April 16, 1929. D. H. KLEINSCHMIDT 1,708,970

AMALGAMATOR

Filed Oct. 9, 1924 3 Sheets-Sheet 1

Fig. 1.

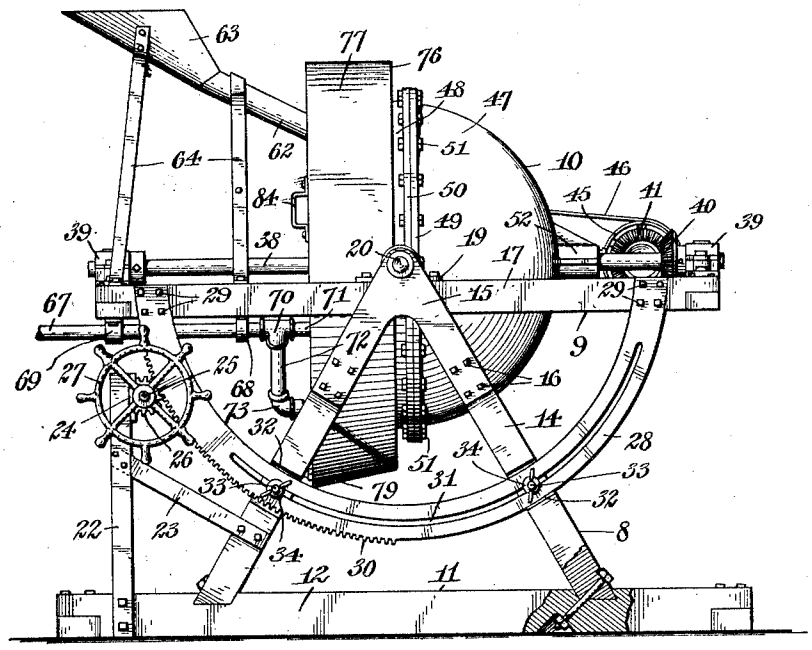
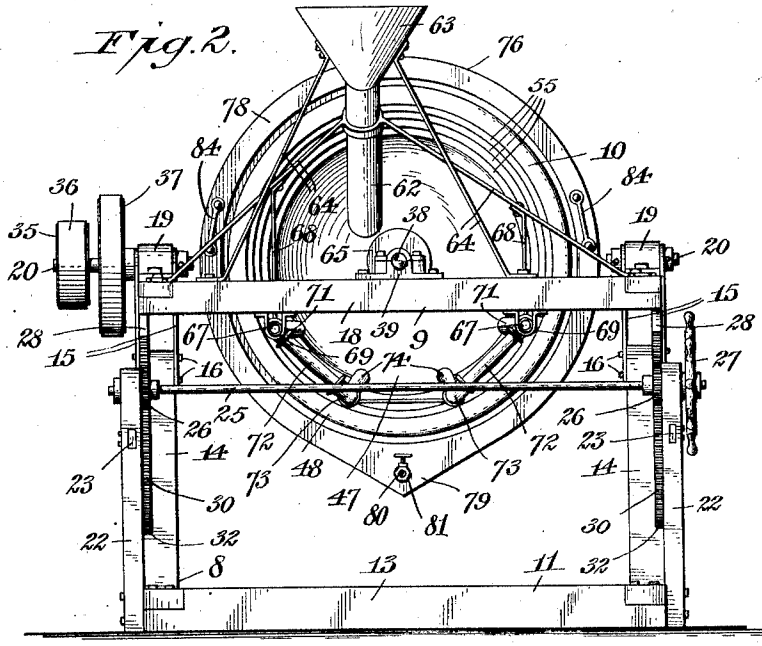


Fig. 2.



Daniel H. Kleinschmidt, Inventor.
By Emil Kuehl Attorney

Witness:
J. J. Oberst.

April 16, 1929. D. H. KLEINSCHMIDT 1,708,970

AMALGAMATOR

Filed Oct. 9, 1924 3 Sheets-Sheet 2

Fig. 3.

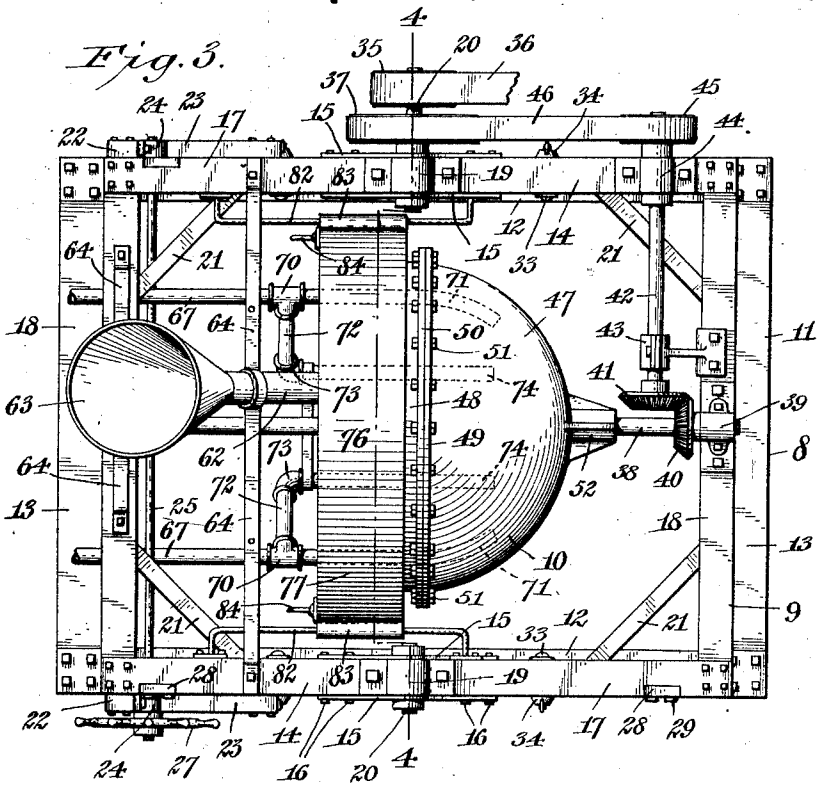
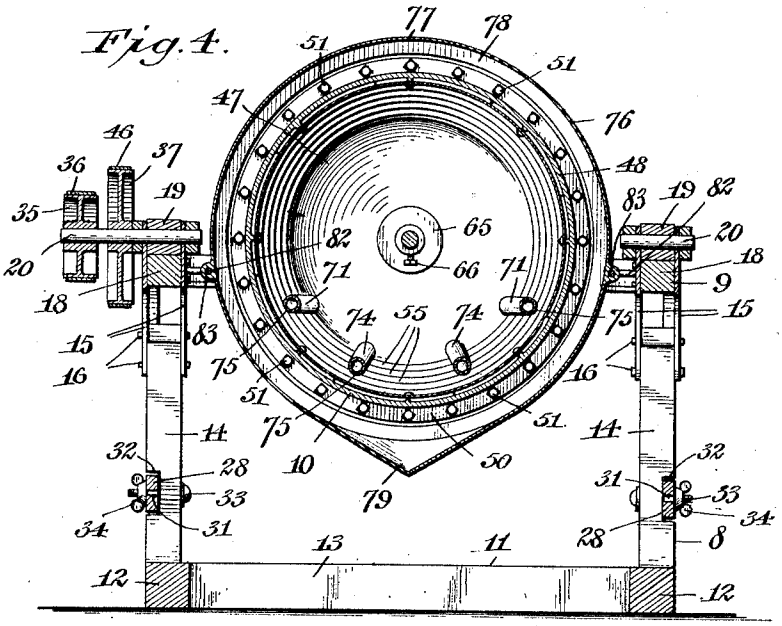


Fig. 4.



Witness:
J. J. Oberst.

Daniel H. Kleinschmidt, Inventor.
By Emil Kuhard
Attorney.

April 16, 1929. D. H. KLEINSCHMIDT 1,708,970

AMALGAMATOR

Filed Oct. 9, 1924 3 Sheets-Sheet 3

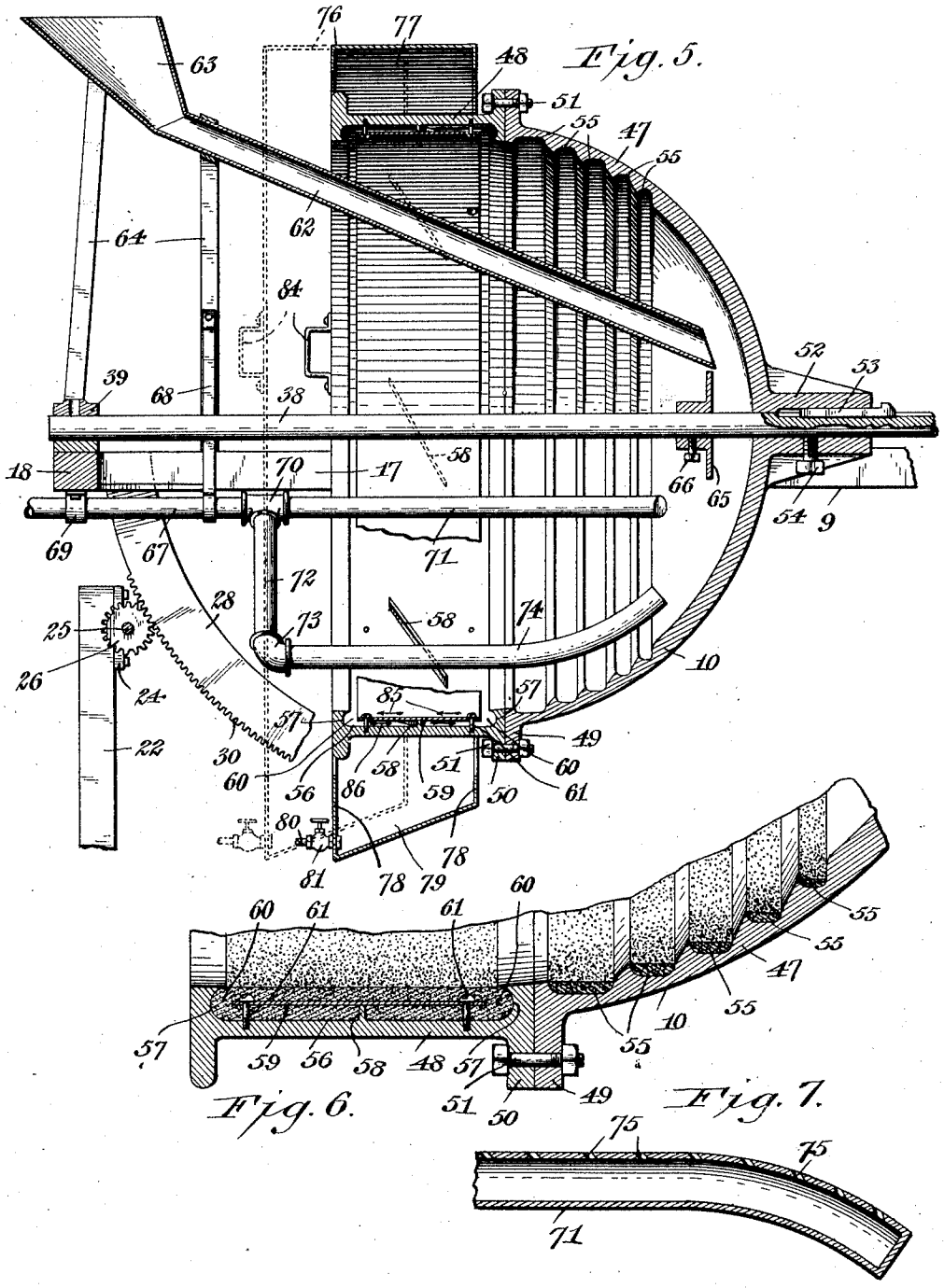


Fig. 5.

Fig. 6.

Fig. 7.

Witness:
J. J. Oberst.

Daniel H. Kleinschmidt, Inventor.
By Emil Kuehl
Attorney.

Patented Apr. 16, 1929. 1,708,970

UNITED STATES PATENT OFFICE.

DANIEL H. KLEINSCHMIDT, OF LOS ANGELES, CALIFORNIA.

AMALGAMATOR.

Application filed October 9, 1924. Serial No. 742,543.

This invention relates to improvements in amalgamators, and more particularly to that type into which earth or pulverized ore, or both earth and ore containing precious metals, are fed for the purpose of separating such metals from the material fed into the machine.

One of the objects of my invention is to provide a machine which is continuous in action and which embodies a rapidly rotating chamber or receptacle, in which the earth or pulverized ore, or both, and water are fed into the machine and passed over a liquid surface of mercury or amalgam to cause the heavier particles in the form of precious metals to be separated from the earth or lighter minerals, or from both, as the case may be.

Another object of my invention is the provision of an amalgamator having a chamber or receptacle containing mercury or amalgam, and being provided with movable means adapted to allow the lighter material or substance passing through the chamber or receptacle to escape from the machine, after separating the heavier material of precious metals therefrom, and which means is also adapted to receive the mercury or amalgam with its contents of precious metals or substances retained therein.

A further object of my invention is to provide an amalgamator with means for adjusting the same so that the flow of material through the same will be increased or diminished and the capacity of the machine regulated thereby.

A further object of my invention is to provide an amalgamator of the type in which precious metals heavier than the mercury or amalgam contained therein are separated from the material of lighter specific gravity than the mercury or amalgam, and in which the operation of separating is more effectively accomplished by the use of water or air as a conveying or accelerating agency, the water or air acting to roll or move the material passing through the machine over or along the surface of the mercury or amalgam and finally force the lighter material, after separation of the heavier therefrom, out of the machine; water or air having a decided advantage over mechanical means used for this purpose, as such mechanical means would soon wear out and tends to force out the amalgam by crowding, and therefore cause loss of the same.

With the above and other objects in view to appear hereinafter, the invention consists in the novel features of construction and in the arrangement and combination of parts to be hereinafter described and more particularly pointed out in the subjoined claims.

In the drawings:—

Fig. 1 is a side elevation of my improved amalgamator.

Fig. 2 is an end elevation, viewed from the front or feeding end thereof.

Fig. 3 is a plan view of the machine.

Fig. 4 is a transverse section taken on line 4—4, Fig. 3.

Fig. 5 is an enlarged fragmentary longitudinal section taken centrally through the amalgamating chamber or receptacle.

Fig. 6 is a further enlarged fragmentary longitudinal section through a portion of the amalgamating chamber or receptacle.

Fig. 7 is a longitudinal section through a portion of one of the water or air feeding or accelerating tubes.

Reference being had to the drawings in detail, the reference numeral 8 designates a fixed supporting frame on which is pivotally mounted an adjustable frame 9 carrying the amalgamating chamber or receptacle 10 and parts directly associated therewith.

The fixed supporting frame may be of any suitable construction, but has preferably a rectangular open base 11 formed of parallel side members 12 and end members 13 securely fastened to opposite ends of said side members. Rising from opposite side members 12 are inverted V-shaped side members or standards 14 which are securely fastened to said side members and have spaced elements 15 at their upper ends. In preferred construction the rectangular open base 11 is constructed of wood, and the lower portions of the side members or standards 14 are also constructed of wood, while the spaced elements 15 forming the upper portions thereof are constructed of heavy plate or sheet metal fastened to opposite sides of the wooden lower portions of said standards by means of suitable bolts 16, or otherwise.

The adjustable frame 9 is also rectangular in formation, having substantially the same width as the rectangular open base and being preferably a trifle shorter. This frame is formed of parallel side members 17 and end members 18 connecting opposite ends of said side members and at points centrally between their ends said side members 17 are posi-

tioned between the spaced elements 15 of the inverted V-shaped standards, each side member having a pivot block 19 fastened to its upper side by means of bolts, or otherwise, which pivot blocks are also positioned between the spaced elements 15 of said standards. Passing through said spaced elements and said pivot blocks so as to be rockable within said blocks or so as to rock with said blocks, as may be desired, are pivot shafts 20 which serve as centers on which the rectangular adjustable frame 9 may swing and which establishes a center of rotation for the amalgamating chamber or receptacle. Said center of rotation passes transversely through said chamber or receptacle and thus assures an adjustment which is quite sensitive and requires comparatively slight movement for change of capacity. As said rectangular adjustable frame is designed to support operating parts of this machine, I preferably provide said frame with braces 21 at its four corners or angles, thus giving said frame the necessary rigidity capable to withstand vibration and strains to which is may be subjected. It is of course to be understood that the construction of the supporting frame and that of the adjustable frame may be varied so long as a suitable support is provided for said adjustable frame and said adjustable frame can be mounted on said supporting frame for pivotal adjustment.

Fastened to the base 11 of the supporting frame near one end thereof, are uprights 22 which are transversely alined, one being applied to the outer side of each of the parallel side members 12 of said base. These uprights are tied to the standards 14 and for this purpose brace bars 23 are provided, one end of each brace bar being fastened to each upright near its upper end and the other end thereof to the standard 14 at the same side of the machine.

Fastened to the inner side of each of said uprights is a journal block 24, the blocks of said uprights being at the upper ends thereof and being alined transversely, and journaled therein is a transverse adjusting shaft 25 to which pinions 26 are fastened. For the purpose of rotating said shaft and said pinions, a hand wheel 27 is secured to one end of the shaft, the hand wheel and the adjacent pinion being arranged so that the hubs thereof lie in contact with opposite ends of one of the journal blocks and thus prevent lengthwise movement of said shaft.

Disposed at opposite sides of the machine are two semi-circular bars or members 28, each having opposite ends secured to a side member 17 of the adjustable frame near opposite ends thereof. The side members 17 are notched to receive said bars or members, and the latter are securely fastened into the notches of said side members by means of bolts 29. These semi-circular bars or members 28 are alined with the pinions 26 on the operating shaft 25, and along a portion of their outer edges they are provided with teeth 30. Therefore, at least a portion of each of said semi-circular bars or members may be considered as a segment gear. The pinions 26 are in mesh at all times with said segment gears, as clearly shown in Fig. 1. Each of said semi-circular bars or members is slotted along a greater portion of its length, as at 31, and the diverging members of the standards are notched, as at 32, to receive said bars or members so that they are flush with the outer surfaces of said standards.

Secured in the downwardly diverging members of each standard, are bolts 33 which project from said diverging members and extend through the slots of said semi-circular bars or members 28, nuts 34 being threaded onto the projecting ends of said bolts and being adapted to be forced firmly against said bars or members at opposite sides of the slots formed therein so as to retain said bars or members, and consequently the adjustable frame 9, in any desired position.

One of the pivot shafts 20 is longer than the other and extends outwardly a distance from the standard through which it is passed, and on the projecting end thereof is a drive pulley 35 around which a drive belt 36 is arranged, and a second pulley 37 adjacent said drive pulley.

38 designates a longitudinally-disposed shaft journaled in bearings 39 secured to the upper sides of the end members 18 of the adjustable frame 9, and on said shaft a bevel gear 40 is secured which meshes with a second bevel gear 41 secured on a transverse shaft 42 journaled in bearings 43, 44 fastened, respectively, to one of the end members 18 and to one of the side members 17 of the adjustable frame 9. Said transverse shaft projects outwardly beyond the side of said adjustable frame and on its projecting end it has a pulley 45 secured thereto around which and the pulley 37 a belt 46 is passed. The longitudinally-disposed shaft 38 is therefore driven by the belt 36 through the medium of the pulley 35 on one of the pivot shafts 20, the pulley or prime mover as it may be termed, the belt 46, pulley 45, shaft 42, and bevel gears 41 and 40; and while this is considered a highly desirable arrangement for driving said longitudinally-disposed shaft owing to the driving gear or mechanism so arranged being in connected condition and swinging as a unit on the axis of the adjustable frame, other driving gears or mechanisms may be substituted if found suitable for the purpose. In making this statement it is not my intention to disclaim the driving gear shown and described, but on the contrary, it is my intention to generically include driving gears or mechanisms of different arrangements which fall

within the principle involved in that particularly shown and described.

Secured to the longitudinally-disposed shaft 38 is the amalgamating chamber or receptacle 10, which is in the form of a bowl having a substantially semi-spherical section 47, and a ring-like or cylindrical section 48, said sections having peripheral flanges 49, 50 at contiguous ends which lie in contact and by means of which and bolts 51 passed therethrough the two sections of the bowl are connected together. The longitudinally-disposed shaft 38 extends axially through said bowl and the latter is provided at its closed end with a boss 52 through which said shaft is passed so that the bowl is given an extended bearing on the shaft and a rigid support assured for the same. In order that the bowl may be securely fastened to said shaft, the latter and the boss of the bowl are provided with coinciding key slots in which a key 53 is arranged, and a set screw 54 is also passed through said boss and bears with its end against the shaft to further assure a secure fastening of the bowl to the shaft, especially since the two are adapted to be rotated at comparatively high velocity, as will appear hereinafter.

By reason of one end of the bowl being of semi-spherical formation, it is gradually enlarged in diameter from its closed end toward the open end of the semi-spherical section, and in this semi-spherical section a series of mercury or amalgam-retaining grooves 55 are formed. These grooves are gradually increased in width from the innermost groove outwardly to the open end of said semi-spherical section. In the ring-like or cylindrical section 48 of the bowl, a comparatively wide and deep annular mercury or amalgam-retaining groove or depression 56 is formed, which serves as a basin, the side walls of which are concaved, as shown at 57 and the outer cylindrical wall of which has obliquely-disposed fins 58 thereon, preferably integral therewith, these fins being disposed in spaced relation, as clearly shown in Fig. 5. It is to be noted that these obliquely-disposed fins 58 are of a height approximately one-half the depth of the basin 56, in which they are disposed, and arranged within said basin and lying in contact with said fins, is what I term a separator 59 in the form of a ring made of plate or sheet material having a width somewhat less than that of the basin in which it is centrally disposed so that spaces 60 are provided between opposite edges of said ring and the concaved side walls 57 of said basin. Retainer screws 61 are passed through said separator ring at intervals along each of its marginal portions, and these screws are threaded into the outer cylindrical wall of the basin 56, as clearly shown in Figs. 5 and 6.

The separator ring 59 divides the amalgam within the basin into two bodies, which, however, come together and intermix in the spaces between the edges of said ring and the side walls of the basin, and in these spaces the amalgam may be said to be en-masse.

When the bowl is prepared for operation, the amalgam grooves 55 and the amalgam basin 56 will be filled with mercury or amalgam, as clearly shown in Fig. 6, and it is of course understood, in order that all portions of these grooves and the basin be completely filled with mercury or amalgam, the bowl must be in rotation so that the mercury or amalgam will be retained within said grooves and basin by centrifugal force, as will be explained hereinafter.

62 designates a feed or supply tube, which extends into the bowl 10 of the machine and which has a hopper 63 at its outer end, said tube and hopper being supported from the adjustable frame 9 by means of supporting bars 64, two of which are secured to the hopper and converge downwardly therefrom for attachment to one of the end members of said adjustable frame, and two of which are suitably secured to the feed or supply tube at a point adjacent said hopper and converge downwardly therefrom for attachment to the side members of said adjustable frame.

The inner or delivery end of said feed or supply tube terminates a short distance from the closed curved end of the bowl directly above a baffle 65 fastened to the longitudinally-disposed shaft 38, which may be termed the bowl or amalgamator shaft. This baffle is in the form of a disk having a hub at one side through which a set screw 66 is passed that has its inner end bearing firmly against the shaft to retain the baffle in position thereon. With the inner or delivery end of the tube and the baffle disposed as described, any material fed through said tube will be delivered into the bowl directly against the inner closed wall thereof and between said wall and the baffle.

To assist in the separation of gold, platinum or other precious substances of greater specific gravity than the mercury or amalgam contained within the amalgamating receptacle or bowl, I resort to the use of what I term an accelerating device, which comprises means for supplying water, air, or the like to the material fed into the bowl while said material is moving in contact with the enclosing wall of said bowl; and this device, in what I now consider its preferred form, comprises one or more air or water supply pipes 67 (two of said pipes being shown in the drawings) supported from a hanger or hangers 68 fastened to one of the supporting bars 64 connected to the feed or supply tube and a clip 69 surrounding each of said pipes and fastened to the under side of one of the end members of the adjustable frame.

By means of a suitable fitting 70, a perforated accelerator tube 71 is connected to

said supply pipe, and this fitting has a branch tube 72 secured thereto to which is connected by means of an elbow 73 a second accelerator tube 74. These tubes may be varied in number, but as shown in the drawings there are two accelerator tubes connected to each air or water supply pipe 67, and these tubes extend into the bowl 10 and are curved or otherwise fashioned to conform to the outline of that portion of the wall with which they are co-extensive. Each accelerator tube has a series of reversely-inclined air or water apertures 75, so disposed for the reason that these tubes extend into the bowl from the open end thereof and the purpose of the accelerator tubes are to direct jets of air or water against the material passing through the bowl in the direction in which the material is to be passed out of the bowl. Therefore, the jets of air or water, as the case may be, serve to assist in the movement of the material through the bowl and they serve this purpose without acting to force any of the mercury or amalgam out of their retaining grooves or out of the basin formed within the wall of the bowl.

Surrounding the ring-like or cylindrical section 48 of the bowl, is what I term a mercury catch or catch basin 76, which is in the form of an annular chamber having a peripheral wall 77 and side walls 78, and at the lowermost portion of this mercury catch or annular chamber, the peripheral wall is bulged outwardly to form an outwardly-inclined drain portion 79 provided with a discharge pipe 80 having a valve 81 therein for controlling the escape of mercury from said mercury catch or annular chamber. It is to be understood that this catch or catch basin is one adapted to receive mercury when discharged from the bowl, and while it is invariably retained in the position shown in full lines in Fig. 5, when the machine is operating it is adapted to be moved forwardly into the position shown in dotted lines in said figure when the mercury is to be drained from the bowl or when the mercury supplied into the bowl exceeds that necessary to fill the grooves 55 and the basin 56. For the purpose of moving the catch in the desired position, it is slidably supported on the rectangular frame 9, and for this purpose guide and supporting rods 82 are fastened to the inner sides of the side members of said frame and the mercury catch or annular chamber 76 is provided with guide sleeves or loops 83 through which said guide supporting rods are passed. For conveniently moving the mercury catch or basin from one position to another, it is provided at its outer end with handles 84.

When placing the machine in operation, the mercury catch or annular chamber 76 is moved to the position shown in dotted lines in Fig. 5 so that it projects beyond the open end of the bowl. Power is then applied to the elongated pivot shaft 20 by means of the belt 36, or otherwise, and by means of the driving gear or mechanism shown and described, or other suitable mechanism having its parts co-operating to function in substantially the manner as that shown and described, the amalgamating receptacle or bowl is rotated at a high rate of speed. The mercury or amalgam is next introduced into the bowl through the feed or supply pipe 62 and gradually fills the grooves 55 and the basin 56 of the bowl, and any surplus mercury or amalgam is delivered out of the open end of the bowl into the mercury catch or annular chamber 76 while the bowl is being rotated. When all the surplus mercury or amalgam has been delivered into the mercury catch, the latter is moved rearwardly from the position shown in dotted lines in Fig. 5, to or beyond that shown in full lines so that any material which later may escape from the open end of the bowl, will not enter the mercury catch. The sand, earth, or other material containing gold or other precious minerals to be separated therefrom is next delivered into the bowl through the feed or supply pipe 63, preferably with a suitable quantity of water. This material escapes from said tube within the bowl and is directed against the inner closed end of the bowl in close proximity to its axis. The material striking said inner end, splashes or rebounds against the baffle 65 and is then directed to the peripheral wall of the bowl, and owing to said wall being gradually enlarged in diameter forwardly, the centrifugal force imparted by the fast rotation of the bowl carries the material away from the center, and as this material is supplied with a quantity of water when fed through the spout, it moves comparatively freely along the wall of the bowl and over the mercury or amalgam-filled grooves, and in this action it is assisted in its movement by jets of air or water directed outwardly and forwardly through the apertures 75 in the accelerator tubes.

In passing forwardly along the walls of the semi-spherical section 48 of the bowl, the heavier particles or nuggets of precious metal contained in the material, lodge in the mercury or amalgam within the grooves 55 and are held captive therein, while that portion of the material freed from such heavier particles or nuggets and containing the finer or flour-like particles of precious material, is moved forwardly and passes in contact with the mercury or amalgam retained within the basin 56, the finer or flour-like part being retained and held captive within the mercury or amalgam within said basin. It may here be stated that the mercury or amalgam within said basin is in constant circulation or under agitation caused by the action of the air or water jets against the material passing

over the basin and also by the fins 58 arranged within the basin between the separator ring 59 and the peripheral wall of said basin. The rotation of the machine will always be somewhat faster than the circular movement of the mercury or amalgam within said basin and therefore said fins will have a tendency to cause the mercury or amalgam to circulate around the separator ring, the movement of the mercury or amalgam inside the separator being outwardly or toward the open end of the bowl, as indicated by the arrows 85, Fig. 5, while a reverse movement of the mercury or amalgam takes place in the space between said separator ring and the peripheral wall of the basin, as indicated by the arrows 86.

The forward movement of the air or water jets tends to carry the material out of the machine and owing to this material; that is, the sand, earth, crushed or pulverized rock, being lighter than the mercury or amalgam, it will, when freed of all precious substances, float forwardly over the top of the mercury or amalgam and be expelled from the bowl beyond the outer open end thereof.

After feeding any desired quantity of sand, earth, crushed or pulverized rock or other material containing precious substances to be recovered by amalgamation through the machine, the mercury catch or annular chamber 76 is drawn forward from the position shown in full lines in Fig. 5 to that shown in dotted lines, and rotation of the bowl stopped, whereupon the mercury or amalgam and the precious substances contained or held in suspension therein will flow to the bottom of the bowl, with the result that it will run out of the bowl into said mercury catch, or amalgam chamber, as it may be termed. It will, however, be found necessary to tilt the bowl forwardly to pour out all of the mercury or amalgam and when this is found necessary, the hand wheel 27 will be actuated to rotate the pinions 26 in mesh with the segment gears formed on the semi-circular bars or members 28, and this will cause the adjustable frame by which the amalgamating bowl is carried, to be swung on the pivot shafts 20 with a forward inclination sufficient to pour out practically all mercury or amalgam within the bowl. When opening the valve 81, the mercury or amalgam with its precious metal contained or held in suspension therein, will be delivered through the discharge pipe 80 to any suitable point, where the amalgam may be filtered, or otherwise treated to assure full recovery of the precious metal. When operating the amalgamating receptacle to pour out the mercury or amalgam, said receptacle acts as a separating receptacle since it separates the mercury and amalgam from the residue of the material originally fed into the receptacle.

While I have shown the amalgamating receptacle or bowl in horizontal position, such position is found entirely practicable for amalgamation in most instances, especially when the material is fed into said receptacle bowl with a liberal quantity of water. When, however, it is desired to increase the capacity of the bowl by passing a given quantity of material through the same within a given length of time, the bowl may be inclined forwardly to any desired degree, and by reason of the fact that the bowl is rotated at a fairly high rate of speed, centrifugal force will retain the mercury or amalgam within the grooves and basin of the bowl, even though inclined, and the material passing through the bowl, after being freed from the precious metal sought to be recovered therefrom, will escape freely from the open end of the bowl, this material being dropped from the bowl and delivered to any suitable point.

By gradually increasing the mercury or amalgam retaining grooves from the closed end forwardly, assurance will be had that any particles or nuggets of precious metal escaping one groove in its course through the bowl will encounter a somewhat larger body or bodies of mercury or amalgam and be finally trapped therein before reaching the basin 56, which is adapted to recover the finer or flour-like particles, which will either cling to the peripheral wall of the basin under centrifugal action, or be held in suspension within the mercury or amalgam in said basin.

By providing the basin with a body of mercury or amalgam which is in constant circulation, or under movement back and forth in an endless course with a component movement circularly, assurance is had that the fine or flour-like precious particles of metal will be retained within the mercury or amalgam while the sand, earth, crushed or pulverized rock or other material from which the precious metal is freed, will be assisted in its escape from the bowl, owing to that portion of the mercury or amalgam inside of the separator ring moving in a forward direction.

Having thus described my invention, what I claim is:—

1. An amalgamator, comprising an amalgamating bowl horizontally-disposed, means for pivotally mounting said bowl with its center of rotation passing transversely through said bowl, and driving mechanism having its prime mover co-axial with the pivotal mounting of said bowl.

2. An amalgamator, comprising an amalgamating receptacle closed at one end and open at the other and disposed at an angle to the vertical, a shaft extending through said amalgamating receptacle and to which the latter is secured, means for pivotally mounting said amalgamating receptacle, mechanism for rotating said shaft including an element having its axis coincident with the axis of the pivotal mounting of said re-

ceptacle, means for feeding material into said amalgamating receptacle to be discharged from the open end thereof when freed of precious substances, and an amalgam catch surrounding said amalgamating receptacle and movable to receive the amalgam with its precious contents from said amalgamating receptacle.

3. An amalgamator, comprising a supporting frame, an adjustable frame pivotally mounted on said supporting frame, an amalgamating receptacle carried by said adjustable frame and disposed at an angle to the vertical, said amalgamating receptacle containing amalgam, means for feeding material into said amalgamating receptacle to be passed therethrough and escape from the same after being freed of precious substances, and an amalgam catch supported by and movable along said adjustable frame and normally surrounding said amalgamating receptacle, said amalgam catch being adapted to be moved to receive the amalgam with its precious contents after passing any desired quantity of material through said amalgamating receptacle.

4. An amalgamator, comprising a supporting frame, alined pivot shafts at opposite sides of said supporting frame, an adjustable frame mounted for rotative adjustment by means of said pivot shafts, a longitudinally-disposed shaft on said adjustable frame, a pulley on one of said pivot shafts, a transverse shaft having a pulley alined with said first-mentioned pulley, a belt passing around said pulleys, means for rotating said last-mentioned pivot shaft, a bevel gear on said longitudinally-disposed shaft, a bevel gear on said transverse shaft in mesh with the bevel gear on said longitudinally-disposed shaft, an amalgamating receptacle secured to said longitudinally-disposed shaft, a feed tube supported by said adjustable frame and extending into said amalgamating receptacle, and an amalgam catch surrounding the discharge end of said amalgamating receptacle and movably supported by said adjustable frame.

5. An amalgamator, comprising a horizontally-disposed amalgamating receptacle mounted for swinging adjustment on horizontal centers, said amalgamating receptacle having an annular amalgam basin formed in the wall thereof, means for rotating said amalgamating receptacle, and means within said amalgam basin to retard the circular movement of the amalgam therein.

6. An amalgamator, comprising a horizontally-disposed amalgamating receptacle having an annular amalgam basin formed in the wall thereof near its outlet and means for rotating said amalgamating receptacle to cause the amalgam in said basin to cling to the wall of said receptacle, and means to prevent the amalgam within said basin moving circularly at the speed of said amalgamating receptacle.

7. An amalgamator, comprising a horizontally-disposed amalgamating receptacle having an annular amalgam basin formed in the wall thereof near its outlet end, a ring within said basin spaced from the peripheral wall thereof and somewhat narrower than said basin to provide two bodies of amalgam at opposite sides of said ring but en masse between the edges of said ring and the side walls of said basin, and means for rotating said amalgamating receptacle.

8. An amalgamator, comprising a horizontally-disposed amalgamating receptacle having an annular amalgam basin formed in the wall thereof near its outer end and having spaced internal ribs on the peripheral wall of said basin, a separator ring within said basin lying against said spaced internal ribs and having its edges spaced from the side walls of said basin, and means for rotating said amalgamating receptacle.

9. An amalgamator, comprising an amalgamating receptacle having an annular amalgam basin at its outlet end, means within said amalgam basin to cause the amalgam therein to travel in an endless manner within the basin with a component travel movement parallel with the axis of said amalgamating receptacle, and means for rotating said amalgamating receptacle.

10. An amalgamator, comprising an amalgamating receptacle having an annular amalgam basin at its outlet end, means within said basin to cause the amalgam therein to circulate within the basin in a direction parallel with the axis of said amalgamating receptacle with a component movement in a circular direction, and means for rotating said amalgamating recepticle.

11. An amalgamator, comprising an amalgamating receptacle having an annular amalgam basin therein and having spaced obliquely-disposed ribs extending from its peripheral wall and an annular ring bearing against said ribs and positioned centrally with reference to the depth of said basin, the edges of said ring being spaced from the side walls of said basin, and means for rotating said amalgamating receptacle.

12. An amalgamator, comprising a supporting frame, an adjustable frame pivotally mounted on said supporting frame, a segment gear carried by said adjustable frame, a pinion in mesh with said gear segment, a shaft to which said pinion is secured, means for rotating said shaft and pinion to cause said gear segment to move and swing said adjustable frame on its pivots, means on said supporting frame to clamp said segment gear in any desired position, an amalgamating receptacle carried by said adjustable frame, and means for rotating said amalgamating receptacle.

13. An amalgamator, comprising a sup-

porting frame having a base, standards at opposite sides rising from said base and uprights also rising from said base and braced to said standards, a shaft journaled on said uprights, pinions on said shaft, a hand wheel for rotating said shaft and pinions, an adjustable frame pivotally mounted to the upper end of said standards, semi-circular members at opposite sides of said adjustable frame and having opposite ends thereof secured thereto, said semi-circular members being slotted through a portion of their length and lying against the outer sides of said standards, bolts secured to said standards and extending through the slots of said semi-circular members, nuts threaded onto said bolts and adapted to be clamped against said semi-circular members, said semi-circular members having gear teeth formed along a portion of their lengths adapted to mesh with said pinions and a receptacle carried by said adjustable frame.

14. An amalgamator, comprising a separating receptacle open at one end and disposed at an angle to the vertical, said separating receptacle being adjustable on a center disposed at a right angle to its axis and between the ends thereof, a catch basin surrounding said separating receptacle and being adjustable with said separating receptacle on said center and movable in the direction of the axis of said separating receptacle so as to surround said receptacle in its entirety, or overhang the open end of said receptacle.

In testimony whereof I affix my signature.

DANIEL H. KLEINSCHMIDT.