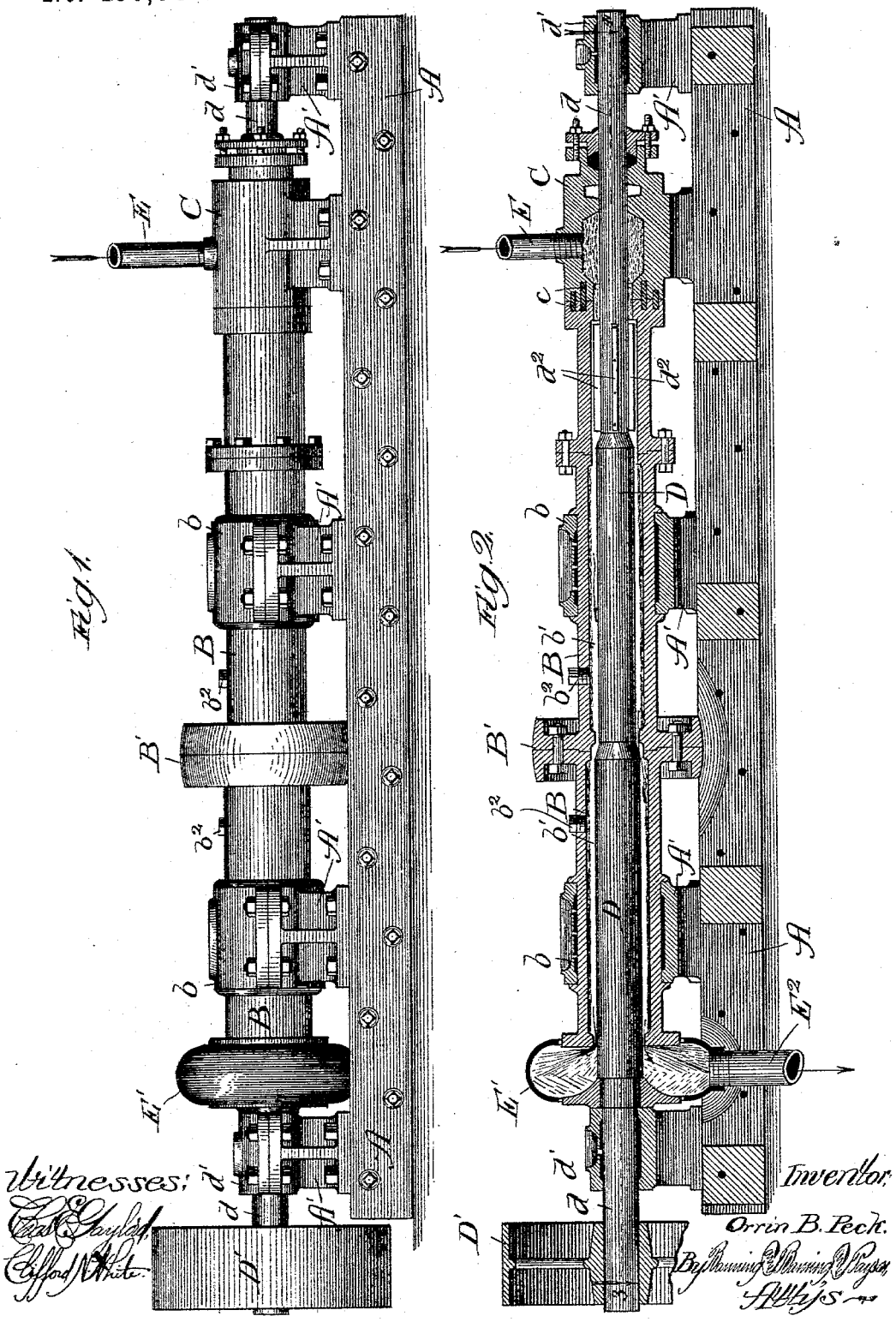
(No Model.) 5 Sheets—Sheet 1.

O. B. PECK.

CENTRIFUGAL AMALGAMATOR.

No. 490,041. Patented Jan. 17, 1893.



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O. B. PECK.

CENTRIFUGAL AMALGAMATOR.

No. 490,041. Patented Jan. 17, 1893.

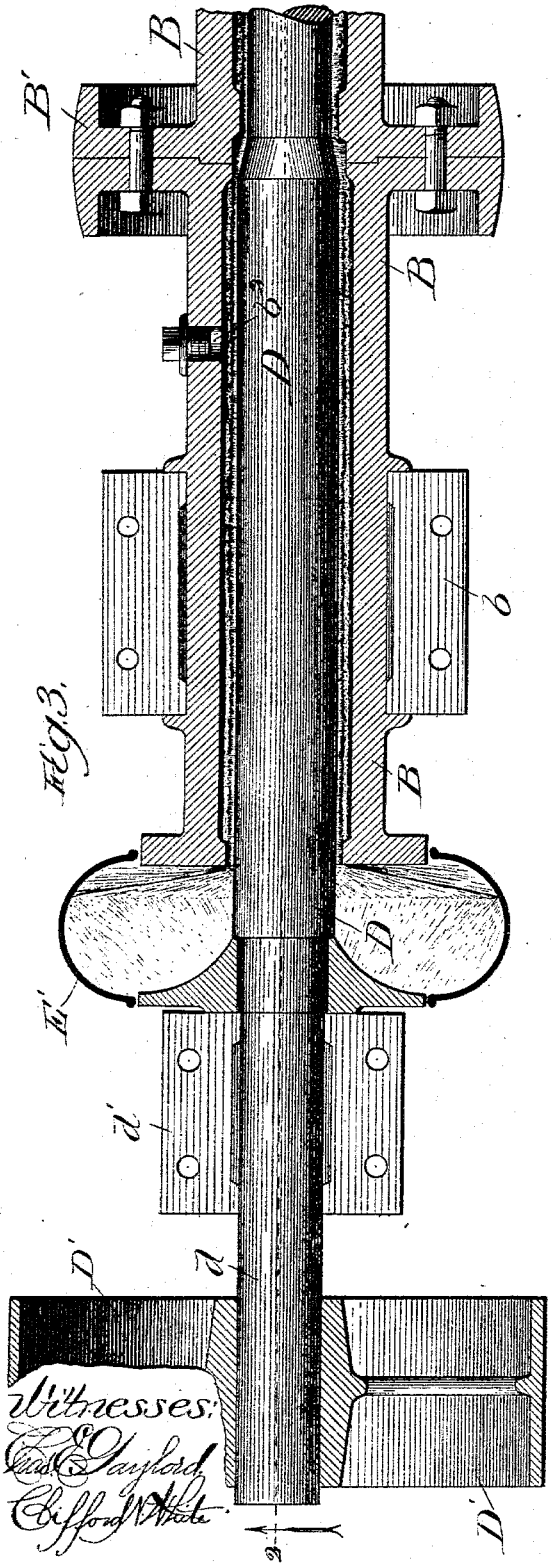

Fig. 3.

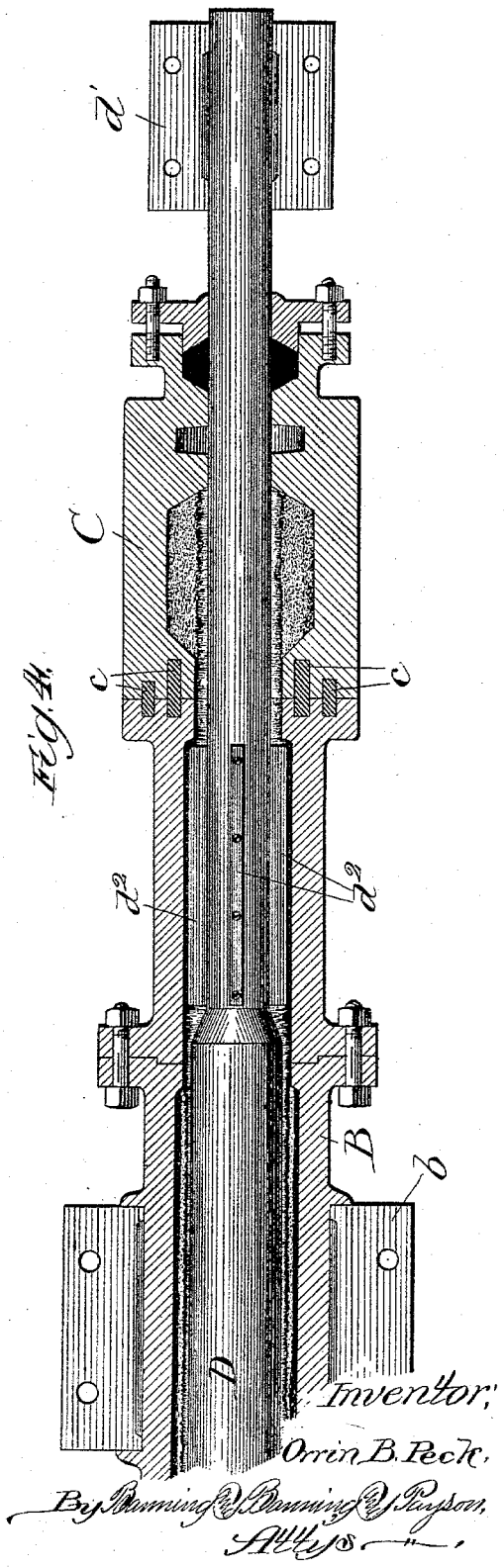

Fig. 4.

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(No Model.) 5 Sheets—Sheet 3.

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CENTRIFUGAL AMALGAMATOR.

No. 490,041. Patented Jan. 17, 1893.

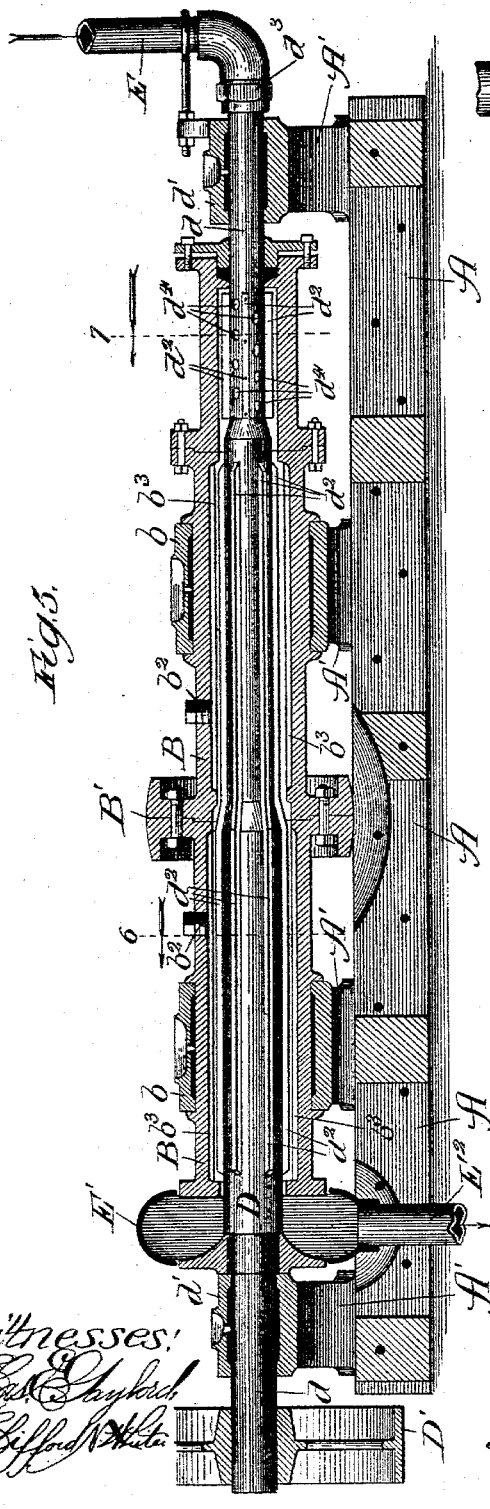

Fig. 5.

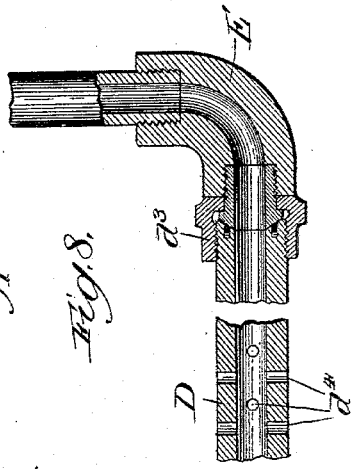

Fig. 8.

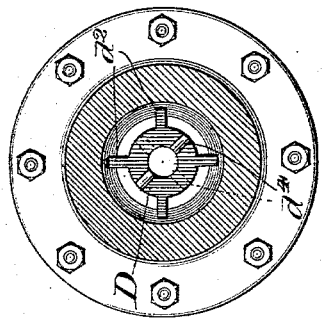

Fig. 7.

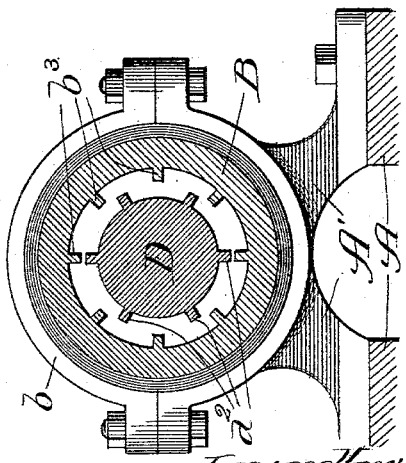

Fig. 6.

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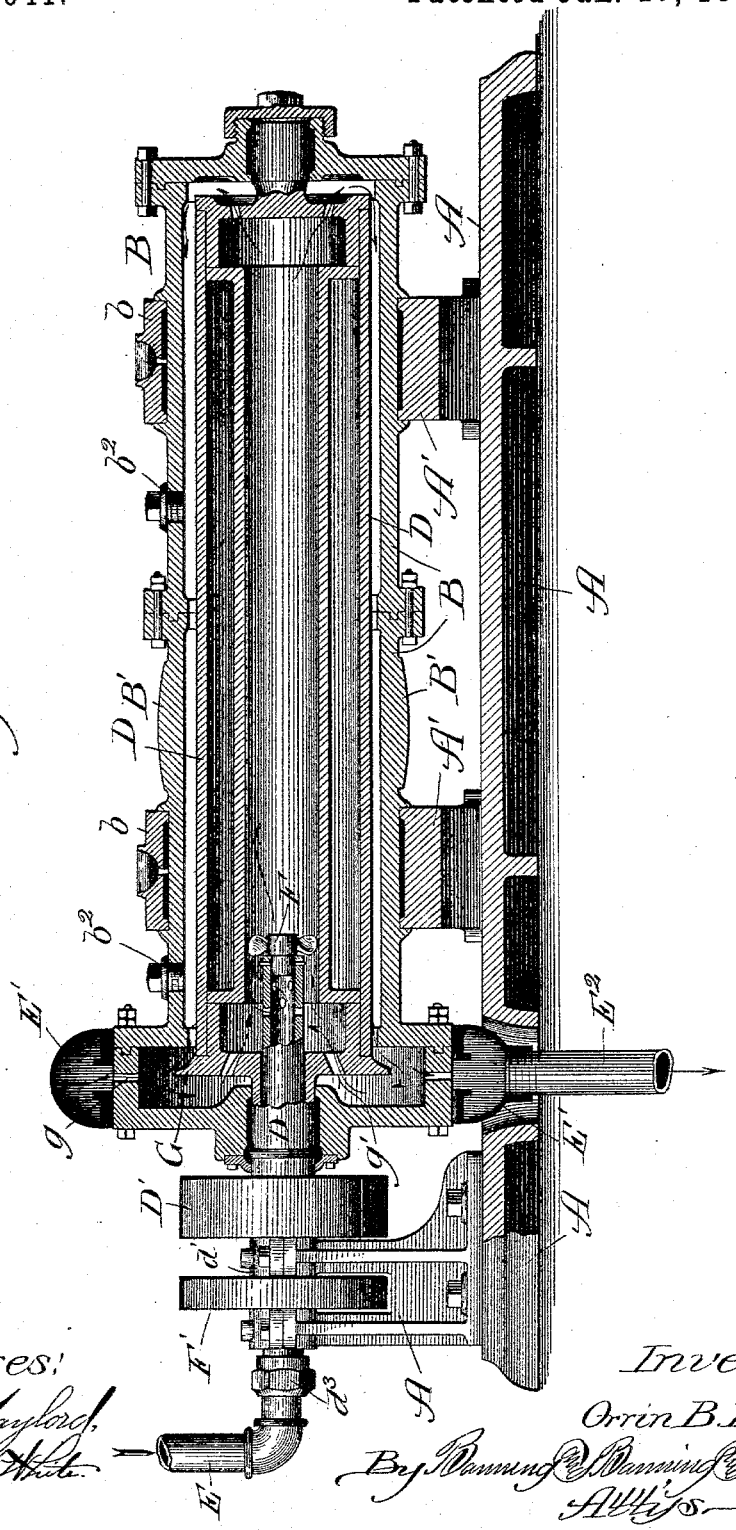
(No Model.) 5 Sheets—Sheet 4.

O. B. PECK.

CENTRIFUGAL AMALGAMATOR.

No. 490,041. Patented Jan. 17, 1893.

Fig. 9.



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CENTRIFUGAL AMALGAMATOR.

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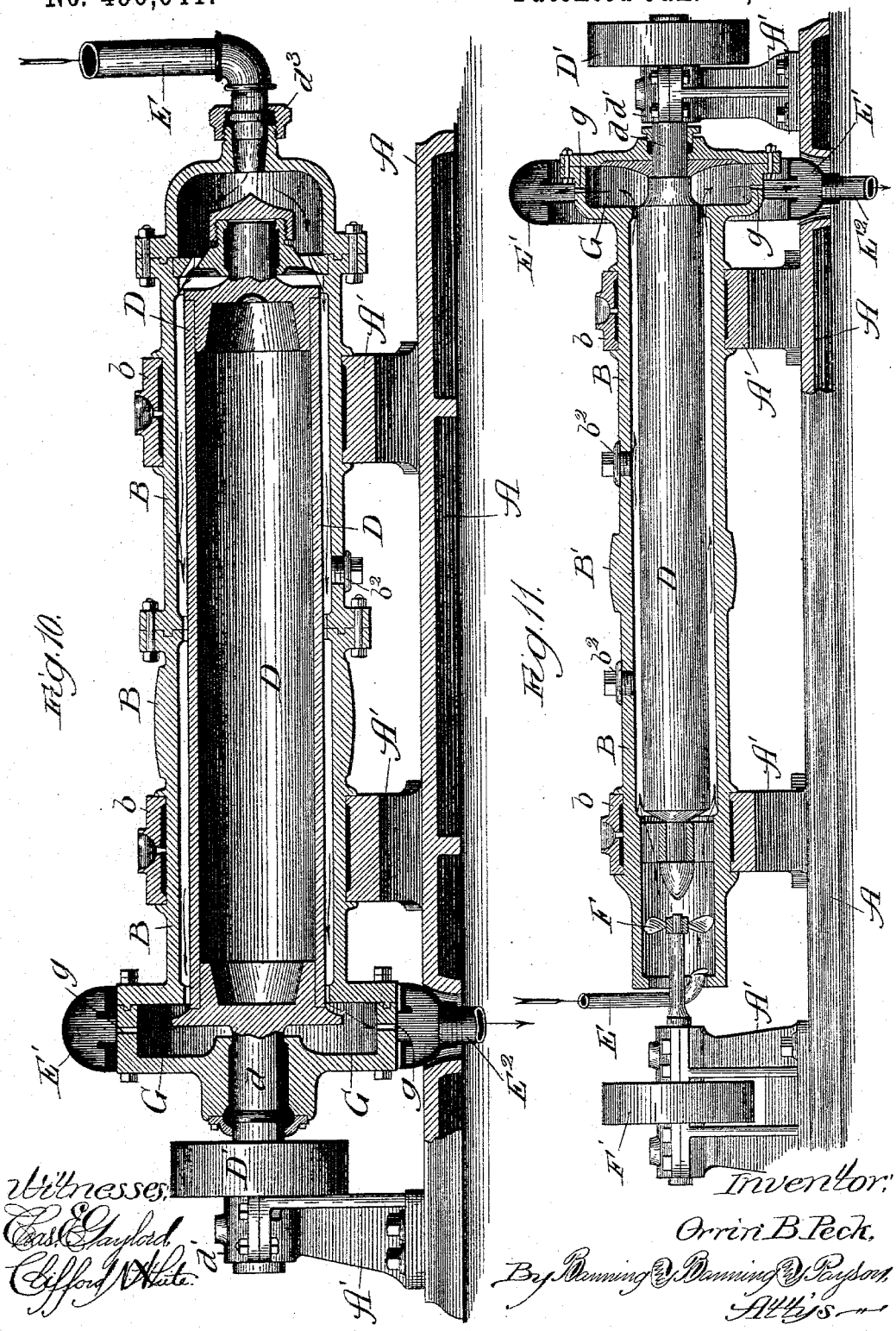

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UNITED STATES PATENT OFFICE.

ORRIN B. PECK, OF CHICAGO, ILLINOIS, ASSIGNOR TO MELINDA PECK, OF SAME PLACE.

CENTRIFUGAL AMALGAMATOR.

SPECIFICATION forming part of Letters Patent No. 490,041, dated January 17, 1893.

Application filed September 26, 1892. Serial No. 446,912. (No model.)

To all whom it may concern:

Be it known that I, ORRIN B. PECK, a citizen of the United States, residing at Chicago, Illinois, have invented certain new and useful Improvements in Centrifugal Amalgamators, of which the following is a specification.

In the drawings, Figure 1 is a side elevation of my improved amalgamator; Fig. 2 a vertical longitudinal section taken on line 2 of Fig. 3; Fig. 3 an enlarged plan sectional view of one half of the machine, taken on line 3 of Fig. 2; Fig. 4 an enlarged plan sectional view of the other half of the machine, taken on line 4 of Fig. 2; Fig. 5 is a vertical longitudinal sectional view similar to that shown in Fig. 2, and showing a modified form of construction; Figs. 6 and 7 are enlarged cross sectional views taken on lines 6 and 7 respectively of Fig. 5; Fig. 8 an enlarged sectional view of the construction between the feed pipe and the rotating deflector shaft, and Figs. 9, 10 and 11, are vertical longitudinal sectional views of the machine showing further modifications.

In making my improved centrifugal amalgamator, I make a bed, A, provided with brackets, A′, adapted to receive and support the bearings in which the operative parts of the apparatus are arranged. I make a revoluble amalgamating vessel, B, adapted to be rotated through means of a belt operating on a pulley, B′, or in any other convenient way. The amalgamating vessel is arranged in bearings, *b*, supported by the brackets, A′, to permit it to be rotated at the desired rate of speed. At one end of the revoluble amalgamating vessel is preferably arranged a non-revoluble receiving vessel or chamber C, into which the material to be treated is first introduced, and from which it passes to the revoluble vessel, as shown in Figs. 1, 2 and 4. the vessels B and C are arranged end to end, and rings or packing, *c*, shown in Figs. 2 and 4, let into annular grooves in the ends. These rings fit with sufficient looseness in the grooves of one of the ends to permit the revoluble vessel to freely revolve, notwithstanding their presence. Their object, as will of course be understood, is to prevent leakage. A deflector, D, is arranged longitudinally in the revoluble amalgamating vessel, to force or deflect the material being treated into closer contact with the amalgamating surface. This deflector may also be made to perform the office of a stirrer or distributer, as will be more particularly hereinafter explained. The deflector is preferably provided at its ends with trunnions or deflector shafts, *d*, which are suitably journaled in bearings *d′*, to permit it to be rotated within the amalgamating vessel.

In order to impart the desired rotation to it, the deflector shaft may be provided at one end with a pulley D′, through which it may be rotated by means of a belt, or in any other convenient way. Between the amalgamating vessel B and the deflector D, there is a longitudinal annular channel, passage or space, through which the material, while under treatment, may pass to effect the separation of the valuable from the worthless particles. I do not mean, however, to confine myself to a channel or passage formed by the arrangement of two revolving vessels or cylinders, one within the other. The channel or passage through which the material is passed is intended to be in juxtaposition to the amalgamating surface, and it may be made or formed in any desired way. Nor do I consider it material whether the channel or passage be annular, or divided up into a number of separate channels or passages. As to the means used for forming the channel or passage, therefore, as much latitude of construction may be employed as desired. I provide the amalgamating vessel, or the channels therein, with shallow chambers or depressions, *b′*, adapted during its operation to receive and contain the desired quantity of mercury necessary to effect the amalgamation of the particles which it is desired to secure. These shallow chambers may be made in different ways, several of which I have shown in the drawings, but I prefer to make them of such shape or in such manner as that they will hold or retain the mercury the more securely the greater the amount of centrifugal force developed. In Fig. 2 I have shown them as annular, while in Fig. 6 I have shown them formed by arranging a number

of longitudinal ribs or partitions on the interior surface of the amalgamating vessel. The material to be treated, preferably diluted with water, may be introduced into the non-revoluble receiving chamber through a pipe E, as shown in Figs. 1 and 2, whence it passes into the channel or passage of the amalgamating vessel. It is there subjected to centrifugal action and directed or guided by the deflector into close proximity to the amalgamating surface, as it proceeds through the channel or channels toward the point of discharge. The material to be treated may, if preferred, be introduced under pressure from a force pump or other convenient means of so introducing it. The precious metals that are in condition to be precipitated or amalgamated in the mercury are caught therein and retained, while the more worthless particles and water pass into the end of the revoluble amalgamating vessel, where they are discharged into a curbing, E′, to be carried off through a pipe E^2, to the desired place of deposit. After a sufficient amount of precious metals has been secured by the amalgamating material, the further introduction of material to be treated may be suspended, and the rotation of the revoluble amalgamating vessel stopped, when the amalgamating material and the precious metals caught up by it may be allowed to flow out through holes, b^2, which may be closed by caps during the operation of the amalgamator.

I have shown in Fig. 2 a number of longitudinal flanges or wings, d^2, adapted to operate upon the material immediately after it passes from the non-revoluble receiving vessel into the revoluble amalgamating vessel. These wings or flanges serve to stir the material so as to bring it the more quickly into condition to be operated upon.

In Fig. 5 I have shown the deflector provided throughout its entire length with longitudinal wings or flanges to stir or distribute the material while under treatment and distribute it uniformly over the amalgamating surface. In the modified form of construction shown in Fig. 5, I have dispensed with the non-revoluble receiving vessel, and have made the end of the deflector shaft hollow and rotatably connected by a packing box, d^3, with the feed pipe or conduit E, in a way that the material to be treated may be introduced into the hollow portion of the deflector shaft and through the amalgamating channel or channels under pressure. I have provided the hollow shaft with perforations, d^4, within the end of the hollow amalgamating vessel, so that the material is discharged into such vessel and subjugated to treatment, as in the cases above cited. In the modified construction shown in Fig. 5 I have not only provided the deflector with longitudinal wings or flanges, but I have also provided the amalgamating vessel B with longitudinal wings or flanges b^3, dividing the shallow depressions or chambers for the reception and retention of the amalgamating material into longitudinal compartments.

In Fig. 9 I have shown still another modified form of construction. In this case the material to be treated is introduced into the hollow of the deflector, substantially in the same manner as in Fig. 5, and need not, therefore, be represented or described in detail. After the material has entered the interior of the hollow deflector, it is forced forward by a screw or obliquely arranged revolving blades, F, mounted on a shaft adapted to be rotated by a pulley F′, through means of a belt or in other convenient ways, and as it reaches the other end of the deflector it passes out through ports or passages, as shown by the arrows, into the amalgamating channel or passage between the deflector and the revoluble amalgamating vessel. As it passes along this passage or channel, a portion of the precious metals is caught up and retained by the amalgamating material, and the water and more worthless portions of the material being treated pass into the enlargement or chamber G, provided with discharge orifices, g, through which the waste and a portion of the water pass, to be carried off by the pipe E^2. A portion of the water, however, again enters the hollow of the deflector, through holes g', as represented by the arrows, to be again forced forward and circulated around through the amalgamating channels or passages.

In Fig. 10 I have shown another modified form of construction. In this case the material introduced through the pipe E passes into the amalgamating channels or passages, and along through them, between the revoluble amalgamating vessel and the external surface of the deflector, to the chamber or enlargement G, and out through the ports g, to be carried off through the pipe E^2, as in the other cases, but without having a portion of the water forced back through the deflector, to again pass or circulate through the amalgamating channels.

In Fig. 11 I have shown the material entering through the pipe E into the chamber or receptacle, where it is immediately operated upon by the screws or blades F, and forced through the amalgamating passages or channels without passing through the interior of the deflector, whence it escapes to the orifices and is carried off by the pipe E^2 as in the other cases. In those cases where the deflector is rotated, I prefer that the outer vessel should be rotated at a somewhat different speed, and that the speed of rotation of the outer vessel should be sufficient to develop a centrifugal force greater than the force of gravitation, although, of course it may be rotated at as much higher speed as may be found desirable or advantageous in operation, to best suit the varying conditions found in the material to be treated.

While I have illustrated and described the construction, arrangement and operation of my improvements with considerable detail, I

wish it to be understood, however, that I do not intend to limit myself to details of construction further than as I may mention such details in my claims.

In the claims I will use the term "vessel" to designate the rotatable part or portion of the machine that may be used to contain the channels or passages with the chambers or depressions in them, and mean to include such part under such term whether made technically in the form of a vessel or not. I may also say that when I use the term "material" in the claims, I intend it in a broad signification, to include any water or other liquid which may be mixed with the material, and it is apparent that the means for forcing the material through the channels or passages largely employ the water or other liquid as the agent through which such force is exerted on the material.

What I regard as new and desire to secure by Letters Patent is:—

1. In a centrifugal amalgamator, a rotatable vessel provided with a channel or channels containing chambers or depressions adapted to receive and retain mercury the more securely the greater the amount of centrifugal force developed, means for forcing material through the channel or channels, and means for stirring and distributing the material under treatment, substantially as described.

2. In a centrifugal amalgamator, a rotatable vessel provided with a channel or channels containing chambers or depressions adapted to receive and retain mercury the more securely the greater the amount of centrifugal force developed, means for forcing material through the channel or channels and means for stirring and distributing the material under treatment rotatable independently of the rotatable vessel, substantially as described.

3. In a centrifugal amalgamator, a rotatable vessel provided with a channel or channels containing chambers or depressions adapted to receive and retain mercury the more securely the greater the amount of centrifugal force developed, means for stirring and distributing the material under treatment, and means for deflecting or guiding the material into proximity to the mercury, substantially as described.

4. In a centrifugal amalgamator, a rotatable vessel provided with a channel or channels containing chambers or depressions adapted to receive and retain mercury the more securely the greater the amount of centrifugal force developed, means for stirring and distributing the material under treatment rotatable independently of the rotatable vessel, and means for deflecting or guiding the material into proximity to the mercury, substantially as described.

5. In a centrifugal amalgamator, a rotatable vessel provided with a channel or channels containing chambers or depressions adapted to receive and retain mercury the more securely the greater the amount of centrifugal force developed, and means for mechanically forcing material through the channel or channels, substantially as described.

6. In a centrifugal amalgamator, a rotatable vessel provided with a channel or channels containing chambers or depressions adapted to receive and retain mercury the more securely the greater the amount of centrifugal force developed, and means for mechanically forcing material through the channel or channels rotatable independently of the rotatable vessel, substantially as described.

7. In a centrifugal amalgamator, a rotatable vessel provided with a channel or channels containing chambers or depressions adapted to receive and retain mercury the more securely the greater the amount of centrifugal force developed, means for mechanically forcing material through the channel or channels, and means for deflecting or guiding the material through the channel or channels, substantially as described.

8. In a centrifugal amalgamator, a rotatable vessel provided with a channel or channels containing chambers or depressions adapted to receive and retain mercury the more securely the greater the amount of centrifugal force developed, means for mechanically forcing material through the channel or channels rotatable independently of the rotatable vessel, means for deflecting or guiding the material into proximity to the mercury, and means for stirring and distributing the material under treatment rotatable independently of the rotatable vessel, substantially as described.

9. In a centrifugal amalgamator, a rotatable vessel provided with a channel or channels containing chambers or depressions adapted to receive and contain mercury during the rotation of the vessel, and rotatable obliquely arranged screws or blades for mechanically forcing material through the channel or channels, substantially as described.

10. In a centrifugal amalgamator, a rotatable vessel provided with a channel or channels containing chambers or depressions adapted to receive and contain mercury during the rotation of the vessel, means for mechanically forcing material through the channel or channels, and means for stirring and distributing the material under treatment, substantially as described.

11. In a centrifugal amalgamator, a rotatable vessel provided with a channel or channels containing chambers or depressions adapted to receive and contain mercury during the rotation of the vessel, means for mechanically forcing material through the channel or channels, means for deflecting or guiding the material into proximity to the mercury, and means for stirring and distributing the material under treatment, substantially as described.

12. In a centrifugal amalgamator, a rotatable vessel provided with a channel or channels containing chambers or depressions adapted

to receive and contain mercury during the rotation of the vessel, means for mechanically forcing material through the channel or channels, means for deflecting or guiding the material into proximity to the mercury, and means for stirring and distributing the material under treatment rotatable independently of the rotatable vessel, substantially as described.

13. In a centrifugal amalgamator, the combination of rotatable cylinders, one within the other, provided with a channel or channels containing chambers or depressions adapted to receive and contain mercury during the rotation of the vessel, means for conveying material through the channel or channels, and means for stirring and distributing the material under treatment, substantially as described.

14. In a centrifugal amalgamator, the combination of rotatable cylinders, one within the other, provided with a channel or channels containing chambers or depressions adapted to receive and contain mercury during the rotation of the vessel, means for conveying material through the channel or channels, means for stirring and distributing the material under treatment, and means for mechanically forcing the material through the channel or channels, substantially as described.

15. In a centrifugal amalgamator, the combination of rotatable cylinders, one within the other, provided with a channel or channels containing chambers or depressions adapted to receive and contain mercury during the rotation of the vessel, each of said cylinders being rotatable independently of the other, substantially as described.

16. In a centrifugal amalgamator, the combination of rotatable cylinders, one within the other, provided with a channel or channels containing chambers or depressions adapted to receive and contain mercury during the rotation of the vessel, and rotatable obliquely arranged screws or blades for mechanically forcing material through the channel or channels, substantially as described.

17. In a centrifugal amalgamator, the combination of rotatable cylinders, one within the other, provided with a channel or channels containing chambers or depressions adapted to receive and contain mercury during the rotation of the vessel, at least one of the cylinders being provided with ribs, corrugations or projections on its surface for stirring and distributing the material under treatment, substantially as described.

18. In a centrifugal amalgamator, the combination of rotatable cylinders, one within the other, provided with a channel or channels containing chambers or depressions adapted to receive and contain mercury during the rotation of the vessel, and means for causing water to circulate repeatedly through the channels or passages, substantially as described.

19. In a centrifugal amalgamator, a rotatable vessel provided with a channel or channels containing chambers or depressions adapted to receive and retain mercury the more securely the greater the amount of centrifugal force developed, and a non-rotatable pipe or conduit communicating with the vessel for supplying water and material under pressure thereto, substantially as described.

20. In a centrifugal amalgamator, a rotatable vessel provided with a channel or channels containing chambers or depressions adapted to receive and retain mercury the more securely the greater the amount of centrifugal force developed, means for deflecting and guiding the material along the surface of the mercury in the vessel, and a non-rotatable pipe or conduit communicating with the vessel in a substantially water-tight manner, for supplying water and material under pressure thereto, substantially as described.

21. In a centrifugal amalgamator, the combination of two rotatable cylinders, one within the other, with a channel or passage between them adapted to receive and contain mercury during the rotation of the outer cylinder, and a supply pipe or conduit non-rotatably connected with one of the cylinders in a substantially water-tight manner, for supplying water and material under pressure to the channel or passage, substantially as described.

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