No. 612,100. Patented Oct. 11, 1898.

W. C. HARTMANN.

CENTRIFUGAL SEPARATOR.

(Application filed Mar. 19, 1897.)

(No Model.)

Fig. 1

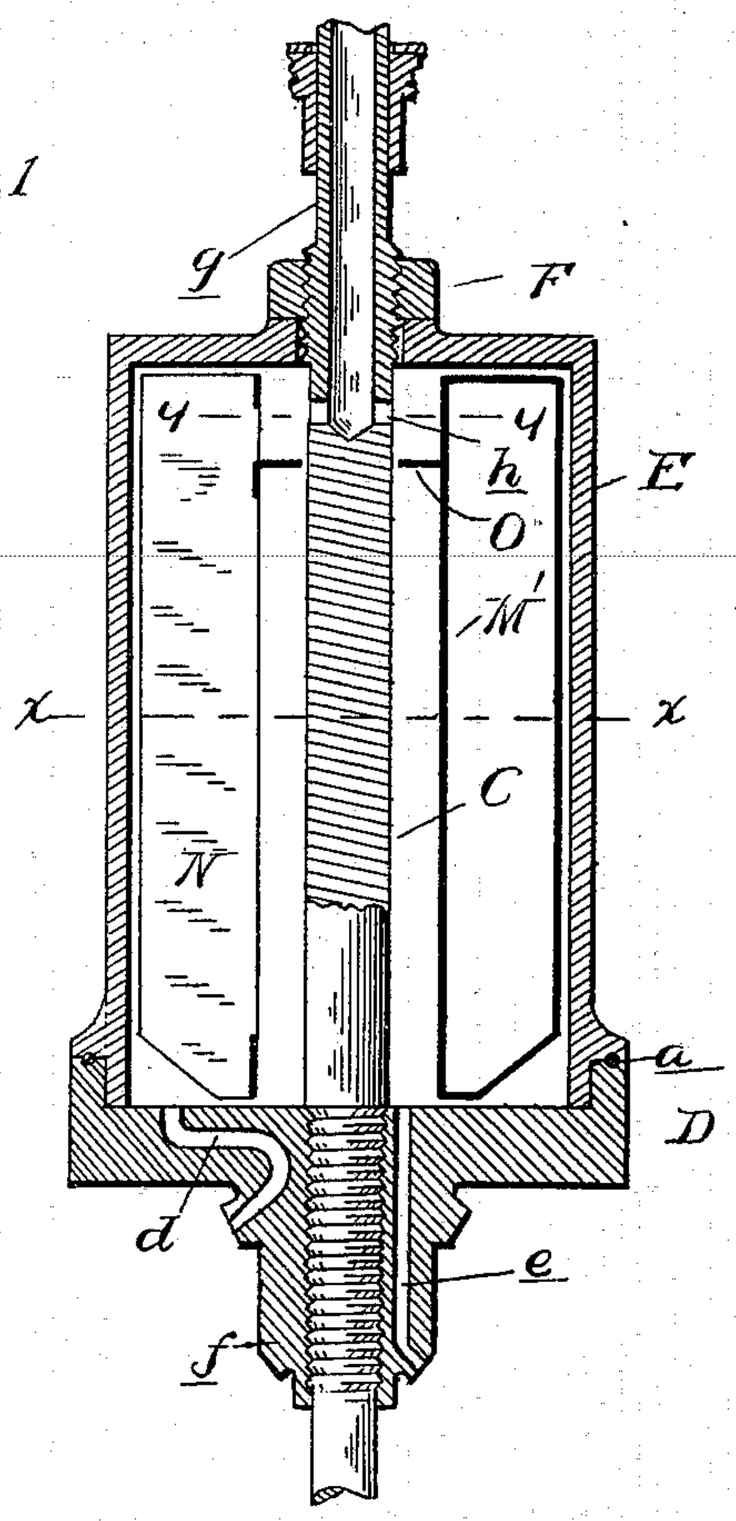


Fig. 2.

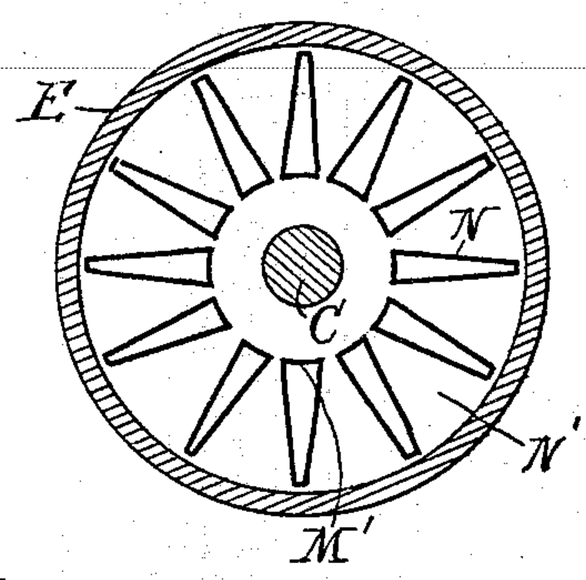
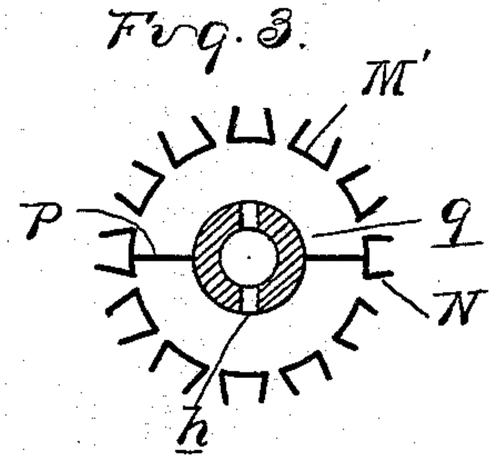


Fig. 3.



Witnesses
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UNITED STATES PATENT OFFICE.

WILLIAM C. HARTMANN, OF LANSING, MICHIGAN, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO CHARLES L. KNEELAND AND GUY W. RENYX, OF SAME PLACE.

CENTRIFUGAL SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 612,100, dated October 11, 1898.

Application filed March 19, 1897. Serial No. 628,298. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM C. HARTMANN, a citizen of the United States, residing at Lansing, in the county of Ingham and State of Michigan, have invented certain new and useful Improvements in Centrifugal Separators, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates more particularly to that class of centrifugal separators adapted for the continuous separation of liquids having component parts of different specific gravity—such, for instance, as milk. In the present state of the art such separators are usually provided with internal structures, comprising diaphragms, partitions, &c., which are placed within the outer casing or bowl for the purpose of facilitating the separation. The direct object desired to be attained by the use of such structure is the formation and direction of currents within the bowl, and their design is based upon the supposition that such currents will hasten the separation by carrying the denser substance outward and the lighter inward through distinct channels. My invention, on the contrary, is based on the theory, which I believe to be the correct one, that such currents are not only useless, but positively detrimental.

It is therefore the object of my invention to obtain an improved structure of that type which while permitting freedom of molecular movement prevents as far as possible the formation of any distinct currents within the bowl, thereby preventing the remixing of the component parts of the liquid when once separated.

The invention consists in the peculiar construction of the structure within the bowl; further, in the construction of the bowl; further, in the construction of an elastic bearing for the spindle carrying the bowl, and, further, in the peculiar construction, combination, and arrangement of parts, all as more fully hereinafter described and claimed.

In the drawings, Figure 1 is a vertical central section through the bowl of my separator. Fig. 2 is a horizontal section thereof on line *x x*. Fig. 3 is a similar section on line *y y*.

My separator comprises a rotary separating-bowl provided with suitable inlet and outlet connections, together with a quieting structure placed within the bowl. This internal structure in its simplest form comprises a cylindrical screen A, dividing the bowl into inner and outer compartments, in combination with an imperforate diaphragm B, arranged transversely thereto.

The screen A is slitted or otherwise apertured, so as to admit of a free interchange of the fluids on opposite sides thereof, and at the same time the imperforate portions of the screen are sufficient to prevent any decided current passing from one chamber to the other. The screen is preferably so located in the bowl that it will exactly or approximately coincide with the natural division between the lighter of the separated products and the zone of separation during the operation of the device.

The function of the imperforate diaphragm B is to interrupt any circulatory currents which otherwise would be formed in the bowl, and this diaphragm should extend at least across the zone of separation.

With a separator thus constructed when used for separating milk the full milk is fed into the bowl, passing first into the outer compartment. Here it will be compelled to rotate at the speed of the bowl by reason of the diaphragm B, which prevents the formation of any circulatory currents, allowing the separation to be effected by the centrifugal action alone, the blue milk passing outward and cream particles inward in substantially radial lines. As the centrifugal action diminishes upon approaching the center of the bowl the division between the zone of separation and the cream is never as sharply defined as the one between the zone of separation and the blue milk, and there is therefore greater danger of an imperfect separation. This difficulty is overcome by the slitted screen A, which divides the milk from the cream, and while allowing the cream particles to pass freely inward prevents the passage of eddies or other disturbing currents.

In Figs. 1 and 2 of the drawings I show a construction of my separator which while in

principle the same as the one already described is much more effective in its operation and is superior in other ways. In this construction C represents the rotary spindle, upon which is secured the circular head D, preferably by screw-thread engagement. E is a dome seated upon the head D and apertured at its top to allow the upper end of the spindle to pass out, a gasket *a* being preferably placed between the head and the dome. F is a nut upon a threaded portion of the spindle above the dome and adapted to hold the dome upon the base, said dome and base together forming the separating-bowl. *d* and *e* are passages formed in the head D, communicating with the interior of the bowl, the passage *d* starting from a point near the outer wall of the bowl and the passage *e* from a point nearer the center. Both passages extend down into the hub *f* of the head and out to the surface thereof at points in different horizontal planes. The upper portion *g* of the spindle C is tubular, this tubular portion extending down into the upper end of the bowl and provided with one or more radial discharge-openings *h*. The spindle is preferably journaled in elastic bearings, which permit the bowl to rotate around its true center of gravity. With this bearing the collar G, which forms the journal, can move laterally in any direction to a limited extent, being returned to its central position by the tension of the band L. The internal structure comprises a cylindrical apertured screen M', similar to the one employed in the construction first described; but in place of the single diaphragm B a number of radial partitions N are distributed around the tube. These partitions are preferably broad at their inner ends and taper toward their outer ends, thus dividing the space without the tube A into a series of wedge-shaped compartments N', communicating at their inner apexes with the space within the tube. O is a horizontal partition within the tube M' near its upper end, being located just below the opening *h* in the tubular spindle. P are radial diaphragms within the tube M' above the partition O.

The parts being thus constructed the operation is as follows: The fluid to be separated, such as milk, is fed into the bowl through the tubular spindle *g*, first entering the tube M' above the partition O, where the diaphragm P imparts to it the rotatory motion of the bowl. It then passes through the slits in the tube M' into the wedge-shaped compartments N'. Here the separation will take place, the cream being forced inward and passing through the slits into the tube M', while the blue milk passes outward, the whole mass gradually lowering vertically in the bowl. By the time the bottom of the bowl is reached the separation is completely effected, and the blue milk and cream pass out separately through their respective channels *d* and *e*.

The object of tapering the partitions N is, first, to contract the openings at the apexes of the compartments sufficiently to obtain the desired screening effect, and, secondly, to concentrate the mass of the liquid near the periphery of the bowl, where the maximum centrifugal action takes place.

The greater the number of separate compartments the less chance there can be for the formation of disturbing-currents, to overcome which is the chief object of my construction. I therefore preferably employ a number of the diaphragms N, and although I have described but one apertured quieting-screen it may be advantageous, especially in a large bowl, to employ more than one.

The construction of the bowl is such that it may be quickly taken apart, thus facilitating the cleansing of the parts.

What I claim as my invention is—

1. In a centrifugal separator, the combination with a rotatable bowl, of a fixed series of substantially wedge-shaped imperforate partitions arranged in a circle within the bowl with their broad or butt ends inward, and out of contact with each other, and means for conducting the material to be acted on into the space between the partitions.

2. In a centrifugal separator, the combination with a bowl, of a series of substantially wedge-shaped partitions within the bowl arranged adjacent to but out of contact with each other and having their broad or base sides located inwardly, and a diaphragm across the center of the bowl at or near the upper end thereof, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM C. HARTMANN.

Witnesses:

LIDA HAVENS,

LILLIE THOMAS.