the cylinder above the plate

to allow the amalgam to gather to any thickness desired. It is also necessary when the cylinder is raised that no opening be left through which the contents of the amalgamating-chamber can escape. That is to say, the shaft upon which the cylinder is supported passes through journal-openings in the ends of the case, and if the shaft is raised without provision being made the journal-opening below the shaft allows the water and gangue to escape from the amalgamating-chamber.

I provide improved means whereby I allow adjustment of the cylinder relative the bottom of the plate II and absolutely prevent any leakage of material around the shaft. I accomplish this by providing the ends *a a'* with journal-block seats *R*, which are provided with grooves *R'*, extending entirely around the seats. In these seats I arrange journal-blocks *R''*, which are provided with tongues which slide in the grooves in the seat. The tongues *r''* at the bottom and top of the journal-block are wide enough to allow considerable vertical movement of the blocks without withdrawing the lower tongue from the lower groove of the seat, and the seat is made sufficiently large to allow the block to be moved vertically by the upper tongue sliding in the upper groove without the lower tongue being withdrawn from the lower groove.

The shaft *B* is supported externally of the casing by means of vertically-adjustable journal-supports *S S'*. These supports are rendered adjustable by means of set-screws *s*. Thus when the amalgam gathers upon the plate II to such a degree as to interfere with rotation of the cylinder the journal-supports *S S'* are raised by means of the set-screws *s*, thus raising the shaft and the cylinder to the desired height. The journal-blocks *R'* slide in the grooved seats and the tongues *r''* prevent any escape of material from the chamber.

Now, having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an amalgamator, the combination of a case provided with an outlet; a rotatable amalgamating-cylinder journaled in the case and provided with outwardly-projecting wings; a curved amalgamating-plate arranged in the bottom of the case beneath the cylinder; means for feeding upon the top of the cylinder the material to be amalgamated; and means for rotating the cylinder to cause it to carry toward the rear of the case the material to be amalgamated, deliver it upon the curved amalgamating-plate, sweep it across such plate and out of the discharge-outlet.

2. In an amalgamator, the combination set forth of a rotatable amalgamating-cylinder provided upon its outer face with projecting wings; a suitable casing having in its bottom a curved amalgamating-plate having its front bent outward to form a discharge-lip, and having its rear portion extended upward above a horizontal line drawn from the top of the discharge-lip; means for feeding upon

the cylinder material to be amalgamated; and means for rotating the cylinder to cause the material fed thereupon to be thrown against the upwardly-projecting rear portion of the curved amalgamating-plate.

3. In an amalgamator, the combination of a rotatable amalgamating-cylinder provided upon its outer face with projecting wings; a suitable casing having in its bottom a curved amalgamating-plate having its front bent outward to form a discharge-lip, and having its rear portion extended upward above a horizontal line drawn from the top of the discharge-lip; an apron-plate having its upper edge extending under said lip to receive the discharge; means for feeding upon the upper portion of the cylinder material to be amalgamated; and means for rotating the cylinder to cause the material fed thereupon to be thrown against the upwardly-projecting rear portion of the curved amalgamating-plate.

4. An amalgamator comprising a case having journaled therein a revoluble cylindrical amalgamating-plate; a trough-shaped amalgamating-plate arranged beneath the cylinder; a slidable packing between the trough-shaped plate and the case; means for adjusting the trough-shaped plate to carry it nearer to or farther from the cylinder; and means for revolving the cylinder.

5. An amalgamator comprising a case having vertical end walls; a shaft journaled in such end walls; a cylinder provided with wings and secured to the shaft; a semicylindrical amalgamating-plate arranged in the case beneath the cylinder, having its rear portion rigidly fixed to the case and its front portion provided with an outwardly-projecting lip and adjustably secured to the case; an elastic packing secured to the ends of the semicylindrical plate and adapted to expand against the ends of the case to form a slidable hermetical closure between such plate and the ends of the case; and suitable means for adjusting the front portion of the semicylindrical plate to carry it toward and from the cylinder.

6. An amalgamator comprising a case having vertical end walls; a shaft journaled in such end walls; a cylinder secured to the shaft; a semicylindrical amalgamating-plate arranged in the case beneath the cylinder, and having its rear portion fixed to the case and its front portion provided with a projecting discharge-lip and secured to flexible brackets; an elastic packing arranged at each end of the plate to form a slidable hermetical closure between the ends of the plate and the ends of the case; and the adjusting-screws secured to the case and arranged to adjust the front portion of the semicylindrical plate relative the cylinder.

7. In an amalgamator, the combination set forth of a cylindrical amalgamating-plate; internal heads arranged to fit within the ends of the cylinder and secured thereto, one of such heads being provided in its outer face

with a groove; a shaft passing through the cylinder and through the heads and having a transverse perforation; a pin passed through the perforation in the shaft, projecting from the shaft and seated in the groove in the head; outer heads, each provided with a projecting flange adapted to fit upon the outside of its respective end of the cylinder, and each secured to its respective internal head of the cylinder.

8. In an amalgamator, the combination set forth of a case having its upper half hinged to open to allow an amalgamating-cylinder to be removed from the case; the cylinder journaled to revolve in the case; the feed-table secured to the hinged top of the case, and the lid hinged to the front of the hinged upper portion of the case.

9. In an amalgamator, the combination of a case having its ends provided with grooved journal-block seats; journal-blocks provided upon two sides and the bottom with tongues arranged to fit tightly in the grooves; a shaft journaled in the journal-blocks, passing through the case and supported exteriorly to the case in vertically-adjustable journal-supports; such journal-supports; a cylinder secured to the shaft and adapted to be revolved in the case; and an amalgamating-plate arranged in the case beneath the cylinder.

10. In combination, an amalgamating-plate

bent into cylindrical form; internal heads, one inserted into each end of the cylinder and secured thereto; external heads, each provided with a flange adapted to fit upon the outside of its respective end of the cylinder, and each provided with radial slots or seats; the flat amalgamating-strips forming wings for the cylinder and having their ends arranged in the slots in the flanges; and a shaft passing axially through the cylinder and the cylinder-heads.

11. In an amalgamator, the combination of a case having in its bottom a curved amalgamating-plate, and having in its front a suitable discharge-outlet, the rear portion of the curved amalgamating-plate extending above a horizontal line drawn from the bottom of the discharge-outlet; a revoluble cylinder journaled in the case and provided with outwardly-projecting wings; a suitable feed arranged to feed upon the front upper portion of the cylinder the material to be amalgamated; and suitable means for revolving the cylinder to carry toward the rear the material to be amalgamated and to throw it against the upper portion of the curved amalgamating-plate.

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