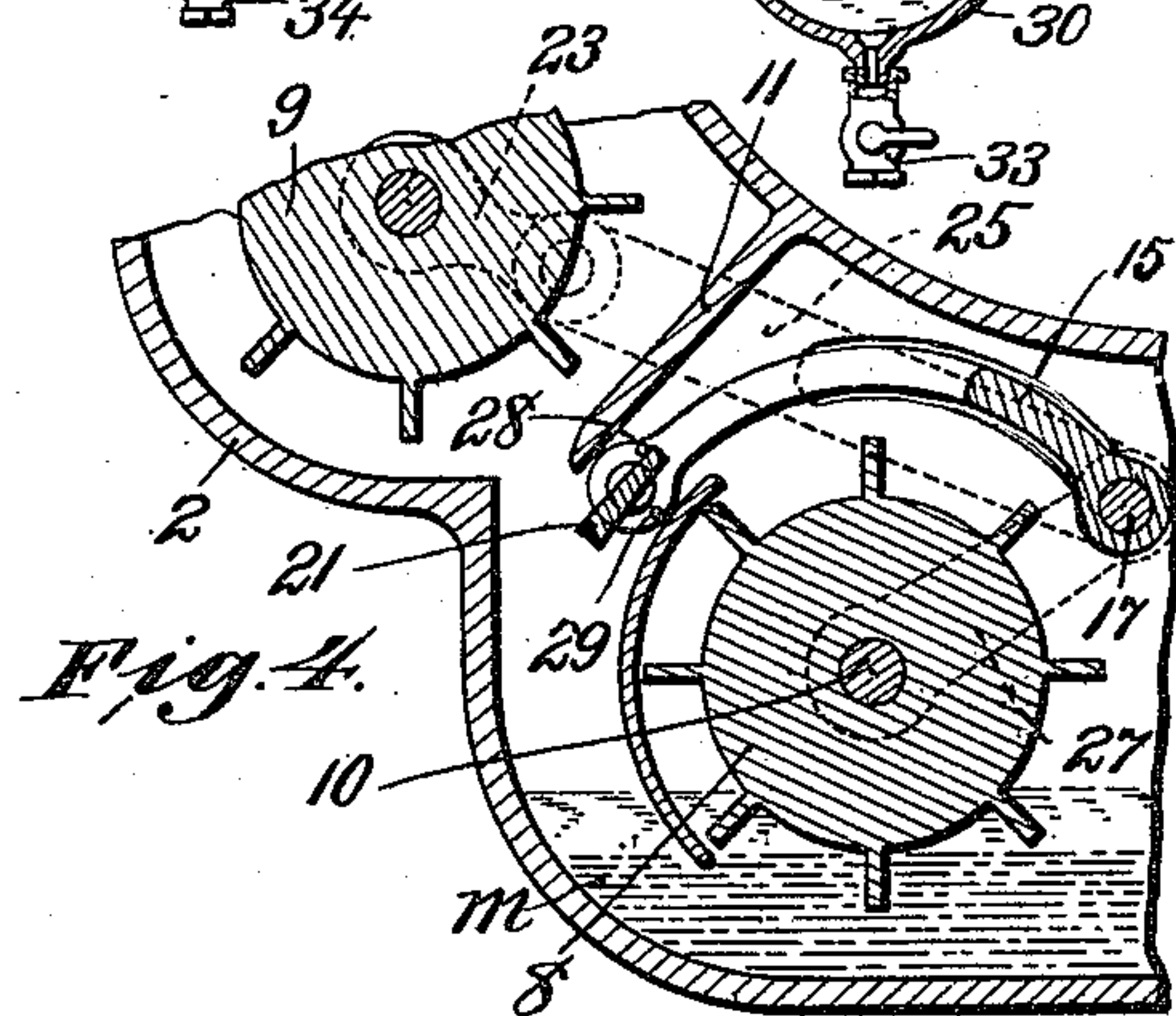
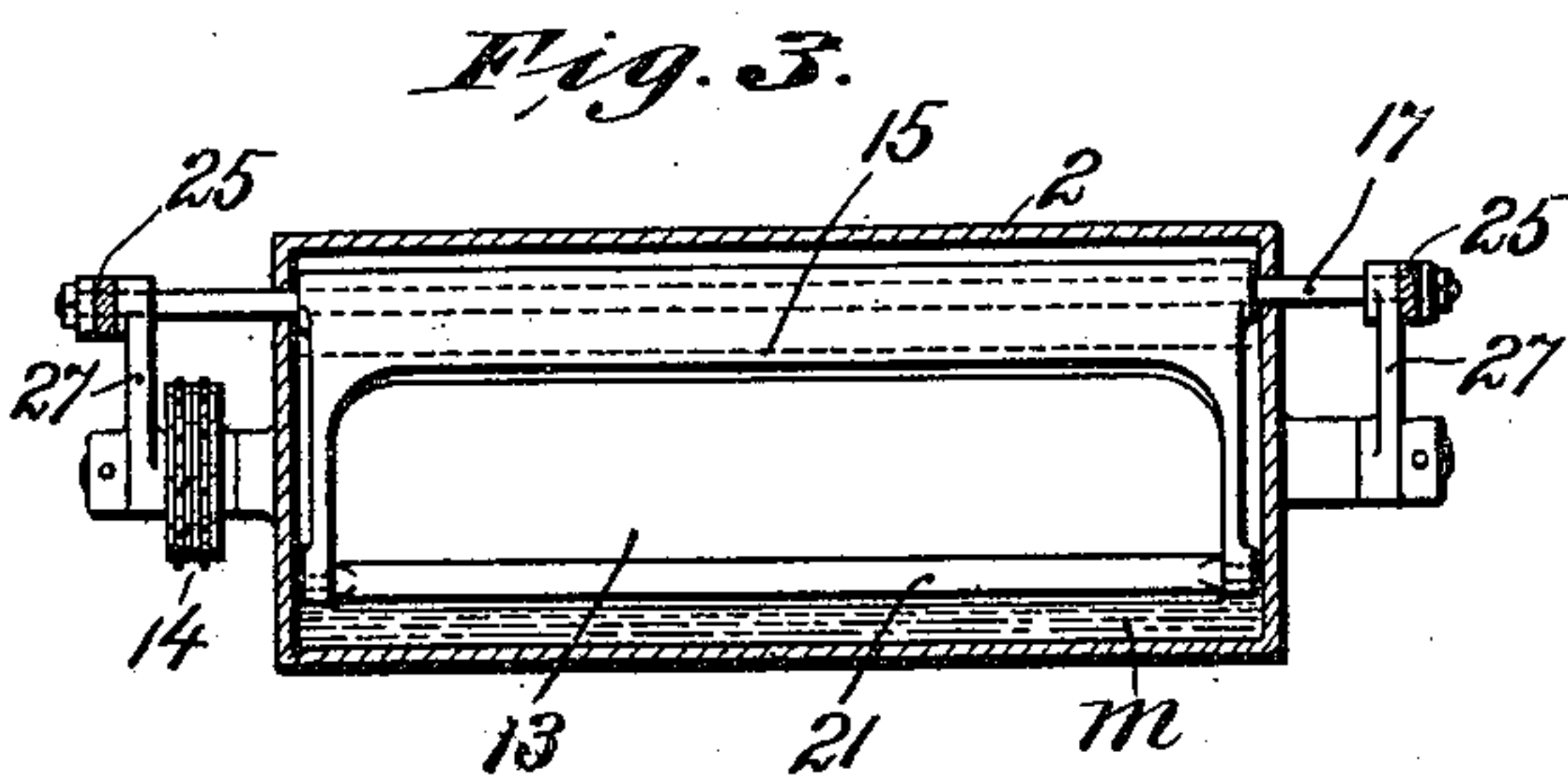
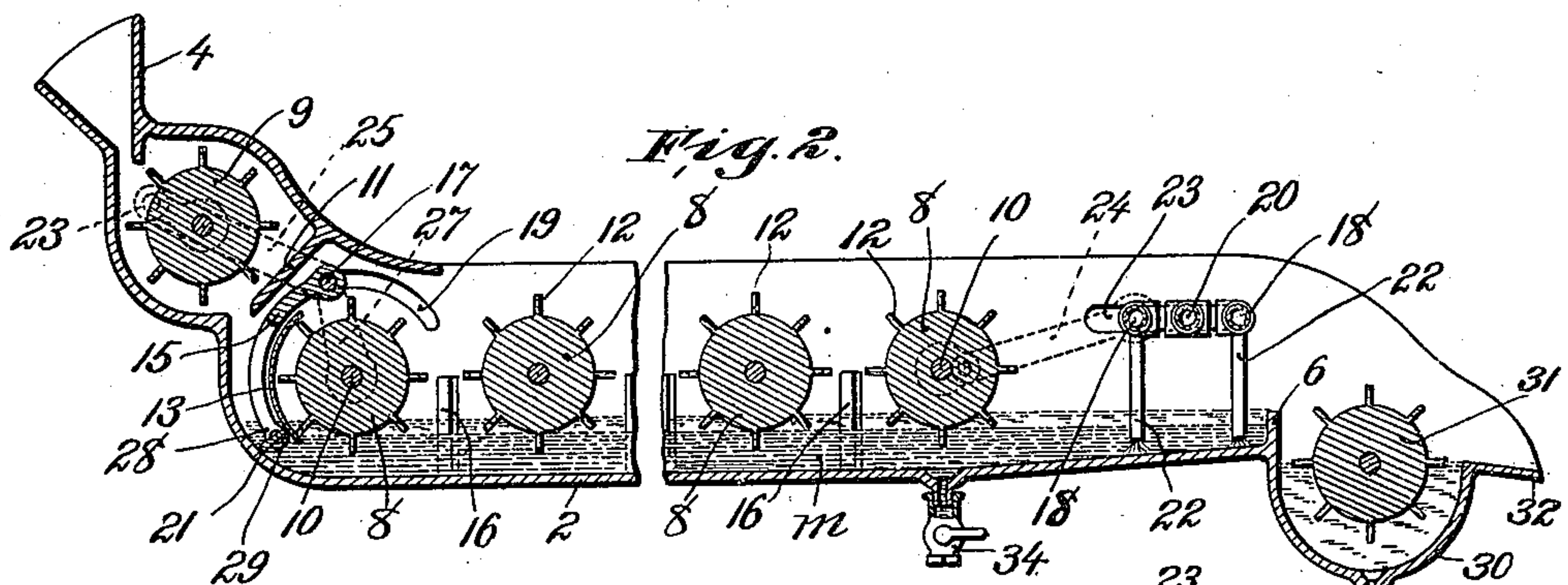
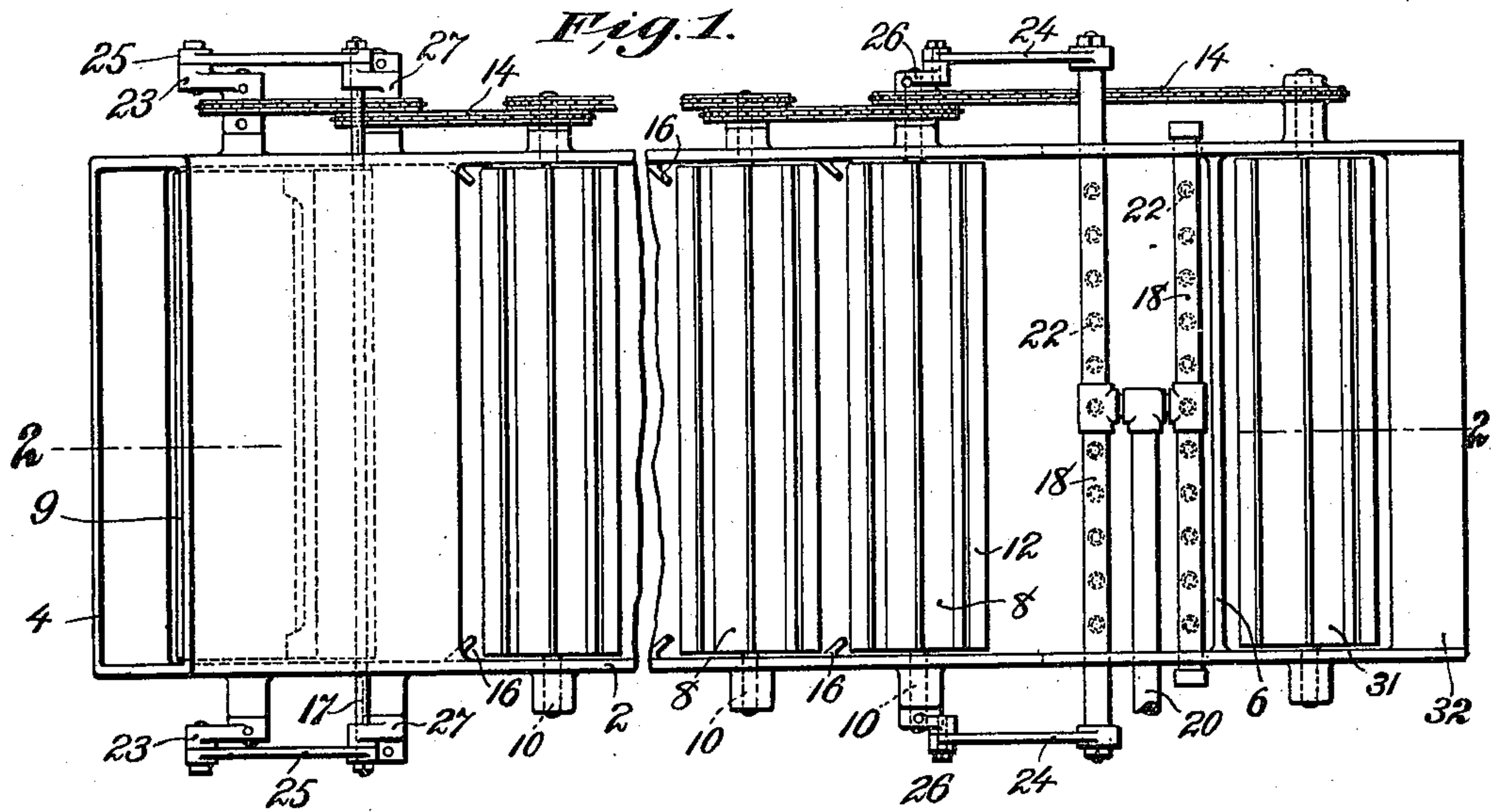


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 AMALGAMATOR.  
 APPLICATION FILED MAY 11, 1908.

975,704.

Patented Nov. 15, 1910.



Witnesses

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# UNITED STATES PATENT OFFICE.

JOSEPH H. McNEIL, OF EAST SAUGUS, MASSACHUSETTS.

## AMALGAMATOR.

975,704.

Specification of Letters Patent.

Patented Nov. 15, 1910.

Application filed May 11, 1908. Serial No. 432,297.

*To all whom it may concern:*

Be it known that I, JOSEPH H. McNEIL, a citizen of the United States, residing at East Saugus, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Amalgamators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to amalgamators, and more particularly to that type of amalgamator for use in the separation of "flour gold" from the auriferous matter in which it is contained.

One feature of the invention includes the provision of improved means for insuring a thorough contact with the mercury of the finely crushed auriferous matter containing the flour gold during its passage through the mercury.

Other features of the invention include the provision of improved means for feeding the auriferous matter to the mercury and for preventing caking of the materials in the amalgamator during the separation of the gold.

In addition to the features of the invention above referred to, the invention also consists in certain constructions and arrangements of parts as fully set forth hereinafter, the advantages of which will be obvious to those skilled in the art.

To this end the invention comprises the features and combinations of parts herein-after described and particularly pointed out in the appended claims.

The various features of the invention will be best understood from a description of one embodiment thereof, such, for instance, as illustrated in the accompanying drawings, in which:

Figure 1 is a plan view of the amalgamator; Fig. 2 is a section in elevation on the line 2—2 of Fig. 1; Fig. 3 is a detail showing the supplemental feeding device in elevation; and Fig. 4 is a detail in section illustrating the operation of the supplemental feeding device.

In the embodiment of the invention selected for illustrative purposes, a trough 2 is provided for containing mercury, indicated by *m*. The trough 2 is provided at one

end with a hopper 4 into which the auriferous matter is introduced, and at its other end with a weir 6. In the body of the trough are arranged a series of feeding drums 8 mounted on shafts 10 journaled in the sides of the trough 2. These drums are of comparatively large diameter, the peripheral surface in each instance being in contact with the surface of the mercury in the trough. Each of the drums 8 is provided with radially arranged short feeding blades 12 which enter the mercury and on rotation of the drums assist in feeding the auriferous matter through the trough. The drums 8 are placed as closely together as is permitted by their feeding blades 12, so that as the material containing the gold is passed beneath them they assist in holding said material below the surface of the mercury, thereby facilitating a thorough mixture of the mercury and auriferous matter. The drums 8 are rotated to feed the material through the mercury by means of chain-and-sprocket gearing 14 connecting all the drums, which gear may be driven from any suitable source of power. Owing to the journaling of the drums in the sides of the trough it is difficult to prevent the formation of a space between the ends of the drums and the trough sides.

As it is highly desirable that the auriferous matter be thoroughly mixed with the mercury and not be allowed to rise to the surface of the mercury, means should be provided to prevent said matter from passing into or through the spaces just referred to. To obtain this end, a pair of deflectors 16 are provided in front of each of the drums, and extending from the sides of the trough and across said open spaces. These deflectors rise vertically from the bottom of the trough (Fig. 2) and preferably project obliquely from the trough sides (Fig. 1) so that they act to guide the auriferous matter toward the center of the trough, beneath the drums and away from the spaces at the ends of the drums. After the auriferous matter has been thoroughly mixed with the mercury so as to separate the gold therefrom, it is liable, unless the tailings are immediately removed from the trough, to gather in a mass beyond the feeding devices, or to cake up, and thus prevent the withdrawal at the proper time from the trough



of the mercury-coated particles of gold alone. To avoid this it is customary to introduce water into the trough beyond the feeding devices so as to wash the tailings out of the trough. In the present instance it has been found highly advantageous to supply the water for the wash at a point beneath the surface of the mercury, as it thus tends to cause a stirring up or boiling of the mixture of matter and water and materials suspended therein to prevent the caking or gathering in a mass of said materials. There has therefore been provided at the lower end of the trough and between the feeding drums 8 and the weir 6, a transversely arranged water pipe or pipes 18, herein shown as two, and fed by a pipe 20 from a suitable source of supply. Each of the pipes 18 is provided with a series of downwardly projecting discharge nozzles 22 which extend beneath the surface of the mercury. The water pipe cannot be wholly submerged in the mercury as it would then be completely filled with the mercury and this would prevent an efficient discharge of the water. Therefore, only the portion of the water supply conduit in which the discharge openings are located is submerged, leaving a portion of the supply passage within the trough above the surface of the mixture of mercury and auriferous matter and thus avoiding a complete filling of the conduit with mercury and the consequent obstruction to the flow of the water. An efficient manner of further preventing the caking of the materials in the amalgamator is to provide a stirrer for constantly agitating the matter after its amalgamation by passing beneath the feeding drums. In order to thus agitate the matter the pipe or pipes 18 are passed through slots 23 in the sides of the trough and connected by pitmen 24 to cranks 26 on one of the rotary shafts 10 for sustaining the drums 8. With such a construction, as the feeding drums rotate the pitmen 24 are reciprocated, and they in turn reciprocate the discharge nozzles 22, which, owing to their projection through the matter and into the mercury, provide the desired agitation of the materials held in suspension.

Between the hopper 4 and the first drum 8 of the series, there is preferably provided an auxiliary feeding drum 9 similar in its construction to the drums 8, which directs the auriferous matter from the hopper 4 through an opening in a partition 11 into the trough. Between the forward wall of the trough and the first of the feeding drums 8 there is arranged a partition 13 which extends transversely across the forward end of the trough and forms between it and the wall of the trough a passage for the auriferous matter. It has been found convenient to mount, for movement in the passage just

described, a supplemental feeding device for forcing the auriferous matter beneath the surface of the mercury before it is acted upon by the feeding blades 12 on the drums 8. To this end a curved hanger 15 is mounted on a rod 17 extending transversely across the trough 2 and projecting at each end through circular slots 19 in the sides of the trough, which hanger is provided with a feeding blade 21. The hanger with its feeding blade 21 is reciprocated toward and from the mercury by means of cranks 23 mounted on the shaft of the drum 9 and connected by pitmen 25 with the outer ends of the rod 17, which rod is sustained by supports 27 loosely mounted on the shaft 10 of the first drum 8. The feeding blade 21 is pivotally mounted by its ends in the hanger 15 which is provided with a pair of stops 28 and 29 to limit its movement in either direction about its pivotal points. The mounting of the blade 21 is such that as the hanger 15 is moved upward by rotation of the cranks 23 the blade will swing about its pivots and into engagement with the stop 28 so as to assume the position shown in Fig. 4, and will be drawn upward edgewise through the auriferous matter, filling the passage in which the supplemental feeding device operates. Preferably, the feeding blade is somewhat thicker at its forward edge than at its rear edge, so that it is aided by gravity in rotating about its pivots to an edgewise position. On the downward stroke of the hanger 15, however, the engagement of the blade with the auriferous matter in the passage will cause the blade to again swing about its pivots until it engages the stop 29, at which time it extends transversely across the passage mentioned and will force a charge of the auriferous matter ahead of it and beneath the mercury, where such matter is thereafter engaged by the feeding blades of the drums and passed onward through the trough. With this construction an efficient means is provided for insuring an initial placing of the auriferous matter beneath the surface of the mercury.

Beyond the weir 6 there is provided a catch basin or trap 30 within which there is mounted a rotating drum 31 similar to the feeding drum 8, and from this trap extends an overflow orifice 32. It has been found that frequently some of the gold which has been separated from the mercury by the auriferous matter washes over the weir at the end of the trough with the tailings. The trap 30 is designed to catch and retain such valuable matter, and it is provided with a valve or gate 33 of any suitable construction, for drawing this matter off. The trough 2 is also provided with a valve or gate 34 for drawing off the gold separated from the auriferous matter, and to facilitate such removal the trough 2 is preferably somewhat



lower at its center longitudinally than at its sides. The trough is also provided with a sloping rear end, the valve 34 being placed at the juncture of these slanting portions of the trough bottom.

While the illustrated embodiment of the invention shows the devices for discharging water and agitating the mixture located within the trough at the end where the tailings are discharged, the invention, as defined by the claims, is not limited to this particular arrangement.

Nothing herein contained is to be interpreted as limiting the invention in the scope of its application to use in connection with the particular mechanism here selected for purposes of illustration and explanation. While the particulars of construction herein set forth are well suited to one form of the invention, it is not to be understood that these particulars are essential, since they may be variously modified within the skill of the artisan without departing from the true scope of the actual invention as defined in the following claims.

What is claimed as new, is:—

1. An amalgamator, having, in combination, a substantially flat bottomed mercury trough, a rotary drum provided with feeding blades extending across the trough, and deflectors in front of said drum to guide the auriferous matter away from the spaces at the ends of the drum and into contact with the feeding blades, said deflectors extending outwardly from the sides of the trough and downwardly below the lowermost portion of the surface of the drum to the trough bottom.

2. An amalgamator, having, in combination, an elongated mercury trough, means in the forward portion of the trough for feeding the auriferous matter through the mercury, a water pipe above the mercury extending across the trough at its rear end and beyond the feeding means, a plurality of discharge nozzles extending downwardly from said pipe and into the mercury, and means for agitating said nozzles as the water is being discharged.

3. An amalgamator, having, in combination, a mercury trough, a supply hopper, and means for feeding the auriferous matter through the amalgamator comprising a rotary drum in the hopper, rotary drums in the trough, a supplementary feeding device operating in the trough in a supply passage formed between the hopper and trough drums, and means for operating said drums and feeding device.

4. In an amalgamator, a mercury trough, a supply chute, and a reciprocatory feeder between the discharge end of the chute and the mercury adapted to force the auriferous matter beneath the mercury, said feeder having a centrally pivoted feeding blade

constructed and arranged to swing into position to engage the materials with its flat surface on the feeding stroke and weighted to swing by gravity into position to pass edgewise through the materials on its return stroke.

5. An amalgamator, comprising, in combination, a mercury trough, a plurality of feeding drums in said trough, a supply hopper at one end of the trough above said drums, a feeding drum in said hopper, a trap at the other end of the trough below said drums, a feeding drum in said trap, means beyond the drums to supply water to agitate the matter and wash out the tailings into the trap, supplementary means to assist the hopper drum in supplying auriferous matter to a point where it will be engaged by the feeding drums, and supplementary means to assist the water to agitate the matter.

6. An amalgamator, comprising, in combination, a mercury trough, rotary feeding drums therein, a reciprocatory feeding device arranged to move about the foremost drum and force a charge of matter beneath said drum, and an agitator for the matter, said last two elements being controlled in their movements by the movement of the rotary feeding drums.

7. An amalgamator, having, in combination, a mercury trough, a rotary feeding drum near one end thereof so arranged that the surface of the mercury forms a tangent plane with its peripheral surface and provided with feeding blades projecting into the mercury, a partition extending into the mercury between the drum and the end wall of the trough arranged parallel to said drum and wall and forming an annular passage for the reception of the auriferous matter before it is engaged by the feeding blades, and a supplemental feeding device constructed to operate in said passage and adapted to carry a charge of matter beneath the drum and into position to be fed forward by said feeding blades.

8. An amalgamator, having, in combination, a mercury trough, means for feeding the auriferous matter through the trough to procure amalgamation, and means for washing the matter after its amalgamation and during the discharge of the tailings from the trough comprising a water conduit in the trough and provided with discharge openings, said conduit extending into the mercury but to an extent to submerge only that portion in which the discharge openings are located.

9. An amalgamator, having, in combination, an elongated mercury trough adapted to receive the auriferous matter at one end and discharge the tailings at its other end, means for feeding said matter through the mercury thereby causing separation of the

noble metals, means for discharging water  
beneath the surface of the mercury at the dis-  
charge end of the trough to prevent caking  
of the matter after passing the feeding  
5 drums and to assist a discharge of the  
tailings, and provision for agitating said  
means during the discharge of the water.

In testimony whereof I affix my signa-  
ture, in presence of two witnesses.

JOSEPH H. McNEIL.

Witnesses:

BENJAMIN A. SLOCUM,  
WARREN G. OGDEN.