

No. 619,199.

Patented Feb. 7, 1899.

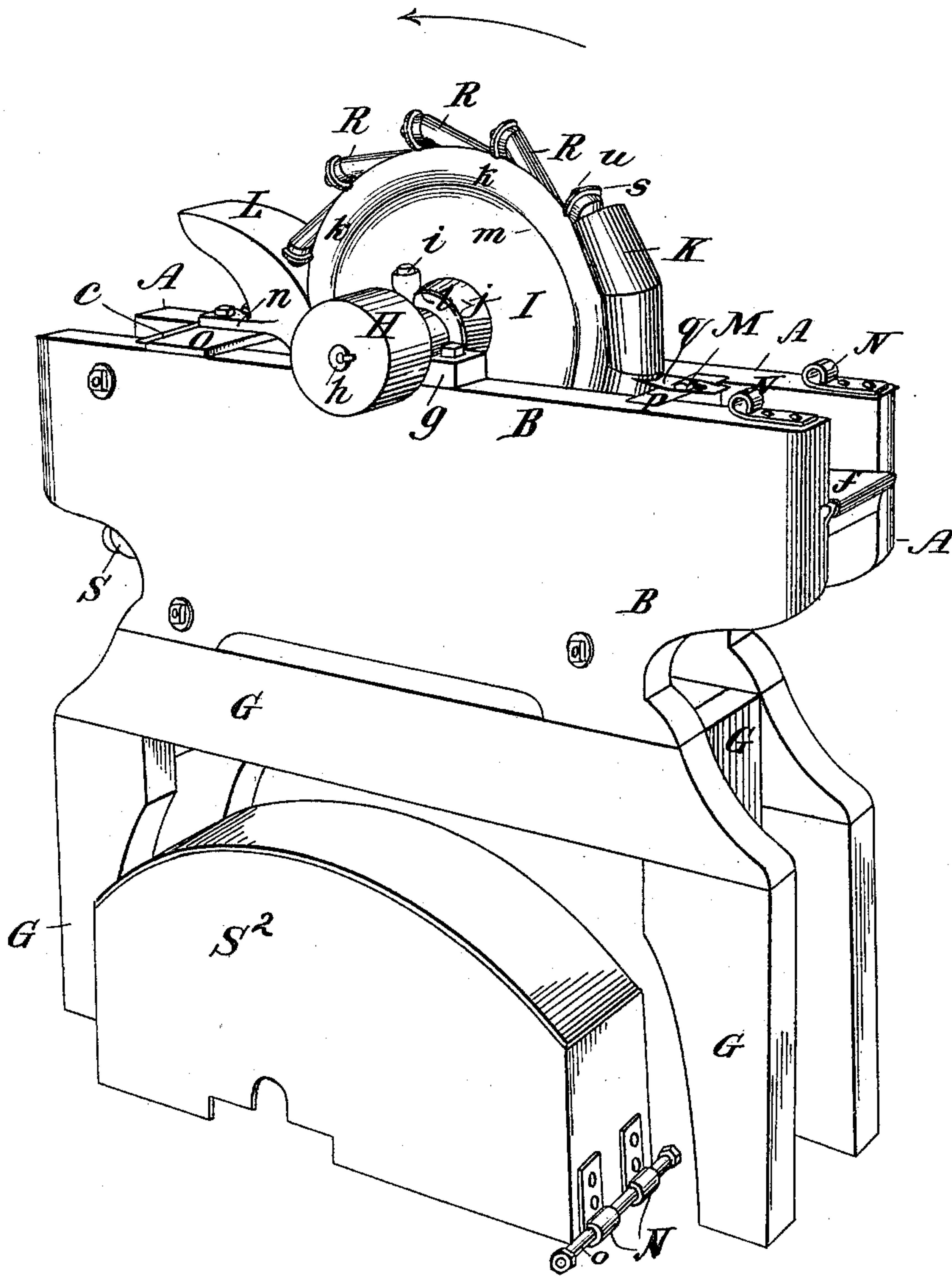
J. N. MARION.
AMALGAMATOR.

(Application filed Apr. 6, 1898.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1,



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No. 619,199.

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J. N. MARION.
AMALGAMATOR.

(Application filed Apr. 8, 1898.)

(No Model.)

2 Sheets—Sheet 2.

Fig. 2,

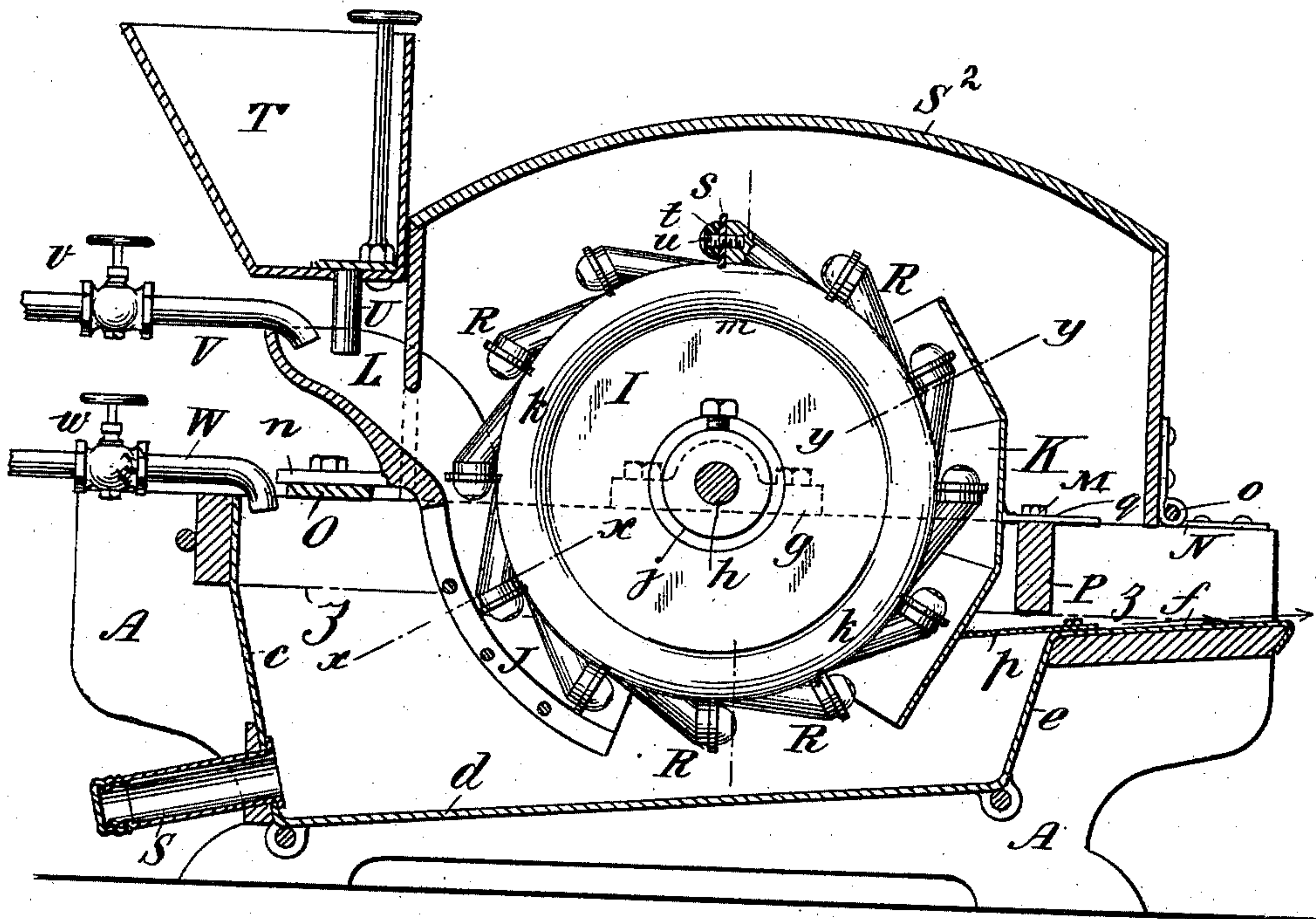


Fig. 3,

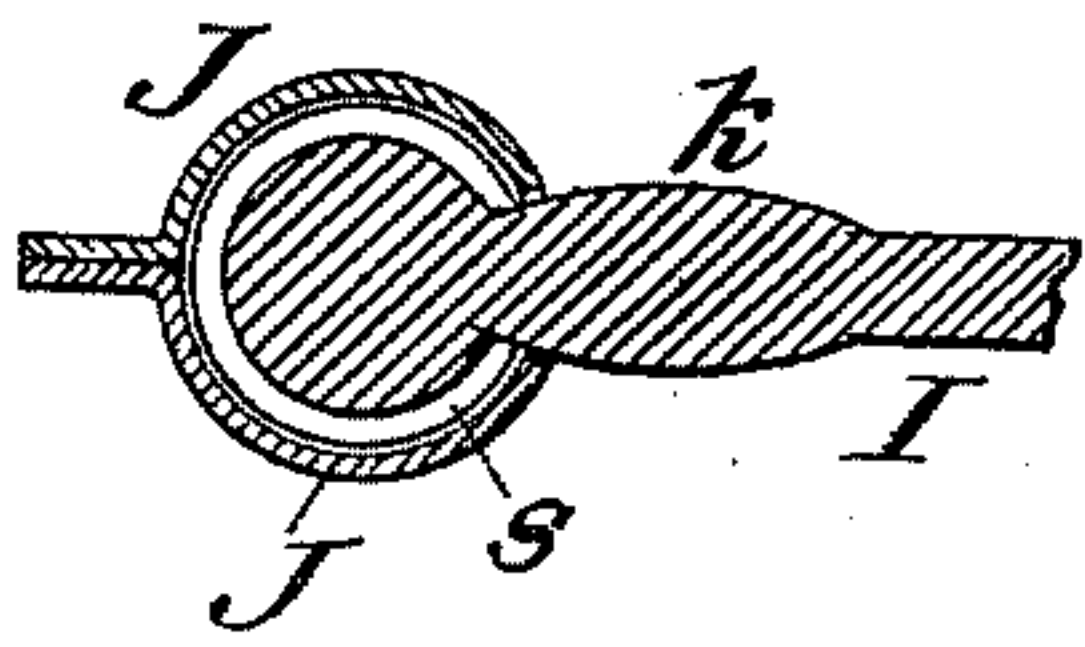


Fig. 5,

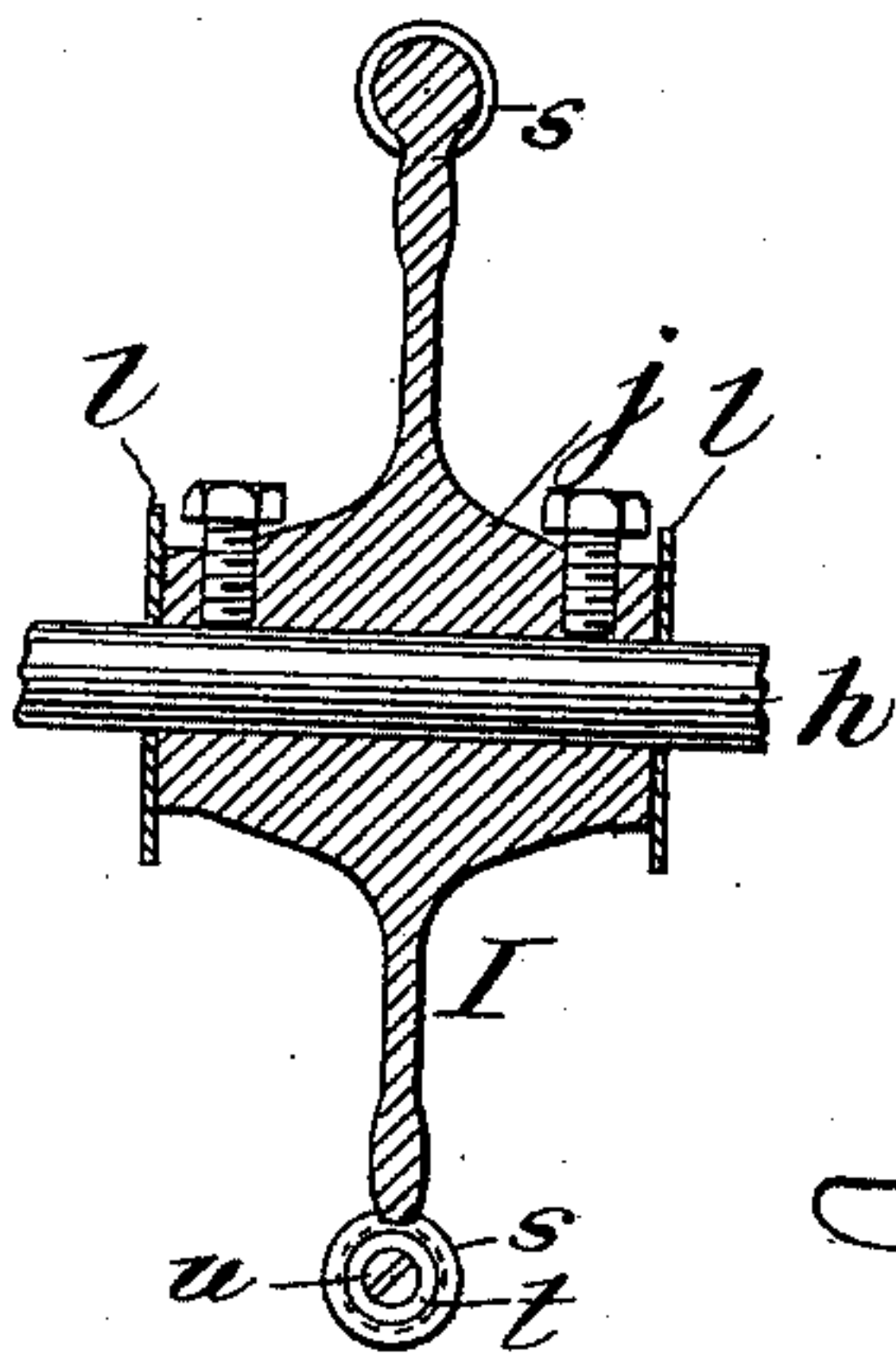
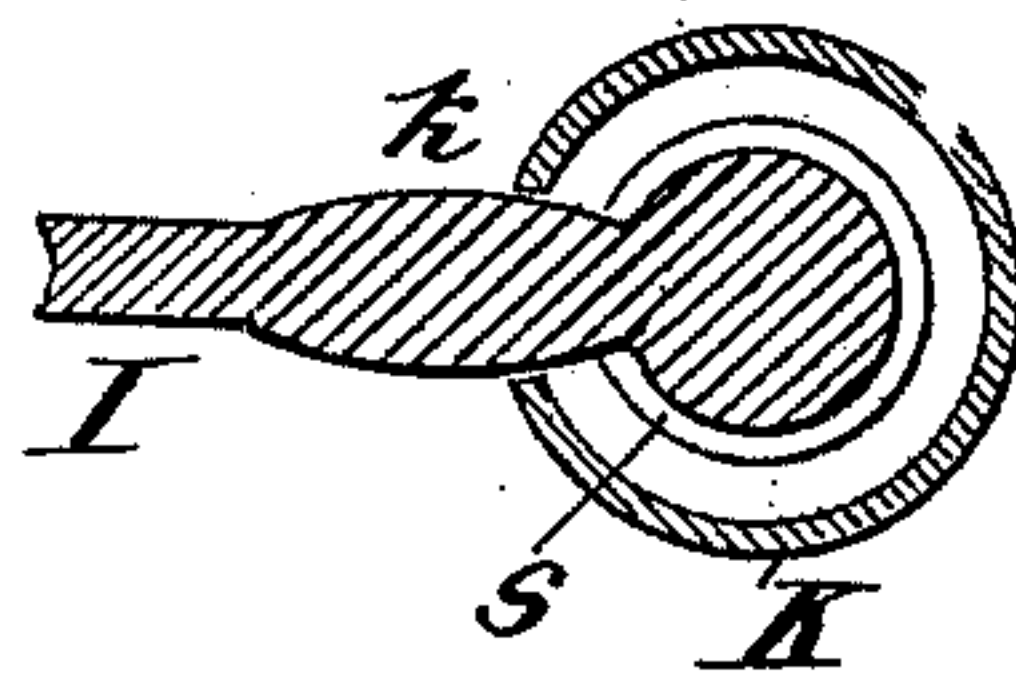


Fig. 4,



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JONATHAN N. MARION, OF LOUISVILLE, KENTUCKY.

AMALGAMATOR.

SPECIFICATION forming part of Letters Patent No. 619,199, dated February 7, 1899.

Application filed April 6, 1898. Serial No. 676,636. (No model.)

To all whom it may concern:

Be it known that I, JONATHAN N. MARION, a citizen of the United States, residing at Louisville, in the county of Jefferson and State of Kentucky, have invented a new and useful Amalgamating-Machine, of which the following is a specification.

My invention relates to a type or species of amalgamators that is adapted to the purpose of separating fine particles of gold from the dust with which it may be commingled by subjecting the combined dust or dirt and gold, together with an accompanying charge of water, to the action of quicksilver, a mass of which is held within a suitable reservoir, through which mass the supply of mixed gold and dust, with its accompanying quantity of water, is caused to pass; and my invention may be said to consist in a machine or contrivance of this type for the purpose above mentioned involving the novel principle of construction and mode of operation and certain novel combinations of devices, all as will be hereinafter more fully explained and as will be most particularly pointed out in the claims of this specification.

To enable those skilled in the art to which my said invention relates to make and use a machine or apparatus involving the same, I will now proceed to more fully describe my improvement, referring by letters to the accompanying drawings, which form part of this specification and in which I have shown my invention carried into effect in that precise form of machine or apparatus which I have so far used in practicing it, though in carrying the latter into effect various mere modifications of the machine herein shown and described may of course be made and some of the details of construction changed more or less without departing from the spirit of said invention.

In the drawings, Figure 1 is a perspective view of a machine embodying my invention and viewed from a point slightly in rear of and to one side of the machine and with the hinged cap or cover removed in order to expose to view the construction of the parts within said cover and also with the feed-box and its attachments omitted for the sake of simplification of the drawings. Fig. 2 is a vertical longitudinal central section of the ma-

chine or apparatus complete. Fig. 3 is a detail cross-section, on an enlarged scale, taken in a plane indicated by the dotted line *xx* at Fig. 2. Fig. 4 is a similar cross-sectional view at the line *yy* of Fig. 2. Fig. 5 is a partial vertical section of the rotatory wheel of the machine, together with its driving-shaft, detached.

In the several figures the same part will be found always designated by the same letter of reference.

An oblong receptacle to contain the quicksilver or mercury is composed of two sides A and B, which in the case shown are made, of the same size and shape, out of hard wood; a slightly obliquely-arranged front board *c*, extending downwardly from the top edges of the parallel side pieces A and B, as shown; a bottom board *d*, extending from the lower end of the board *c* rearwardly and in a slightly-ascending position; an obliquely-ascending rear board *e*, and a nearly-horizontal extension or tail-board *f*, running from the upper edge of the rearmost and nearly-vertical wall *e* of the receptacle to a point preferably nearly coincident with the rearmost end portions or edges of the two side boards A and B of the receptacle, over the extremity of which slightly-inclined board *f* pass off, as will be presently explained, the water and dust from which the fine particles of gold have been removed in the amalgamating process or operation.

On the upper edge of the side boards A and B of the just-described quicksilver-receptacle are securely bolted pillow-blocks or journal-boxes *g*, within which is mounted to turn freely in an ordinary manner a rotatory shaft *h*, said journal-boxes being preferably provided, as shown, with ordinary oil-cups *i*, and on one (projecting) end of said shaft *h* is keyed fast an ordinary drive-pulley H, by which, through the medium of a belt banded therefrom to a suitable driving-pulley, the shaft *h* is driven. On this shaft *h* is also mounted, intermediately of the two sides A and B of the quicksilver-reservoir and so as to have a portion of its periphery rotate or travel in the mass of quicksilver, a web-wheel I, the hub *j* of which is keyed or otherwise securely fastened to the said shaft, and to the outer ends or faces of which hub *j* are brazed on or otherwise permanently fastened thin circular plates *l*, which,

being each of a diameter considerably more than that of the end of said hub, form circular flanges, projecting beyond the peripheries of the ends of said wheel-hub, (see particularly Figs. 1 and 5,) all as clearly shown and for a special purpose, which will be presently explained.

As will be seen from an inspection of Fig. 2, where the broken line zz indicates the level to which the reservoir of the machine is filled with the quicksilver or mercury, the periphery of the rotatory wheel I has always very nearly one-half of its surface circumferentially immersed within the quicksilver.

J (see Figs. 2 and 3) is a tubular device which, as seen, conforms in vertical section to the curvature or circle of the periphery of wheel I, and which in cross-section is almost circular, the continuity of its form in cross-section being broken sufficiently at the inner side (see Fig. 3) to permit the travel within its slitted portion of the reduced or thinned-down portion m of said wheel. The two thus slightly-separated parts of the said tubular device are formed, respectively, with flanges, which are bolted together, as clearly shown in the drawings, and the upper end or portion of this tubular device j is formed or provided with an enlargement L , which is hopper-like in shape and function and into which both the mixture of fine or flour gold and dust and also a supply of water are fed in a manner to be presently described. This tubular device J, with its upper enlarged end or hopper L , is formed or provided, as shown, with a lug-like projection n , which is securely bolted, as shown, to a permanently-arranged cross piece or plate O , mounted on top of the reservoir or receptacle, and thus the said tubular device, with its hopper-like upper end, is securely held or retained in place, the lower end of said tubular device or feed-tube extending, as shown, down nearly to the bottom of the quicksilver reservoir or receptacle.

At the opposite end of the quicksilver-receptacle is arranged another somewhat similar tubular device K, which, however, has no enlargement or hopper at its upper end, is slightly larger in cross-section, and operates, as clearly shown, as a tubular housing, within which travel as they ascend out of the quicksilver-reservoir the feed-buckets or plungers of the rotatory wheel for a purpose to be presently explained, the said tubular device being made somewhat after the fashion of the one marked J and being securely held in place by means of the two rearwardly-projecting lug-like arms or braces, (marked, respectively, p and q ,) one of which is, as shown, securely fastened to the inner end portion of the reservoir bottom board f , while the other is secured in place by means of a bolt M , which, passing through an oblong aperture in the said lug q , enters a permanently-arranged cross-bar P of the quicksilver reservoir or receptacle.

The rotatory wheel I has its rim k formed or provided with a series of projections R , each one of which, as clearly shown, (see particularly Fig. 1,) is of a tapering or sort of conical shape in the direction of its length, while in cross-section it is about circular, with its projecting end being its largest part, and of a diameter not quite sufficient to fill the circular bore of the feed tube or device J, hereinbefore described, and on this enlarged head portion of each one of these devices R of the rotatory wheel is applied a circular disk or washer s , of rubber or rubber packing, which is securely held in place by a hard-rubber or gutta-percha washer t , through which washer t and disk s passes a securing-screw u , by means of which the said packing washer or disk s is securely fastened to the said circular or cylindrical end of the device R . The diameter of the said packing-washer s is such that it will snugly fit (after the fashion of a piston-packing) within the bore of the tubular device J, through which the said packing-washers have to descend during the rotation of the wheel I. (See arrow at Fig. 1.)

The curved tubular housing K, through which the rubber disks s of the feeder-wheel I have to travel as they pass upwardly and out of the quicksilver-reservoir, as before remarked, has a bore of greater diameter than that of the feeder-tube J, the difference in practice being such that the disks s , which work closely (or piston-like) within J, will have an annular clearance within the bore of K of about one-eighth of an inch.

The object and effect of the housing K and of having the rubber disks s so much smaller in diameter than the bore of the housing K are that any quicksilver lifted by these disks as they enter the lower end of the housing K will be permitted to fall back or descend within said housing and cannot possibly be carried up out of the reservoir mass and lodged or scattered on top thereof and mixed up with the dirt and other floating matter in such shape as that small quantities of the quicksilver will be carried off with the escaping refuse or flushed off therewith in washing away any waste or foreign matter that may accumulate on the surface of the quicksilver mass and around the upper parts of the machine immersed therein.

Immediately over the receiving hopper-like device L is located a feed or supply box or receptacle T, into which the dust or fine dirt, with its gold intermixed, is put and from which it passes through a discharge pipe or tube U, so as to fall nearly centrally into the hopper-like device L, and the feed or discharge of the gold and dust thus from the supply-box T through the exhaust-pipe U is controlled or regulated by means of a crow-foot valve, (see particularly Fig. 2 of the drawings,) while by means of a water-supply pipe V, provided with a suitable stop-cock at v , a sufficient or suitable supply of water is fed into the hop-

per-like device L at the same time that the gold deposit and dirt are supplied to said device.

At W is shown a water-supply pipe provided with a suitable valve or stop-cock *w*, the purpose of which is to supply occasionally, as may be required, a sufficient quantity of water discharged on top of the mass of quicksilver, at the forward end of the reservoir, for the purpose of flushing or flooding the mass of quicksilver, and thereby washing off from its surface or enforcing the discharge therefrom and over the rear end of the obliquely-arranged board *f* all dirt which may have collected on top of the mass of quicksilver and round about the rotatory wheel and other parts of the machine which are immersed within said mass.

S is an exhaust or discharge pipe provided with a suitable screw-cap for closing its outer end and adapted to the purpose of drawing off from the reservoir of the machine its charge of combined quicksilver and precious metal, as occasion may require.

As clearly shown, all the working parts which project upwardly from within the reservoir are kept well covered (with the exception of the receiving hopper-like device L) by means of a hinged hood or covering device S², the pintle *o* of which (see Fig. 2) is provided at one end with a head and at the other with a removable nut, so that on removal of the nut said pintle may be withdrawn from the female members N of the hinge-like joint in order that at pleasure the said hinged hood may be wholly and easily removed from the machine, as illustrated at Fig. 1, to give freer access to all the working parts and the reservoir, &c., as circumstances may require.

After all that has been said with reference to the construction of the machine and the operations and functions of some of its parts the following brief explanation will suffice to convey a correct understanding of the general working of the apparatus in actual practice: The machine being adjusted for work and its reservoir filled with quicksilver up to about the level of the broken line *z z* and the rotatory wheel I being set in motion and so as to travel in the direction indicated by the arrows at Fig. 2 and at a speed preferably equal to about one hundred revolutions per minute, the fine sand or dust, with its contained gold, is supplied to the feed-box T, and while a sufficient supply of water is turned into the hopper-like device L from the water-supply pipe V the mixture of gold and dust or fine sand is continuously and properly discharged simultaneously from box T through the exit-pipe U into the said receptacle L, so that the mingled solid materials and water pass downwardly into the curved tubular device J. At the same time the traveling plunger-like devices *s* of the rotatory wheel I carry or force along the intermingled water and solid matter through said tubular device J, from whence it escapes (at the lower end of said device)

into the mass of quicksilver near the bottom of the reservoir, the commingled dust or dirt and water thence passing rearwardly and upwardly through the mass of quicksilver until they arrive at the upper surface thereof, from which they flow or pass off (in the direction indicated by the arrow at Fig. 1) over the upper rear edge or tail end of the obliquely-arranged bottom board *f* of the reservoir, while the fine particles of gold are amalgamated or combine with the mass of quicksilver contained in the reservoir. After the amalgamation process shall have been continued long enough, with a sufficient quantity of the gold-bearing dust or sand supplied from the supply-box T, the mass of combined gold and quicksilver is drawn off from the reservoir through the discharge-pipe S and may be subjected to the usual process or operation in resort for the separation of the gold from the mercury.

It will be observed that in an amalgamator constructed on the principle of that herein shown and described the operation is such that all the commingled or mixed water and solid matters are carried downwardly within or are wholly submerged in the mass of quicksilver and discharged into the mass of mercury at the vicinity of the bottom of the mass, so that all the lighter particles of both liquid and solid matters that have no affinity for the quicksilver must ascend from near the bottom of the contents of the reservoir to the top surface, thus affording the best possible opportunity for any and all minute particles of gold that may be clinging to any particles of dirt or other foreign substance to become separated therefrom and amalgamated or combined with the quicksilver mass, while at the same time all the particles of gold already disconnected from other solid matter will be most easily entirely separated therefrom and amalgamated with the quicksilver, (and this at the vicinity of the lower part of the mass of the latter, thus affording a larger part of the mass an opportunity to act on particles floated upwardly with attached dirt, &c.,) since such freed particles will tend to settle to the bottom of the quicksilver mass in the formation of the amalgam.

In practice I have found that dirt and other foreign matter are liable during the running of the machine to accumulate on the top surface of the mass of mercury and that this objection is overcome and the machine kept in a continuously-operative condition to produce the best results by periodically washing off or flushing the mass of quicksilver by a water-flush supplied at the forward end of the reservoir through the pipe W, as heretofore explained, the flush-water washing off the top of the mass of quicksilver and clearing out all the accumulations from around about the rotatory wheel and other immersed parts of the machine, such refuse being washed off or discharged at the tail end of the bottom board *f* of the reservoir, at which

locality also the main portion of all the dirt and water supplied for the amalgamating operation is also discharged.

The circular disks or plate-like flanges *l*, 5 securely fastened to the ends of the hub of the rotatory wheel *I*, prevent any liquid or other material which may be carried upwardly on the peripheral surface of said immersed hub from running downwardly (from 10 the ends of the hub) onto the wheel's shaft or into the journal boxes or bearings of the rotatory parts of the machine, and this means or its equivalent for avoiding this difficulty I have found to be of considerable importance 15 to the successful practical working of the machine.

Of course it will be understood that proper judgment must be exercised with reference to the quantity of quicksilver to be supplied 20 to the reservoir, the same varying more or less in accordance with the temperature of the water which may have to be used and the supply being regulated so that under varying conditions as to temperature the reservoir 25 will be filled to about the level I have indicated and explained, under which condition the best results are to be obtained.

It will be understood that for the purpose of extracting the gold from a comparatively 30 fine earthy mixture or dust by an amalgamating process the machine I have herein shown and described possesses, as has been demonstrated by actual practice, great advantages over any prior contrivance (known to me) by 35 reason of its novel construction and mode of operation; and it will also be understood that the novel construction and mode of operation peculiar to my improved machine may be embodied in an apparatus modified in many particulars as to details of construction from 40 that which I have shown and described.

What I therefore claim as new, and desire to secure by Letters Patent, is—

1. In a machine for extracting therefrom 45 the fine particles of gold mixed with dust, or small particles of earth and other foreign substances, the combination, with a quicksilver reservoir or receptacle; means for supplying thereto the mixture of gold particles and other 50 solid substances; and means for affording a supply of water in connection with the mixture of solid substances, of a curved feeder tube, or trough, into the upper end of which the said solid and liquid matters are fed and 55 the lower end of which curved feeder-tube is located within said reservoir and near the bottom thereof; and a series of piston-like devices which operate to travel within and continuously force downwardly, through said 60 feeder-tube, the supply of combined liquid and solid matters; all in substantially the manner and for the purpose hereinbefore set forth.

2. The combination, with the quicksilver- 65 reservoir; a curved feeder-tube having its lower, discharge, end located within said res-

ervoir, near its bottom, and having its upper end adapted to receive a supply of combined water and solid matter; a water-supply pipe arranged to discharge into the upper end of 70 said feeder-tube; and a suitable hopper or supply-box arranged to feed the mixture of gold and dust into said feeder-tube, of a rotatory wheel, or disk, provided, at its periphery, with a series of plunger-like devices 75 which travel within and pass through said feeder-tube and which force the combined liquid and solid substances fed thereto, through said tube and out through its lower end into the mass of quicksilver contained in said reservoir; all in substantially the manner and 80 for the purposes hereinbefore set forth.

3. The combination, with the quicksilver-reservoir; a feeder-tube through which the mass of combined liquid and solid matter, to 85 be submerged in the quicksilver, is fed; and a rotatory wheel, or disk, provided with peripherally-arranged piston-like devices that force the contents of said feeder-tube downwardly through it and thence out into the 90 mass of quicksilver in said reservoir, as specified, of the tubular housing, or tunnel, *K*, having its lower end submerged in the mass of quicksilver, having the diameter of its bore materially greater than that of the said peripherally-arranged devices, and having its 95 upper end some distance above the top of the mass of quicksilver; through which housing the said peripherally-arranged piston-like devices of the said wheel, or disk, travel; all in 100 the manner and for the purposes hereinbefore set forth.

4. In an amalgamator of the type shown and described, the combination, with the quicksilver-reservoir; the means for supplying 105 thereto the materials to be treated; and the means for forcing the supply of materials down into the mass of quicksilver all as hereinbefore specified, of means for flushing, or washing off, any accumulation of dust or other 110 solid waste substance which may accumulate on the top surface of the mass of quicksilver and round about the parts immersed therein; all substantially as hereinbefore explained.

5. In combination with the quicksilver-reservoir; and a rotatory wheel, the periphery of which is immersed in the mass of quicksilver in said reservoir, of the flange-like devices *l* or disk-like enlargements at the ends 115 of the hubs of said wheel; the said devices *l* operating, as hereinbefore described, to prevent any quicksilver, or other matter carried upwardly from the reservoir by said wheel, from running down into the axle-bearings or journal-boxes of the latter; substantially as 120 set forth.

In witness whereof I have hereunto set my hand this 5th day of March, 1898.

JONATHAN N. MARION.

In presence of—

ARTHUR HAMBAUGH,
H. L. PATTON.