(No Model.) 2 Sheets—Sheet 1.

D. T. SHARPLES.

CENTRIFUGAL MILK TESTING APPARATUS.

No. 458,194. Patented Aug. 25, 1891.

Fig. 1.

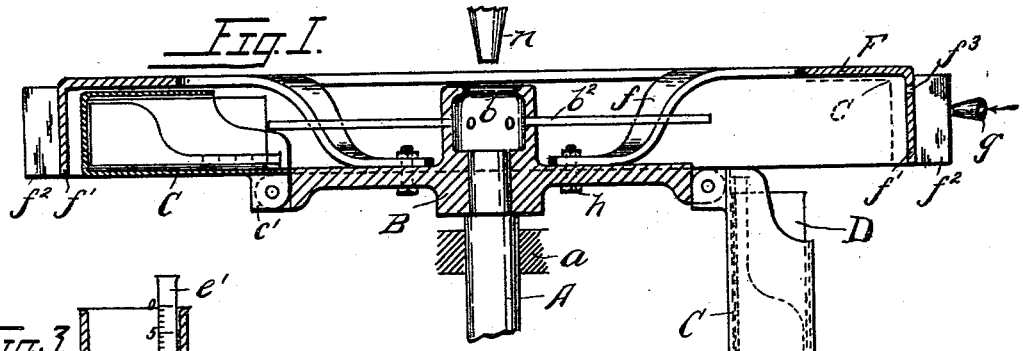
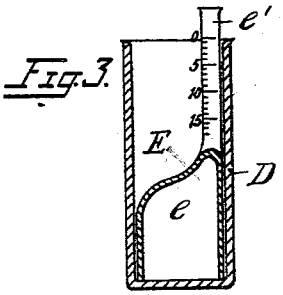


Fig. 3.



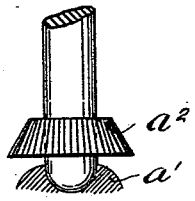
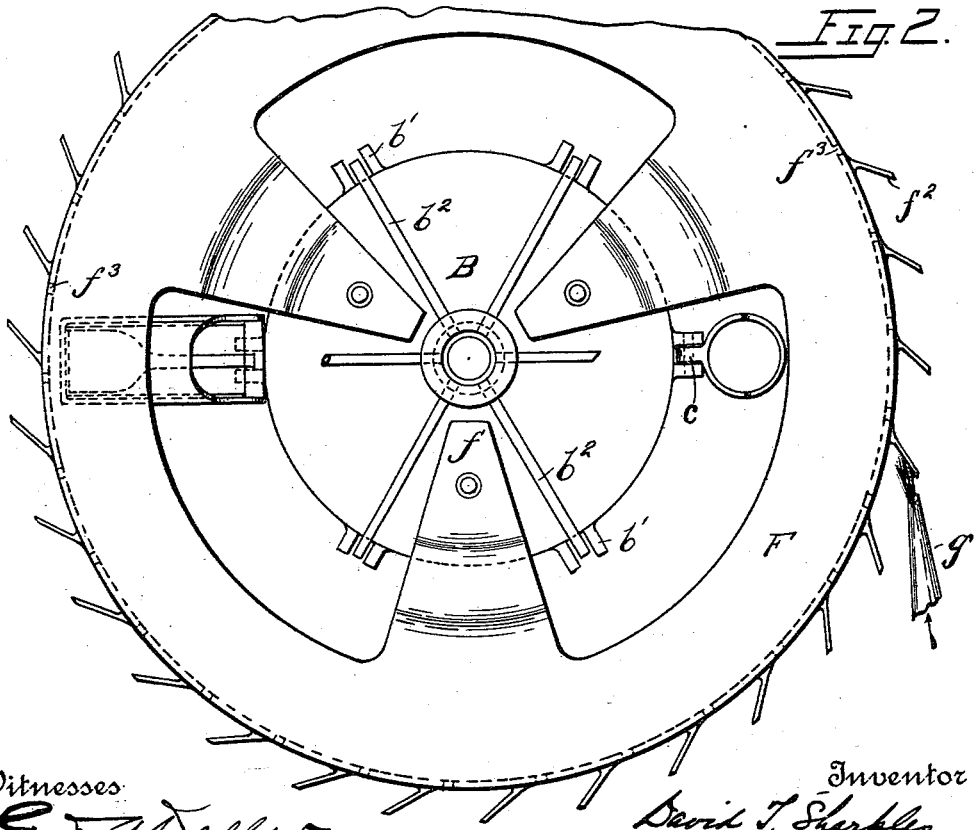


Fig. 2.



Witnesses
Ed. M. Kelly.
Caleb J. Bieber.

Inventor
David T. Sharples
By his Attorney W. H. Edwards

(No Model.) 2 Sheets—Sheet 2.

D. T. SHARPLES.

CENTRIFUGAL MILK TESTING APPARATUS.

No. 458,194. Patented Aug. 25, 1891.

Fig. 4.

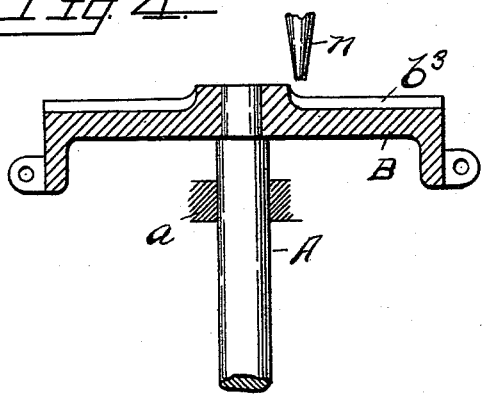
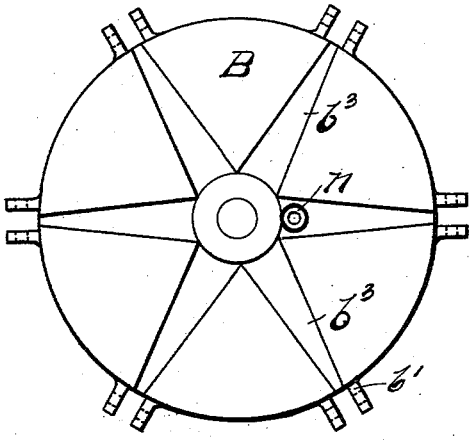


Fig. 5.



Witnesses
E. A. Kelly.
Caleb J. Bieber

Inventor
David T. Sharples
By his Attorney J. P. Lenihan

UNITED STATES PATENT OFFICE.

DAVID TOWNSEND SHARPLES, OF ELGIN, ILLINOIS.

CENTRIFUGAL MILK-TESTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 458,194, dated August 25, 1891.

Application filed February 16, 1891. Serial No. 381,552. (No model.)

To all whom it may concern:

Be it known that I, DAVID TOWNSEND SHARPLES, a citizen of the United States, residing at Elgin, in the county of Kane, State of Illinois, have invented certain Improvements in Centrifugal Milk-Testing Apparatus, of which the following is a specification.

This invention relates particularly to improvements in centrifugal apparatus for whirling testing-vessels containing samples of liquid, such as milk, for the purpose of facilitating and perfecting the separation of the lighter or fatty constituent thereof. The main objects are, first, to permit the convenient handling of the vessels before and after the operation of whirling; second, to complete the separation of the fat and force it into the measuring-tube without stopping the rotation; third, to maintain the liquids at a high temperature during rotation. The means by which I accomplish these results are described in connection with the accompanying drawings, and the invention involved is specifically pointed out in the claims.

Figure 1 is a sectional elevation of the complete apparatus, one side showing the position of the testing-vessels during rotation, the other while at rest. Fig. 2 is a plan view of the same. Fig. 3 shows in detail one form of testing-vessels adapted to be used in connection with my improved centrifugal apparatus. Figs. 4 and 5 show a modification.

The vessels represented in the drawings are of a form fully described in connection with my application, Serial No. 380,244, filed February 4, 1891, and form no part of the present invention. The cylindrical vessel D is open at the top, and the body portion *e* of the bottle-shaped glass tube E fits loosely within it. The graduated neck *e'* of this tube extends beyond the open top of the vessel D when its base rests upon the bottom of the vessel, and the zero-mark of the graduation is somewhat above the top edge of the vessel, while the higher markings extend downward toward the body *e* and the bottom of the vessel.

Referring now to Figs. 1 and 2, A represents a vertical spindle rotated in bearings *a a'*. Mounted upon the upper end of the spindle is a circular plate B, formed with a central cup or reservoir *b*, from which radiates a series of tubes b^2. At the periphery are hinged to ears *b'*, formed thereon, a series of cylindrical pockets C, somewhat larger in interior than the vessels D, which it is intended shall be placed therein. The ears *c* on the pockets, by means of which they are hinged to the plate B, are represented as formed with a flat face *c'*, which serves to steady the pockets and permit the convenient handling of the vessels therein when at rest. Secured to the plate B by means of ears *f* and bolts *h* is an annular casing F, open toward the center and provided with vanes or buckets f^2, projecting from its peripheral wall *f'*.

The apparatus may be used as follows: A certain quantity of each quality of milk to be tested is measured into the vessels D and a proportion of suitable acid is added to each. The vessels are supported in the pockets C, which may contain a quantity of hot water adapted to maintain the contents of the vessel at a high temperature, and which will also serve to cushion the vessels and prevent breakage due to the otherwise unbalanced pressure in the bottles which will be developed by rapid rotation. After mixing the acid and milk the tubes E may be placed in each of the vessels D and the plate B, by which they are carried, be rotated. Rotation is effected directly by the action of a steam-jet from a nozzle *g*, located in close proximity to the wings f^2 of the casing F, on which the jet impinges. As the speed increases the pockets C and the vessels held therein swing up from a vertical position toward a horizontal, as indicated in the drawings, and may be maintained in the latter position until the completion of the test. After five minutes (more or less) of rapid rotation the separation of the fat will be complete, the contents of the vessel being maintained during this time at a high temperature by the same steam which effects the rotation and which enters the casing F and keeps the vessels in an atmosphere of exhaust-steam. Openings f^3, shown in the wall *f'*, may be provided to insure the entrance of steam within the casing. Without stopping or slacking the machine the fixed water-nozzle *n*, located above the central cup *b*, is now opened, and a stream of hot water is delivered into the latter, from which it is thrown outward through the tubes or con-

duits b^2 into the vessels D, the mouths or openings of which are, in their horizontal position, adjacent to the ends of the tubes. The nozzle n is kept open until the vessels D are filled to overflowing. The overflow may be caught in the buckets C. The column of fat will be thus raised in the neck e', the hot water circulating around the tube-body and under its lower edge, which does not form a tight joint, into the tube and forcing the lighter constituent up the neck until, when the water overflows the open end of the vessel D, the top of the column will correspond exactly with the zero-mark of the graduation, which mark will be somewhat beyond the open end of the vessel, as shown, owing to the lightness of the fat column. Sufficient time having been allowed to insure complete separation, the speed of rotation is gradually reduced until the pockets come to rest in their normal vertical position, when the heights of the different columns of fat will be found at once by reading the graduation at the base of the columns.

The advantages of my improvements in the practical operation of testing are very decided. In addition to the convenience with which the vessels may be handled in connection with my centrifugal apparatus before and after rotation, the contents of the testing-vessels may be added to at the proper time during rotation without even changing the speed, and the operation thus made perfectly continuous, instead of intermittent, as heretofore, thus greatly simplifying it and saving much time. The contents of the vessels are maintained at the high temperature desirable during rotation without providing special means for this purpose, the operating-jet of steam being utilized to effect this also.

It is evident that other forms of testing-vessels than that described may be used with equal advantage in my whirling apparatus, the graduated neck and inlet opening being, for instance, readily provided in a single vessel, instead of two, as shown; also, that instead of using hinged pockets, as shown, the pockets may be made solid with the plate B without affecting the general operation materially, though it cannot be carried out as conveniently as with the special apparatus described.

In Figs. 4 and 5 I have shown a modified form of machine, which illustrates how the construction may be changed without departing from the spirit of my invention. In this case the fixed nozzle n is located out of center with the axis of rotation and delivers a constant stream directly into the radial conduits, instead of indirectly through the central cup before referred to. These conduits are represented as gutters b^3, formed in the upper surface of the whirling plate. The apparatus may also be driven in the ordinary way by means of a gear-wheel or pulley a^2, though in this case the great advantage of heating during rotation is not secured. I do not therefore confine my invention to the particular construction set forth; but

What I claim is—

1. In a milk-testing apparatus, the combination, with testing-vessels having supply-openings and graduated tubes extending beyond said openings, of a rotary frame having pockets for said vessels, and radial supply-conduits arranged to deliver into said openings, substantially as set forth.

2. In a milk-testing apparatus, the combination, with testing-vessels having supply-openings and graduated tubes extending beyond said openings, of a rotary carrying-frame provided with a series of radial conduits and a corresponding series of independently-hinged pockets larger in diameter than said vessels to provide an open water-space around the same, all substantially as and for the purpose set forth.

3. In a milk-testing apparatus, the combination, with a rotary frame having independently-hinged pockets to receive the testing-vessels, of an annular casing F, fixed to said frame outside of said pockets, and a steam-nozzle located in close proximity to the exterior of said casing, the space surrounding said pockets being in communication with the outside of said casing, whereby the contents of the vessel are heated by the operating-steam, substantially as set forth.

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

DAVID TOWNSEND SHARPLES.

Witnesses:

H. L. GIVEN,

FRANK E. ALLEN.