(No Model.)

F. HART.

CENTRIFUGAL CREAMER.

No. 436,418. Patented Sept. 16, 1890.

Fig. 1.

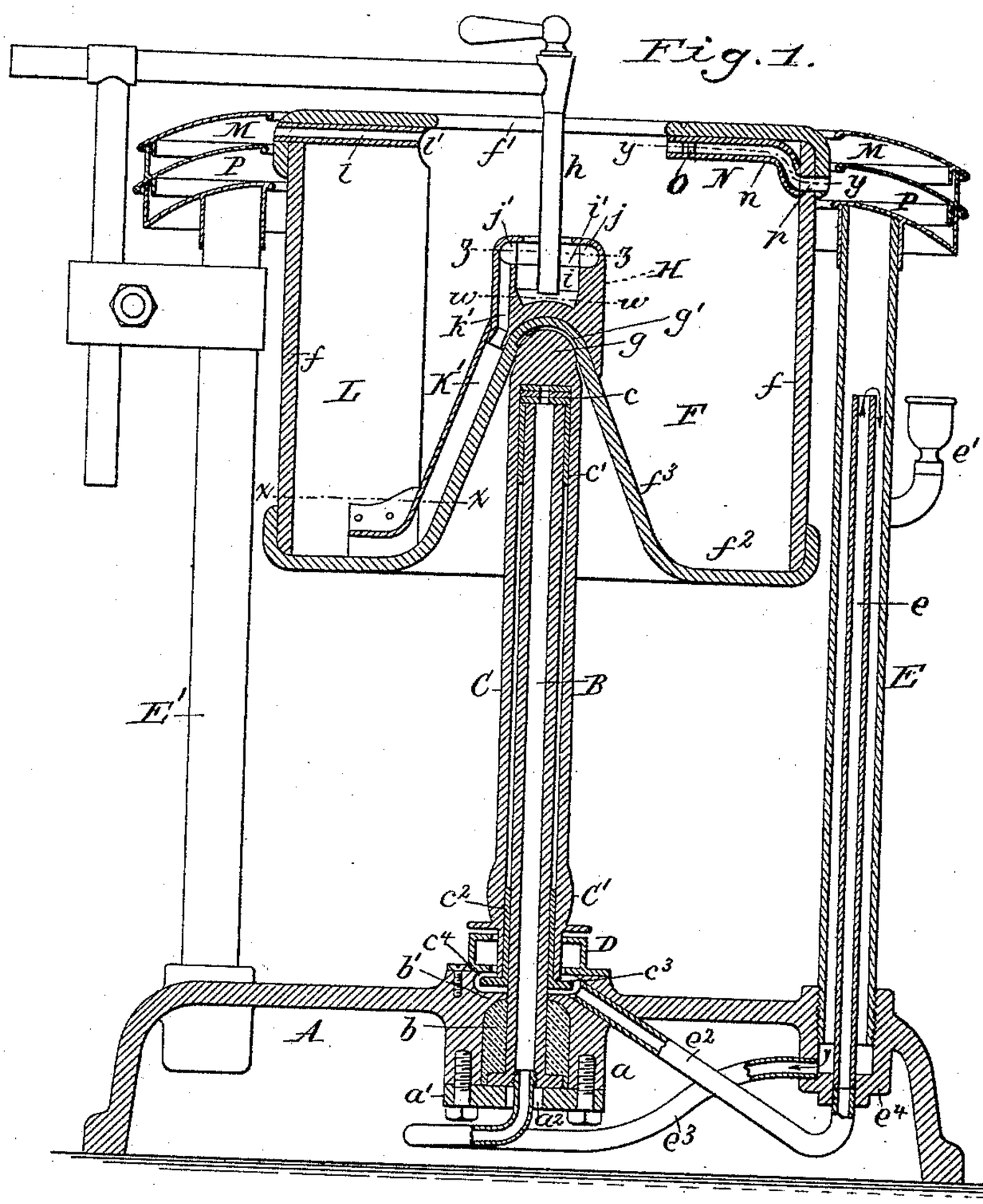


Fig. 2.

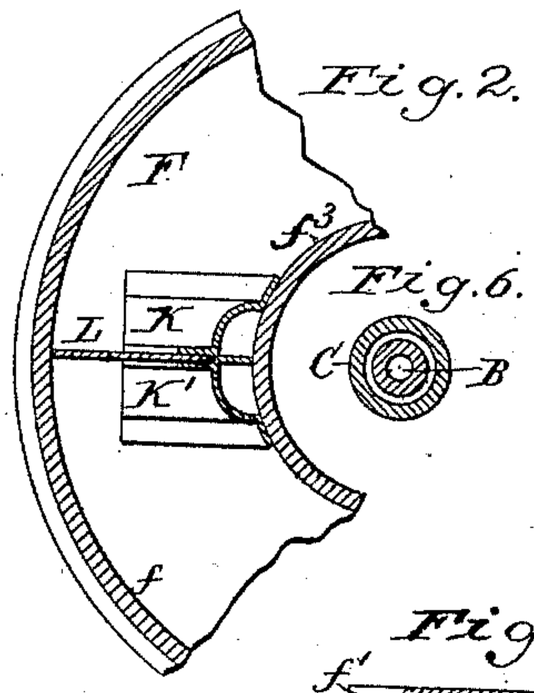


Fig. 6.

Fig. 4.

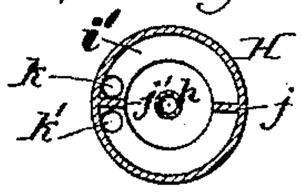


Fig. 5.

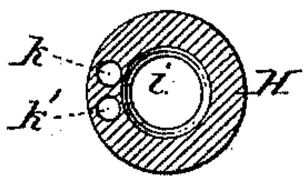


Fig. 3.

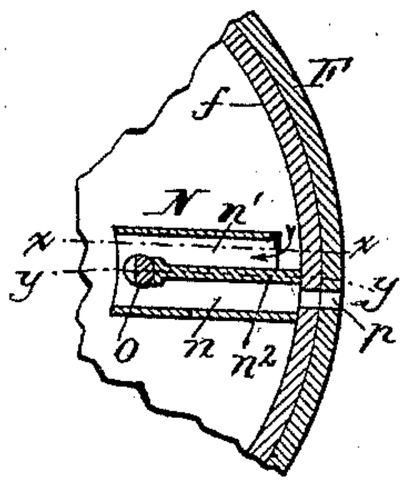


Fig. 7.

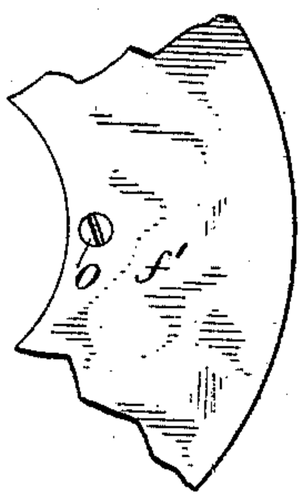


Fig. 8.

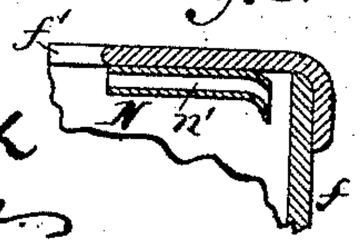
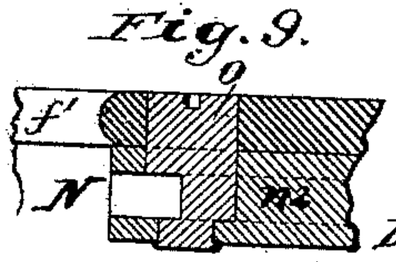


Fig. 9.



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UNITED STATES PATENT OFFICE.

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CENTRIFUGAL CREAMER.

SPECIFICATION forming part of Letters Patent No. 436,418, dated September 16, 1890.

Application filed February 21, 1888. Serial No. 264,756. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK HART, of Poughkeepsie, in the county of Dutchess and State of New York, have invented new and useful Improvements in Centrifugal Creamers, of which the following is a specification.

My invention relates to that class of centrifugal separators which are provided with imperforate drums or bowls, and which are used for separating compound liquids into their constituent liquids of different specific gravities. As these machines are most generally employed for separating full-milk into cream and skim-milk, my improved machine will be hereinafter described with reference to its use as a centrifugal creamer.

The object of my invention is to improve the construction of the parts by which the drum is rotated so as to render such parts self-oiling, dust-proof, and self-adjusting to slight variations in the drum or load; also, to improve the construction of the drum so as to increase its separating capacity and to render the separation more thorough and complete.

My invention consists of the improvements which will be hereinafter fully set forth, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a vertical section of a centrifugal creamer provided with my improvements. Fig. 2 is a horizontal section in line $x\ x$, Fig. 1. Fig. 3 is a horizontal section in line $y\ y$, Fig. 1. Fig. 4 is a horizontal section through the receiving-cup in line $z\ z$, Fig. 1. Fig. 5 is a horizontal section through the receiving-cup in line $w\ w$, Fig. 1. Fig. 6 is a horizontal section through the spindle and standard. Fig. 7 is a fragmentary top plan view of the drum. Fig. 8 is a vertical section in line $x\ x$, Fig. 3. Fig. 9 is a fragmentary section in line $y\ y$, Fig. 3, on an enlarged scale.

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

A represents the base or bed plate of the machine provided with a depending central hub or socket a, to the lower end of which is secured a plate a', having a central opening a^2.

B is a vertical hollow standard secured with its lower end centrally in the base-plate A. The lower end of the standard is provided with a flange which rests upon the plate a', and the cavity of the socket a is filled with an elastic cushion b, of india-rubber or other suitable material, which fits snugly around the lower portion of the standard. The upper portion of the socket a is provided with an inwardly-projecting collar b', which fits snugly around the standard B. The elastic cushion b holds the standard securely in an upright position and at the same time permits the standard to yield slightly and adapt itself to any slight lateral movement of the parts resting on the standard.

C represents a hollow spindle, which rests upon the hollow standard and extends downwardly over the standard nearly to the base-plate A. Suitable perforated washers c are interposed between the top of the spindle C and the top of the standard B.

C′ represents the belt-pulley formed on the spindle C, near the lower end thereof.

c' represents a bearing-sleeve secured within the upper portion of the spindle C and turning on the standard B, and c^2 is a similar bearing-sleeve secured within the lower portion of the spindle C. The lower bearing c^2 is provided with a flange c^3, which projects into an internal annular groove c^4, formed in the socket a of the base above the collar b' thereof.

D is an annular oil-guard secured to the upper side of the socket a and projecting inwardly over the flange c^3 of the lower bearing c^2.

E E′ represent hollow posts secured to the base-plate A on diametrically-opposite sides of the central standard B. The post E is provided with an internal oil-tube e, which ascends within the post to a level slightly above the top of the standard B.

e' represents an oil-cup secured to the post E and communicating with the interior of the post E, below the top of the oil-pipe e.

e^2 is a pipe connecting the lower end of the pipe e with the annular groove c^4, and e^3 is a pipe which establishes communication between the lower end of the bore of the standard B with the hollow boss e^4, in which the hollow standard B is secured. The cavities

of the post E and connecting parts are filled with oil through the oil-cup e' to the level of the oil-cup, so that the oil stands in the hollow standard B in contact with the washers c. The rotation of the spindle C upon the standard B causes the oil to flow outwardly from the top of the standard B, between the rings c, downwardly between the standard and the spindle C, and into the annular groove c^4, in which it is acted upon by the rotating flange c^3, which drives the oil outwardly and through the pipe e^2 and upwardly through the pipe e within the post E. The oil flows over the top of the pipe e, descends in the post E, and returns to the lower end of the hollow standard B through the pipe e^3, thus maintaining a continuous circulation of the oil while the machine is running, and excluding dust, &c., from the bearing-surfaces. The cavity of the annular guard D holds the surplus oil when the machine is at rest. The collar b' of the base fits against the standard so snugly as to prevent the oil from descending to the elastic ring b. The return-pipe e^3 is preferably coiled or bent to render it sufficiently yielding to follow the slight lateral movement of the lower end of the standard, which occurs when the standard adapts itself to the rotating parts above.

F represents the bowl or drum mounted upon the spindle C; f, the peripheral wall of the drum; f', the annular top plate thereof; f^2, the bottom plate, and f^3 the raised hub formed centrally on the bottom plate f^2.

g is a spherical knuckle formed at the upper end of the spindle C, and g' is a spherical socket formed in the apex of the hub f^3 and resting on the knuckle g. The drum is rotated by the friction between this knuckle and socket, and is free to oscillate to a limited extent on this spherical joint.

H represents the cup which receives the full-milk from a pipe h, and which is secured to the upper side of the apex of the hub f^3. The interior space of the cup H is composed of a cavity i, which is preferably constructed with a convex bottom, and slightly flaring upwardly part of the way, and an annular groove or gutter i' formed at the upper end of the cavity i, and made of greater diameter than the latter. The gutter opens inwardly and receives the milk which flows upwardly on the sides of the cavity i. The gutter i' is divided into two semicircular parts by two vertical partition-plates $j\,j'$, arranged diametrically opposite each other, or is otherwise composed of two compartments, each of which receives the full milk to be separated.

$k\,k'$ represent two discharge-pipes through which the milk escapes from the compartments of the gutter i', and which are arranged on opposite sides of the partition j', as represented in the drawings. These pipes $k\,k'$ communicate with somewhat larger pipes K K', which descend over the hub f^3 and open on the bottom of the drum on opposite sides of the vertical blade L, which is secured in the drum in the usual manner for the purpose of compelling the liquid to rotate with the drum.

l represents the cream-discharge pipe arranged at the upper end of the blade L, and extending from a notch l' at the inner edge of the blade outwardly through the peripheral wall of the drum, when the cream is discharged into an annular receiver M.

N represents the discharge-pipe for the skim-milk arranged diametrically opposite the blade L underneath the top plate f' of the drum. The discharge-pipe N is composed of a long branch n, extending from the peripheral wall of the drum inwardly, and a short branch n', which does not extend quite to the peripheral wall of the drum. The two branches are open at their inner ends, which are equidistant from the center of the drum, and are separated by a partition-wall n^2, which has its inner end arranged farther from the center of the drum than the inner ends of the outer walls of the branches.

O is a plug which is arranged at the inner end of the partition-wall n^2, and which is flattened on one side, so that by turning this plug the operative length of the partition-wall can be increased or reduced in such manner as to adjust it toward and from the center of the drum. This plug extends upwardly through the top plate of the drum, and has its upper end slotted to receive a screw-driver. The skim-milk enters the outer end of the short leg n' of the discharge-pipe, flows inwardly through the same, passes around the plug O, and thence flows outwardly through the long leg n of the discharge-pipe and escapes through an opening p in the peripheral wall of the drum into an annular receiver P, which is arranged below the receiver M. The branches $n\,n'$ extend inwardly beyond the inner line of the liquid, so that no liquid can enter the discharge-pipe except through the outer end of the short branch n'. By adjusting the plug so as to locate the edge, around which the skim-milk flows, farther from or nearer to the axis of the drum the relative flow of skim-milk and cream from the machine can be regulated.

The full-milk, which is fed into the receiving-cup H, falls on the convex bottom thereof, spreads equally around the revolving cup, rises in a vertical wall along the sides of the cup, and flows over into the compartments of the annular gutter i', each of which receives an equal volume of the milk. The cavity i being depressed below the gutter i' prevents splashing of the milk as it enters the cup. The milk escapes from the gutter in equal streams through the pipes $k\,k'$ K K' and passes into the drum, one half to one side and the other half to the other side of the blade L. The movement of the milk while subjected to the separating action of the rotating drum is upwardly from the bottom to the top of the

drum, and one-half around the drum from the blade L to the skim-milk pipe N. By this means all parts of the drum are equally utilized in separating the milk, and the path of the milk through the drum is made sufficiently long to effect separation of the cream from the skim-milk in a very simple manner and without holding the milk in the drum so long as to produce improper effects upon the separated cream.

I claim as my invention—

1. The combination, with the base of a supporting-standard secured with its lower portion on said base and having its upper portion unsupported, of a hollow driving-spindle surrounding the standard and extending above the top thereof, and a separating-drum resting upon the head of the spindle, substantially as set forth.

2. The combination, with the base of a supporting-standard secured with its lower portion on said base and having its upper portion unsupported, of a hollow driving-spindle surrounding the standard and provided above the latter with a spherical knuckle, and a separating-drum provided with a spherical socket resting on said knuckle, substantially as set forth.

3. The combination, with the separating-drum provided on one side of its axis with an internal blade and on the opposite side with the exit for the heavy separated liquid, of two supply-conduits opening into the drum adjacent to said internal blade, and on opposite sides thereof, whereby the liquid to be separated is introduced into the drum in two streams on opposite sides of said blade, each of which streams moves around one-half of the drum before reaching the exit for the heavy liquid, substantially as set forth.

4. The combination, with a separating-drum provided on one side of its axis with an internal blade and on the opposite side with an exit for the heavy separated liquid, of a receiving-cup secured within the drum and composed of two compartments, and discharge-conduits leading from said cup into the drum on opposite sides of said blade, substantially as set forth.

5. The combination, with the separating-drum, of an internal receiving-cup composed of two compartments, and separate discharge-conduits leading from each compartment into the drum, substantially as set forth.

6. The combination, with the separating-drum, of an internal receiving-cup provided with a cavity *i*, and an annular gutter *i'*, arranged at the upper end of said cavity and opening inwardly, substantially as set forth.

7. The combination, with the separating-drum, of an internal receiving-cup provided with an annular gutter *i'*, divided into compartments by partitions *j j'*, arranged in said gutter, substantially as set forth.

8. The combination, with the separating-drum provided on diametrically-opposite sides with an internal blade L and an exit for the heavy separated liquid, of a receiving-cup provided with an annular gutter *i'*, separated into compartments by partitions *j j'*, and conduits *k k'* K K', leading from said compartments into the drum on opposite sides of the blade L, substantially as set forth.

9. The combination, with the separating-drum, of a discharge-pipe composed of a short receiving branch and a long discharge branch, both open at their inner ends, and an adjustable piece arranged at the junction of the two branches, whereby the operative length of the pipe can be adjusted, substantially as set forth.

10. The combination, with the separating-drum, of a discharge-pipe N, composed of a short branch *n'*, a long discharge branch *n*, and an adjustable flattened plug O, arranged at the junction of the two branches, substantially as set forth.

Witness my hand this 16th day of February, 1888.

FREDERICK HART.

Witnesses:
ALBERT STORY,
GEO. W. SEARLES.