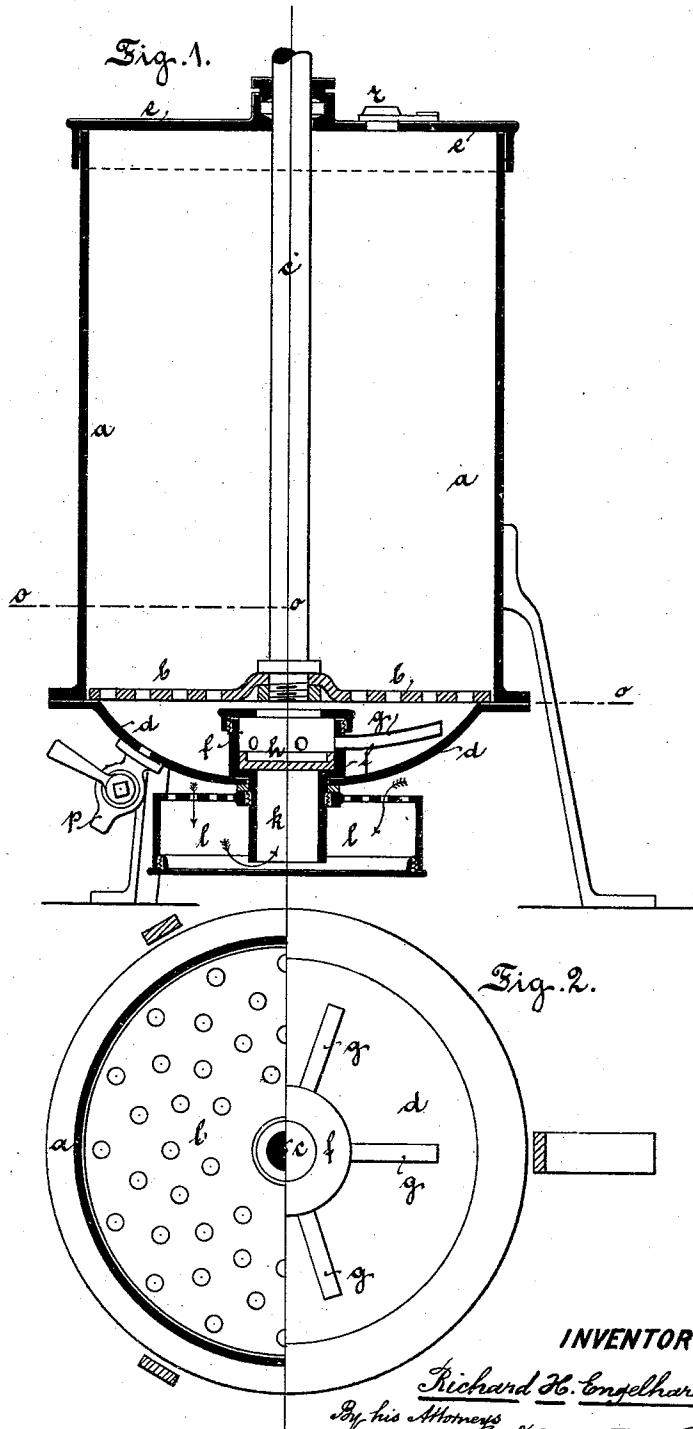


(No Model.)

R. H. ENGELHARDT.
CHURN.

No. 466,299.

Patented Dec. 29, 1891.



WITNESSES:

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UNITED STATES PATENT OFFICE.

RICHARD H. ENGELHARDT, OF BERLIN, GERMANY, ASSIGNOR TO HIMSELF
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CHURN.

SPECIFICATION forming part of Letters Patent No. 466,299, dated December 29, 1891.

Application filed November 7, 1889. Serial No. 329,484. (No model.)

To all whom it may concern:

Be it known that I, RICHARD H. ENGELHARDT, a subject of the King of Prussia and Emperor of Germany, and a resident of Berlin, in the Kingdom of Prussia, Germany, have invented certain new and useful Improvements in Apparatus for Churning and Mixing, of which the following is a specification.

This invention relates to that class of apparatus by the aid of which fluids—such as water, albumen, milk, yeast, and similar fluids—are churned or agitated and are in some cases mixed with air or other substances.

My invention has for its object to improve apparatus of this character and render it more economical and efficient; and my invention is especially applicable in making butter, beating eggs, impregnating a fluid with gas; and in many other other instances where it is necessary to thoroughly mix or agitate a fluid.

In the accompanying drawings, which illustrate my invention, Figure 1 is a vertical axial section of a churning or mixing apparatus. Fig. 2 is a horizontal cross-section thereof cut in two horizontal planes indicated by the dotted lines *o o* in Fig. 1.

Referring to the drawings, *a* indicates a cylindrical vessel, *b* a disk-shaped dasher working therein, and *f* a valve-casing in the bottom thereof.

The vessel *a* is preferably constructed with a concave bottom *d* and a removable cover *e*, and is supported, preferably, by means of three legs. For smaller sizes of apparatus the cover *e* can be dispensed with.

The dasher *b* is preferably a perforated cylindrical disk fitting loosely within the vessel *a* and provided with a dasher-rod *c*, extending vertically through the center of the vessel *a* and projecting outwardly through the cover *e* thereof. The dasher *b* is constructed to have a reciprocating vertical movement, which is imparted to it through the medium of its dasher-rod *c*, either by hand-power applied to the outer end of the rod or by any other suitable force applied to the dasher-rod *c*.

The valve-casing *f* is fixed in the center of the bottom *d* of the vessel, and consists, preferably, of a vertical cylinder having slightly-

contracted openings at its top and bottom ends. The opening at the top end communicates with the interior of the vessel, and the opening at its bottom end consists of a pipe *k*, which communicates with the outer air or with an air-sterilizing apparatus, as desired. The side walls of the valve-casing *f* are provided with radial perforations communicating between the interior of the valve-casing and the interior of the vessel *a*, and small radial pipes *g g* are preferably secured to these perforations and open at one end into the cylinder of the valve-casing *f* and at the other end in the interior of the vessel *a*. A disk-valve casing *h*, fitting closely within the cylinder of the valve *f*, and capable of vertical movement therein, serves to control communication between the interior and exterior of the vessel *a*. This disk-valve *h* normally rests over the bottom opening of the valve-casing *f*, and rises during the upward movement of the dasher *b* until it reaches the top of the cylinder of the valve-casing *f*, where it strikes a cap or thimble screwed thereon, which prevents its escape from the cylinder. When the disk-valve *h* is in the downward position, it closes the lower valve-hole, and when in the upper position it closes the upper valve-hole; but it is so constructed relatively to the radial pipes *g g* that the latter are open to the interior of the cylinder of the valve-casing *f* when the disk-valve is in either of these positions, and the communication between these pipes *g g* and the interior of the valve-casing *f* is only interrupted as the disk-valve *h* is passing the ends of the pipes.

The churn is provided with an air-sterilizer to the lower part of the vessel *a*. The air-sterilizer consists of a sterilizing-chamber *l*, having closed bottom and sides and a perforated top, and it is secured directly to the pipe *k*. The lower end of pipe *k* terminates just above the bottom of the chamber *l*.

The bottom *d* of the vessel *a* is preferably made concave, in order to make room for the valve-casing *f* below the dasher *b*, so that the latter can be flat. If desired, however, the bottom of the vessel can be made flat and the dasher made concave or hollowed out on its under side to make room for the valve-

casing *f*. A draw-off cock *p* is provided in the lower part of the vessel *a* for removing the contents thereof when desired.

Atmospheric air enters the air-sterilizing chamber through the holes in its top, passes thence downwardly through the sterilizing substances, and flows from below into the pipe *k*.

Any suitable air-sterilizing substance may be employed—such as, for example, coiled paper-pulp or infusorial earth.

In operating an apparatus constructed according to my invention, the vessel *a* is partly filled with the fluid to be churned or agitated and the dasher *b* is pushed down, thereby agitating the fluid in a manner similar to that of the ordinary churn, the fluid being compelled to pass through the perforations of the dasher *b*. During this downstroke of the dasher the disk-valve *h* closes the lower opening of the valve-casing *f*, and a portion of the fluid within the vessel is forced through the pipes *g g* and into the cylinder of the valve-casing *f*, thereby augmenting the agitation of the fluid. During the upstroke of the dasher the fluid is similarly agitated, but simultaneously the rising of the dasher creates an air rarefaction underneath it, which is greater or less according to the degree of the speed of the stroke. This causes the disk-valve *h* to leave its lower seat and rise until it shuts the opening in the top of the cylinder of the valve-casing *f*, and thereupon air enters through the pipe *k* into the valve-casing *f*, and goes from there through the pipes *g g* into the fluid and passes in innumerable bubbles through the latter. As the dasher *b* starts on the downstroke, the disk-valve *h* closes and the operation continues as before.

When the cover *e* of the vessel *a* is a tight-fitting cover and a stuffing-box is provided around the dasher-rod *c*, it is necessary to provide a valve *r* in the cover, which is constructed to open outwardly and thereby allow the air sucked into the vessel *a* to escape. Otherwise the continued sucking action of each upstroke would be soon counteracted by

the pressure of the compressed air accumulating inside of the vessel *a*.

By the use of my invention and owing to the combined action of the reciprocating dasher and the air-bubbles passing through the fluid the desired effect is produced in an unusually short time; also, when it is desired to impregnate the fluid with a gas to be absorbed by the fluid this can readily be accomplished, as the fluid and the gas both become finely subdivided and will readily unite.

My invention can be used for various purposes in addition to those hereinbefore recited where it is desired to thoroughly mix or impregnate a fluid with gas, powder, or other substances.

What I claim is, in apparatus for mixing or churning liquids and other similar purposes, the following-defined novel features and combinations, substantially as hereinbefore specified, namely:

In a churn, the cylindrical vessel *a*, having top *e* and bottom *d*, the reciprocating perforated dasher *b*, working longitudinally therein, and the relief-valve *r* at the top of the vessel, in combination with the valve-casing *f* at the bottom of the vessel, having a valve-seat, the rising and falling valve *h* in said valve-casing, the radially-projecting pipes *g g*, communicating with said valve-casing above said valve when said valve is seated, said pipes projecting into the lower part of said vessel, the air inlet-pipe *k*, extending from said casing *f* to below the bottom of the vessel, and the sterilizing-chamber *l*, having closed bottom and sides and perforated top, which is secured around said inlet-pipe, whereby the air entering said inlet-pipe must first pass through the material in said sterilizing-chamber, substantially as set forth.

This specification signed by me this 30th day of September, 1889.

RICHARD H. ENGELHARDT.

Witnesses:

MAX BECK,

CARL T. BUROHARDT.