

(No Model.)

C. W. A. KOELKEBECK.  
CENTRIFUGAL LIQUID SEPARATOR.

No. 349,106.

Patented Sept. 14, 1886.

Fig. 1.

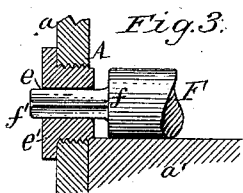
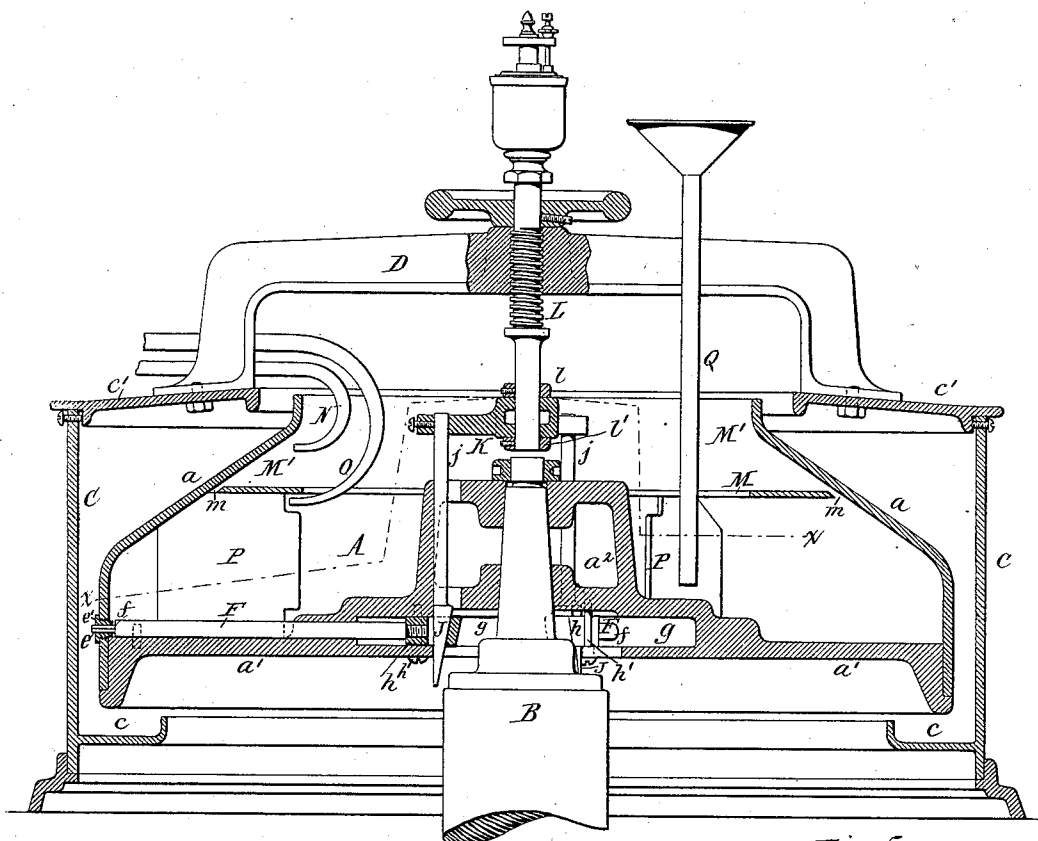


Fig. 2.

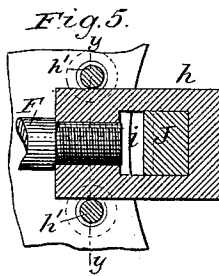
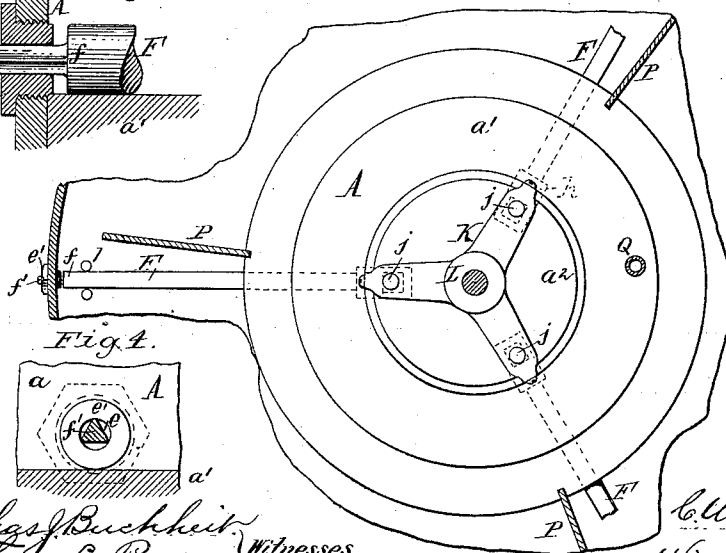
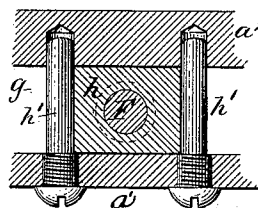


Fig. 6.



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Theo. L. Popp. } Witnesses.

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# UNITED STATES PATENT OFFICE.

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## CENTRIFUGAL LIQUID-SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 349,106, dated September 14, 1886.

Application filed October 16, 1885. Serial No. 180,098. (No model.)

### *To all whom it may concern:*

Be it known that I, CARL W. A. KOELKEBECK, of the city of Camden, in the county of Camden and State of New Jersey, have invented new and useful Improvements in Centrifugal Liquid-Separators, of which the following is a specification.

This invention relates to an improvement in that class of machines which are employed for separating compound liquids into their constituent liquids of different gravities by centrifugal force, and more particularly to those machines in which the heavy liquid is discharged from the revolving separating-drum through openings controlled by adjustable valves.

The object of this invention is to construct a machine of this character, whereby a compound liquid can be separated into three component liquids; and my invention consists to that end of the improvements, which will be hereinafter fully set forth, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a sectional elevation of my improved separator. Fig. 2 is a fragmentary horizontal section in line *x x*, Fig. 1. Fig. 3 is a longitudinal sectional elevation of one of the discharge-valves on an enlarged scale. Fig. 4 is an end view thereof. Fig. 5 is a horizontal section on an enlarged scale of the inner end of one of the valve-rods. Fig. 6 is a vertical section in line *y y*, Fig. 5.

Like letters of reference refer to like parts in the several figures.

A represents the separating-drum, composed of an outer wall, *a*, whose diameter is gradually enlarged downwardly, and a bottom, *a'*, to which the outer wall is firmly secured. The bottom *a'* is provided with a central hub, *a<sup>2</sup>*, which is secured to the upper end of the vertical spindle B.

C is the stationary casing inclosing the drum, and provided below the bottom *a'* with an annular trough, *c*, for the reception of the heavy liquid discharged from the drum.

*c'* is the top flange of the casing C, which surrounds the open upper end of the drum and supports a bridge-piece, D, which extends

over the openings in the upper portions of the casing and drum.

*e* represents discharge-openings formed in the outer wall, *a*, of the drum in the enlarged portion thereof, to discharge the heaviest liquid from the drum.

*f* represents valves arranged on the inner sides of the openings *e*, and provided with angular stems *f'*, sliding in said openings, which latter are preferably formed in bushings *e'*, secured in the outer wall, *a*, of the drum, near the bottom thereof. The valves *f* are formed by the outer portions of rods F, which are arranged radially above the bottom of the drum and project with their inner ends into an annular groove, *g*, formed in the hub *a<sup>2</sup>*. This groove opens inwardly or toward the spindle, and the inner ends of the valve-rods F are provided with flat heads *h*, which are capable of sliding in said groove toward and from the spindle or radially, the heads being held against lateral movement by guide-pins *h'*, extending vertically through the groove *g*, as represented in Fig. 6. The heads *h* are provided with openings *i*, in which engage wedges J, which are formed at the lower ends of vertical rods *j*. The latter are guided in the hub *a<sup>2</sup>*, and project above the same, where they are secured to the arms of a spider, K, arranged centrally over the spindle.

L is a vertical adjusting-screw, working in a threaded opening formed centrally in the bridge-piece D, and provided with a cylindrical lower portion, upon which the spider K is loosely mounted, so as to turn therein. The spider is held on the screw L by adjustable collars *l'*, so as to take part in the vertical movements of the screw. By raising the latter the wedges J are raised, and the rods F are moved outwardly by centrifugal force and the valves are closed, while by lowering the screw and wedges the rods F are moved inwardly and the valves opened.

M is an annular plate arranged horizontally in the upper portion of the drum, and provided near the outer wall, *a*, with openings *m*, through which the separated liquid passes from the lower portion of the drum into the annular collecting-chamber M' above the plate

M. These openings are arranged nearer the axis of rotation than the openings *e*, so that the openings *m* permit of the passage of a liquid of less gravity than the openings *e*.

5 N is a stationary skimming-pipe arranged with its receiving end in the annular collecting-chamber M', above the plate M, to receive the liquid which passes into the upper portion of the drum through the openings *m*. O  
10 is a similar skimming-pipe arranged with its receiving end in the drum below the plate M, to remove the lightest liquid from the drum.

P represents vertical blades or wings secured in the drum between the bottom *a* and the  
15 plate M. The blades do not extend to the outer wall, *a*, in the enlarged portion of the drum, and the heaviest material is thus permitted to distribute or equalize itself over the outer wall of the drum in the enlarged portion thereof.

20 Q represents the feed-pipe, through which the liquid to be separated is fed into the drum. The compound liquid entering the drum is driven by the centrifugal force against the  
25 outer wall of the same, where the component liquids arrange themselves under the influence of the centrifugal force in several concentric layers or belts composed of liquids of different gravities, the discharge-valves *f* being closed  
30 at the beginning of the operation.

The machine is especially suitable for separating wool-bath or wool-scourings into the three component liquids, the heaviest liquid being composed of the insoluble solid impurities held in suspension, the liquid of medium  
35 gravity consisting of the solution which is used for washing the wool, and the lightest liquid consisting of the wool-oil. When the apparatus is used for this purpose, the heavy  
40 impurities arrange themselves in the enlarged portion of the drum next its outer wall and constitute a semi-fluid mass. The solution arranges itself on the inner side of the layer of heavy impurities in line with the openings *m*, and the  
45 oil arranges itself on the inner side of the layer of solution in line with the mouth of the skimming-pipe O. When the compound liquid fed into the drum has been separated, as described, the further addition of compound liquid  
50 through the feed-pipe Q necessitates the discharge of the separated liquids, and the valves *f* are now opened to discharge a quantity of the heavy impurities proportionate to the quantity of heavy impurities fed into the drum  
55 through the feed-pipe Q. The solution or liquid of medium gravity passes through the openings *m* into the annular space M', and is removed by the skimming-pipe N, and the oil or lightest liquid is removed by the skimming-

pipe O. The inclined outer wall of the drum 60 forces the heavy material toward the discharge-openings *e* and insures the discharge of this material and prevents it from adhering to the wall of the drum.

It is obvious that the liquid may be dis- 65 charged from the chamber M' by permitting it to flow over the edge or through a notch in the edge of the chamber.

I claim as my invention--

1. The combination, with the revolving separating-drum provided with peripheral open- 70 ings for the discharge of the heavy material, of adjustable valves which control the flow of the heavy material from said openings, an annular plate secured to the drum near one end thereof and forming a chamber which collects 75 and discharges the material of medium gravity automatically, and a pipe through which the light separated material is discharged from the drum automatically, substantially as set 80 forth.

2. The combination, with a revolving separating-drum provided with a tapering outer wall, of discharge-openings and adjustable 85 valves arranged in the periphery of the drum at the large end thereof for the discharge of the heavy material, an annular plate secured to the drum, near the small end of the drum, and forming a chamber which collects and 90 discharges the material of medium gravity from the drum automatically, and a pipe through which the lightest material is removed from the body of the drum automatically, substantially as set forth.

3. The combination, with the drum A, pro- 95 vided with peripheral discharge-openings *e*, and adjustable valves *f*, of the horizontal plate M, provided with openings *m*, and skimming-pipes N and O, substantially as set forth.

4. The combination, with the drum A, pro- 100 vided with openings *e*, of the valves and rods *f* F, wedges and rods J *j*, spider K, and adjusting-screw L, substantially as set forth.

5. The combination, with the drum A, hav- 105 ing openings *e*, and provided with a hub, *a*<sup>2</sup>, provided with an annular groove, *g*, of the valves and rods *f* F, provided with slotted heads *h*, wedges J, engaging in said heads, and an adjusting-screw, L, whereby said wedges are raised and lowered, substantially as set 110 forth.

Witness my hand this 16th day of September, 1885.

CARL W. A. KOELKEBECK.

Witnesses:

DARRACH CLEAVER,  
R. G. KEES.