

(No Model.)

2 Sheets—Sheet 1.

C. L. GARLAND & J. & S. E. MURRAY.
CENTRIFUGAL AMALGAMATOR AND SEPARATOR.

No. 604,978.

Patented May 31, 1898.

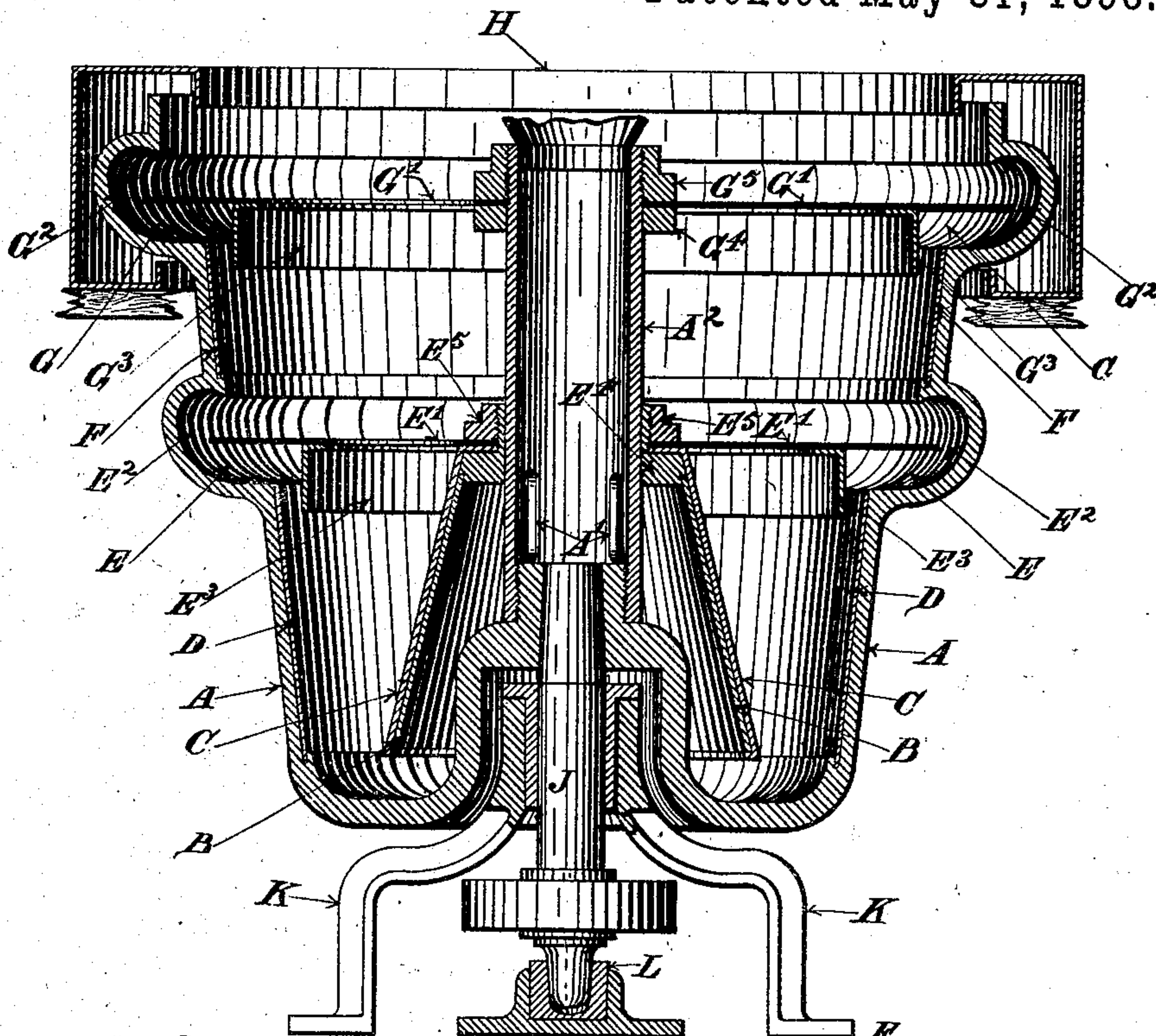


Fig. 1.

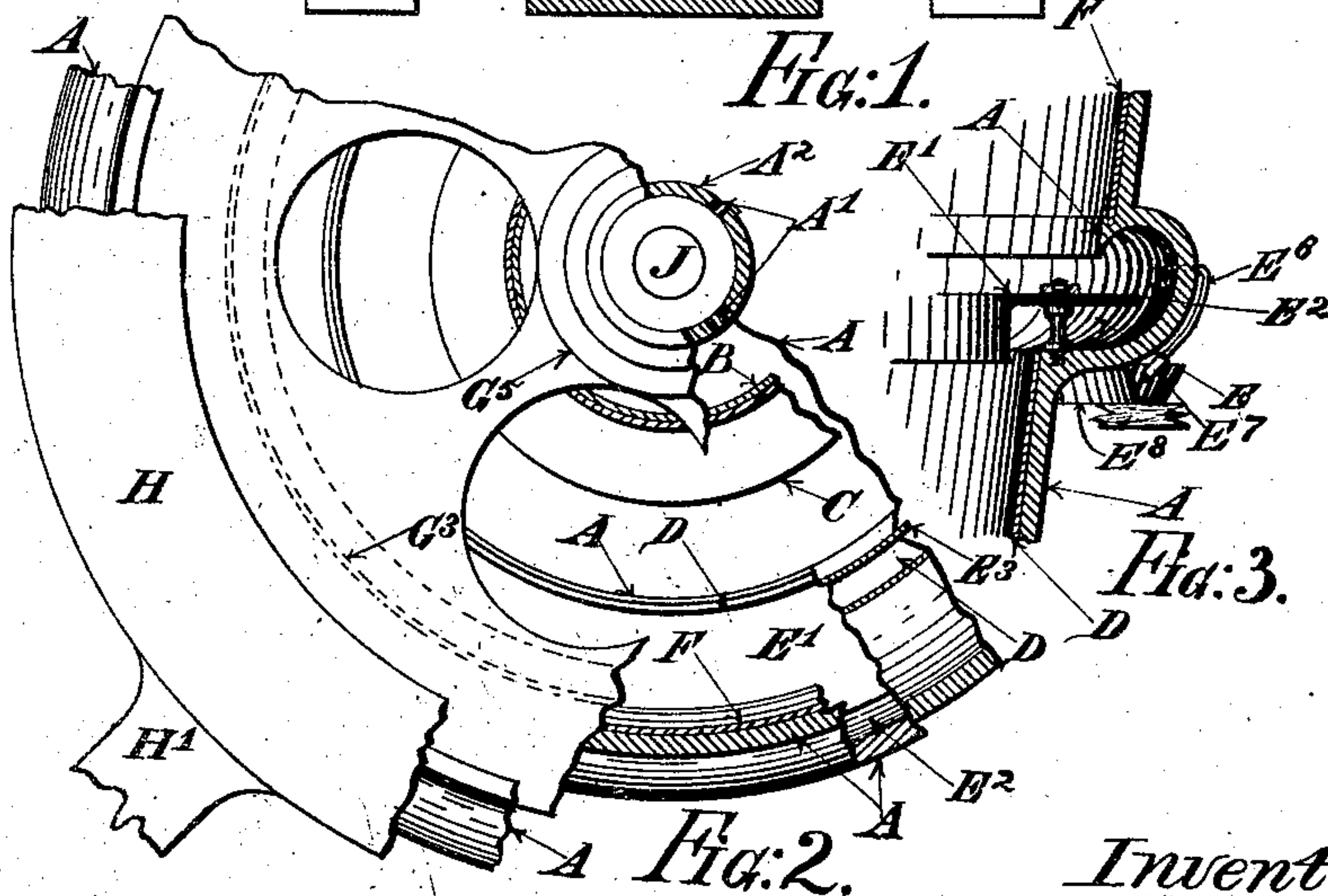


Fig. 2.

Fig. 3.

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Robert Everett

Inventors:

Charles L. Garland

John Murray

Sampson E. Murray

By James L. Norris

Atty.

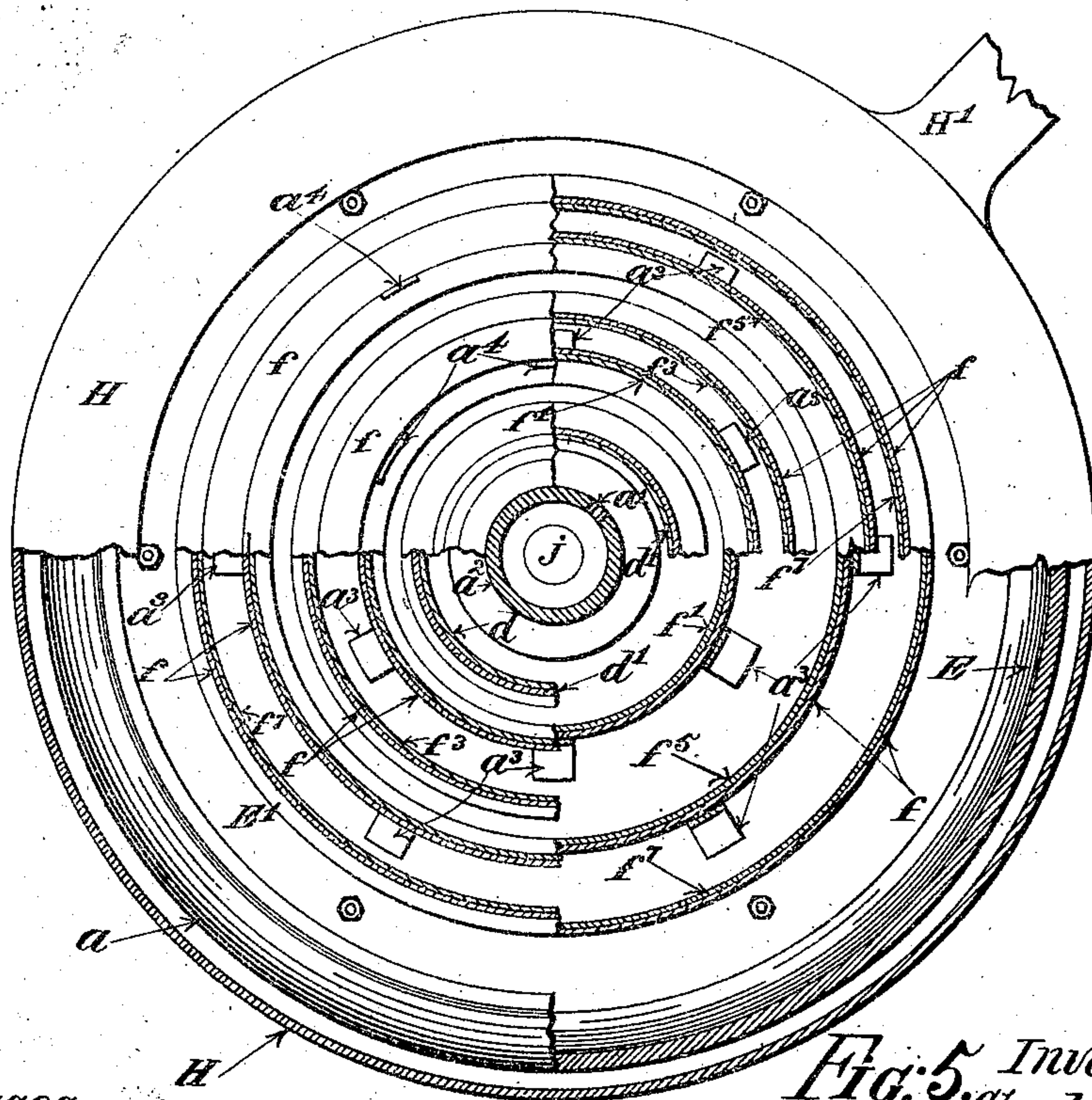
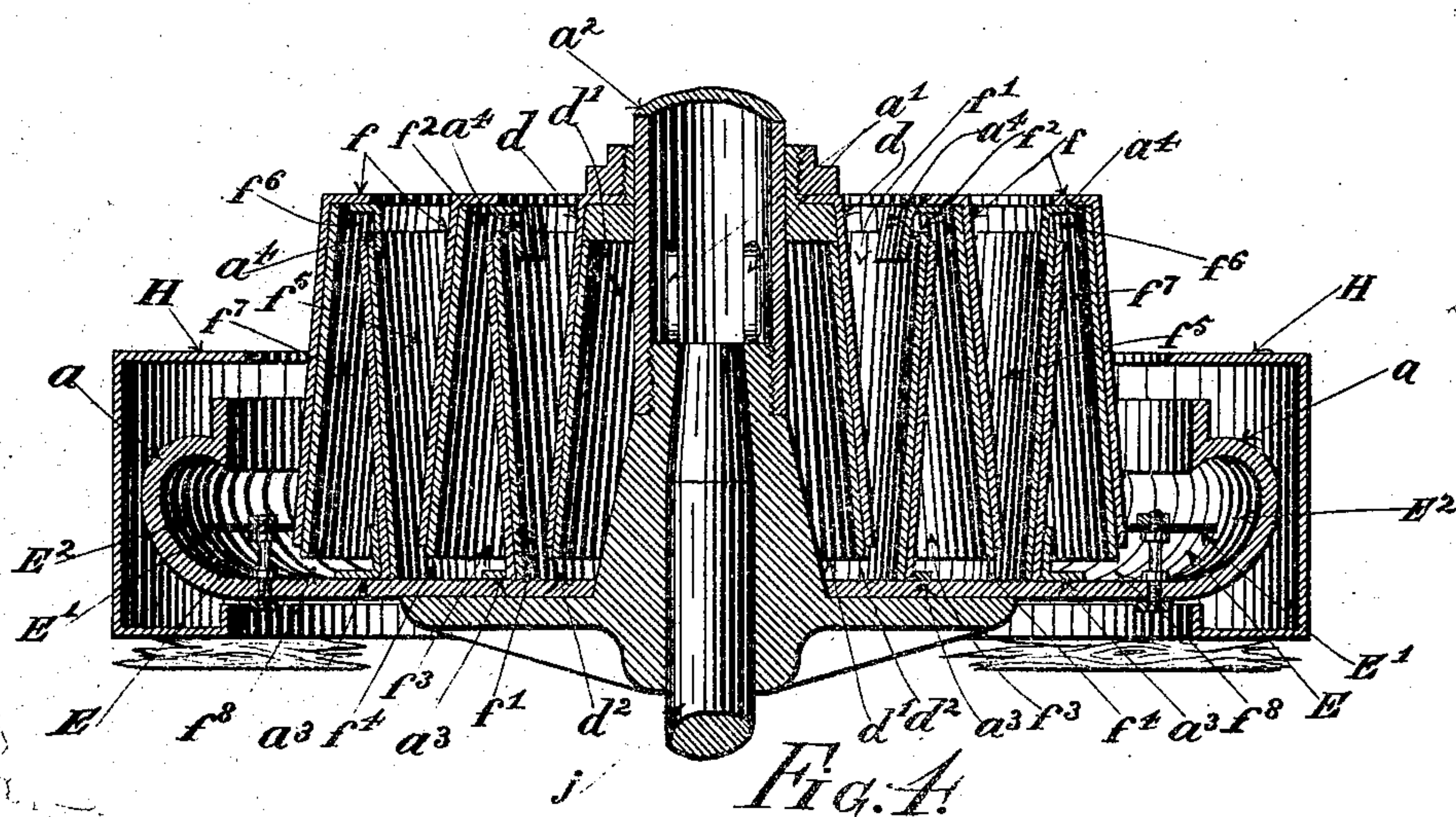
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B. K. K. K.
F. G. G. G.

Fig. 5. Inventors.
Charles L. Garland.
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UNITED STATES PATENT OFFICE.

CHARLES LAUNCELOT GARLAND, OF SYDNEY, AND JOHN MURRAY AND
SAMPSON EDWARD MURRAY, OF COWRA CREEK, NEW SOUTH WALES.

CENTRIFUGAL AMALGAMATOR AND SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 604,978, dated May 31, 1898.

Application filed July 8, 1897. Serial No. 643,901. (No model.)

To all whom it may concern:

Be it known that we, CHARLES LAUNCELOT GARLAND, mine-owner, residing at Sydney, and JOHN MURRAY, mine-owner, and SAMPSON EDWARD MURRAY, carpenter, residing at Cowra Creek, in the British Colony of New South Wales, subjects of the Queen of Great Britain, have invented new and useful Improvements in Centrifugal Amalgamators and Separators for Finely-Divided Auriferous and Argentiferous Materials, of which the following is a specification.

Heretofore attempts have been made to utilize centrifugal force in the amalgamation of the gold and silver contained in finely-divided materials—such as pulverized ores, tailings, and the like. These attempts have up to the present not been successful, as in most of them it was proposed to treat the material in charges or it was proposed to rely upon forces and conditions which are not present in practice.

Now this invention relates to improvements in centrifugal amalgamators and separators for finely-divided auriferous and argentiferous materials in which the operation is continuous, the finely-divided material being fed into the machine and the waste discharged therefrom continuously. In this machine by reason of centrifugal force the auriferous and argentiferous and other metallic particles which are fit for amalgamation are caught upon surfaces of amalgamated plate or plates, (copper or silver or the like plate covered with mercury,) and at the same time the unclean particles are caught or withdrawn from the material under treatment as it passes from feed to discharge.

These improvements in centrifugal amalgamators and separators for finely-divided auriferous and argentiferous materials consist, first, in the combination and arrangement, in and with a revolving pan or bowl or a revolving base or saucer, of one or more approximately (though not precisely) vertical circular peripheries or walls or skins of amalgamating-plate along which the material under treatment is compelled to travel in intimate contact therewith.

These improvements in centrifugal amalgamators and separators for finely-divided

auriferous and argentiferous materials consist, secondly, in the combination and arrangement, in and with a revolving pan or bowl or a revolving base or saucer, of circular catch-grooves or traps of peculiar construction at the end of revolving amalgamating-surfaces or of two or more such circular catch-groove surfaces at the end of and between revolving amalgamating-surfaces. These catch-grooves or traps are circular and preferably of the shape in section of half of the letter S—that is, flaring but having an inward overhang—though they may be of other shape so long as they are divided into two parts with a comparatively narrow connection; and these improvements in centrifugal amalgamators and separators for finely-divided auriferous and argentiferous materials consist, further, in the particular combinations and arrangements of mechanical parts hereinafter described and specifically claimed.

One construction of improved centrifugal amalgamator and separator for finely-divided auriferous and argentiferous materials made according to these improvements consists of a revolving bowl or pan, into which is a central bottom-discharge feed-pipe. This bowl or pan has an approximately (though not precisely) vertical internal periphery of amalgamating-plate and at the head of said plate a catch-groove or trap of the construction hereinafter mentioned. In addition to these mentioned parts there may be an inner cylinder or cone lined with amalgamating-plate reaching nearly to the bottom of the revolving bowl or pan, and there may also be above the first catch-groove or trap a second amalgamating internal circular surface and this superposed by a second catch-groove or trap. There would be of course in any case an annular launder to catch the discharge from the top of the bowl or pan, a feed-hopper for a central hollow spindle of the bowl or pan, a supporting-spindle in a foot step-bearing, and a pulley or other device for revolving the bowl or pan.

A modified construction of improved centrifugal amalgamator and separator for finely-divided auriferous and argentiferous materials made according to these improvements consists of a revolving base or saucer, which

supports a series of approximately (though not precisely) vertical circular peripheries or walls of amalgamating-plate so arranged that the material under treatment will travel over or along them all to a catch-groove or trap of the construction hereinbefore mentioned. In this construction also there would be a central hollow shaft for the feed and a supporting-bearing, and there would further be approved devices for imparting the revolving motion and a circular stationary launder to receive the discharge; but in order that this invention may be clearly understood reference will now be made to the drawings herewith, in which—

Figure 1 is a central section of an improved centrifugal amalgamator and separator for finely-divided auriferous and argentiferous materials constructed according to this invention; and Fig. 2, a partial plan of the same, showing various horizontal partial sections. Fig. 3 is a central section of a modified construction of catch-groove or trap, showing also a draw-off contrivance. Fig. 4 is a central section of a modification of the improved amalgamator and separator, and Fig. 5 is a partly sectional plan view of the same.

In the construction shown in Figs. 1 and 2 a vertical spindle *J* in an appropriate frame *K* and on a foot step-bearing *L* supports the bowl or pan *A*. This bowl *A* has linings *D* and *F* of amalgamating-plate and catch-grooves or traps *E* and *G*. Centrally of the pan *A* is fixed therein a hollow shaft or column *A*², into the top of which fits the feed-hopper and in the bottom of which are discharge slots or orifices *A*¹, leading into the basin or pan. Around the top of the pan and conveniently supported is the receiver or circular launder *II*, from which is an offset *II*¹ to waste. The catch-grooves or traps *E* and *G* are of the configuration shown or approximating thereto and are divided by plates *E*¹ and *G*¹, respectively. (Such plates may form part of the disk, as shown in Fig. 1, or may be a ring, as shown in Figs. 3 and 4.) The dividing-plates leave narrow spaces or passages *E*² and *G*², respectively, between the upper and lower parts of the grooves or traps. *E*³ and *G*³ are splash-rings covering the lower portion of the grooves or traps. When the divisional plates *E*¹ and *G*¹ form part of disks, they are supported by ring-pieces *E*⁴ and *G*⁴, respectively, having screws and nuts *E*⁵ and *G*⁵ thereon. The ring-piece *E*⁴ in addition supports the part *c*, which has the form of a truncated hollow cone and which holds in place the amalgamating or copper plate *B*.

*E*⁶ is a bent pipe leading from the catch-groove or trap downwardly (having a screwed adjustable mouth *E*⁷) and leading into a stationary launder or trough *E*⁸.

In operation the finely-divided auriferous, argentiferous, or other metal-bearing material which is to be amalgamated and to have separated therefrom the heavy particles is fed with water into the hopper, passing down

column or shaft *A*² and through the slots *A*¹ into the pan *A*, which is revolved at a considerable rate of speed. The centrifugal impulse thus imparted causes the material to be thrown forcibly against the amalgamating-surface *B*, where some of the precious metal is retained, the other parts of the material passing under the end of the cone *C* and being impelled by the centrifugal force against the amalgamating-surface *D*, passing upward. The whole of the residue of the precious metal, which is in a fit state for amalgamation, is retained by the amalgamating-plate *D*, while the unclean gold and silver and other metals which may have not amalgamated and other metals of high specific gravity pass into the catch-groove or trap *E*, in which there would accumulate in some instances a fair quantity of mercury retained therein by the centrifugal force. The heavier particles, finding their way behind the bulk of mercury, are retained in the concavity, while the lighter particles, flowing over the mercury, find their way upward out of said trap, though being further influenced by surface *F* and second trap *G* when these are present. The plate or disk *E*¹ directs the centrifugally-impelled material against the aggregated mercury in the trap *E* and also insures that the gathering of material in said trap shall be dispersed, so far as the lighter parts are concerned, by the water flowing upwardly and outwardly around it and then inwardly. The amalgamated plate *F* and the second trap *G* may not be necessary, but are proposed as a further precaution to prevent loss, though it is anticipated that everything worth saving will be saved by the lower amalgamated plates *B* and *D* and the catch-groove or trap *E*.

In the modified construction shown in Figs. 4 and 5 the spindle *j* supports the base or saucer *a* and the cone *d* or a first wall or internal periphery having lining *d*¹ of amalgamated plate. The base *a* supports, by brackets or angle-pieces *a*³ and *a*⁴, the walls or internal peripheries *f*, having amalgamated-plate linings *f*¹ *f*³ *f*⁵ *f*⁷, which leave openings (top and bottom) *f*² *f*⁴ *f*⁶ *f*⁸, the latter of which opens to the trap *E* under the ring-plate *E*¹. The hollow shaft or column *a*² leads the finely-divided material fed therein, preferably with water, to the discharge-orifices *a*¹, through which it passes, and coming within the range of the centrifugal force created by the rapid revolving of the base or saucer *a* and its attachments it is kept closely onto the amalgamating-linings *d*¹ *f*¹ *f*³ *f*⁵ *f*⁷ as it passes, owing to their slight inclinations from one to the other, through openings *d*² *f*² *f*⁴ *f*⁶. From the last amalgamating-plate *f*⁷ it passes through opening *f*⁸ into the trap *E*. The precious metals are retained by the amalgamated plates or linings, and the valuable residue, as before described, is retained in the trap, while the waste is discharged from trap *E* into circular launder *II*.

Having now particularly described and ex-

plained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is—

1. In an amalgamator the combination with
5 a bowl mounted on a central, hollow shaft having a feed-hopper emptying into its upper end, the lower portion of said shaft having slots for the passage of the material, of a part mounted on said hollow shaft and having the shape of a truncated hollow cone, an
10 amalgamating-plate upon the inner face of said part, and one or more circular plates, or disks, mounted on said hollow shaft above the cone-shaped part, and having their edges
15 projecting into a corresponding number of catch-grooves, or traps, formed of the wall of the bowl which projects outward beyond the normal diameter of the latter, substantially as described.

20 2. In an amalgamator the combination with a hollow shaft having slots near its lower end and a feed-hopper communicating with its upper end, of a bowl mounted on and rotating with the shaft, a part mounted on said
25 shaft and having the form of a hollow truncated cone, the closed truncated end lying above the slots in the hollow shaft, an amalgamated plate upon the inner face of said part, the lower edge of the latter being above
30 the bottom of the bowl, and a disk, or circular plate, mounted on said shaft and projecting at its edge into a catch-groove, or trap ex-

tending beyond the outer surface of the bowl and entirely around the same, substantially as described.

3. In an amalgamator, the combination with
35 a vertical hollow shaft having slots at its lower end and a feed-hopper at the upper end, of a bowl mounted on said shaft below the slotted end, a part having the form of a hollow truncated cone having its truncated closed end
40 mounted on the shaft above the slots in the lower end, an amalgamating-plate on the inner face of said part, the lower open end of the latter being above the bottom of the bowl
45 one or more disks or circular plates on said shaft above the said truncated end, the outer edge or edges thereof lying in one or more circular catch-grooves or traps in said bowl which project outward, a splash-ring mounted
50 on the lower face of each of said disks at a little distance from the inner face of the bowl and a circular launder, or trough surrounding and partly inclosing the upper edge of the bowl, and the upper catch-groove, substan-
55 tially as described.

Dated this 8th day of June, 1897.

CHARLES LAUNCELOT GARLAND.

JOHN MURRAY.

SAMPSON EDWARD MURRAY.

Witnesses:

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ELRY NEWELL.