

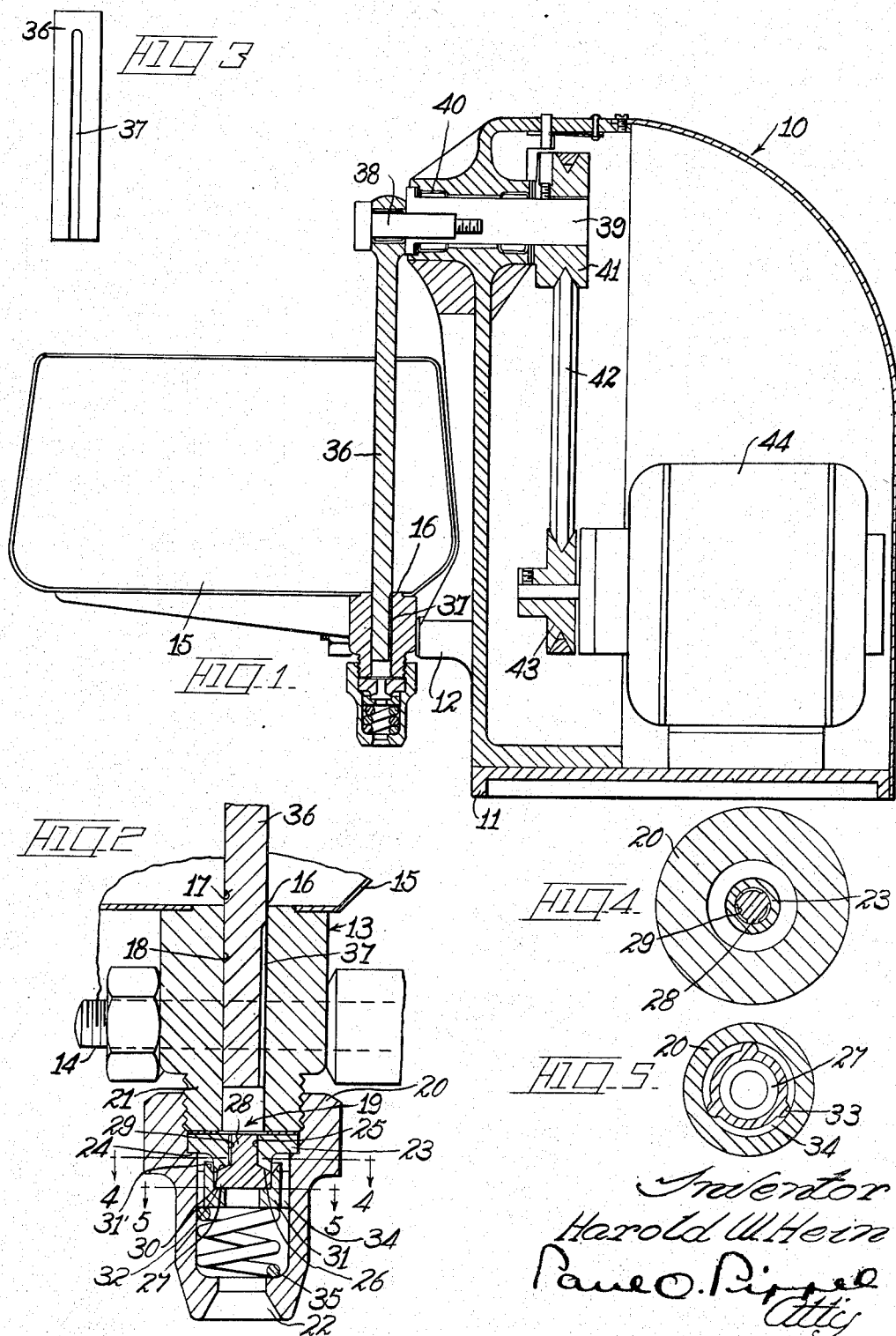
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PISTON TYPE HOMOGENIZER MECHANISM

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PISTON TYPE HOMOGENIZER MECHANISM

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This invention relates to a homogenizer for homogenizing liquids having fatty substances such as milk or the like. More specifically, the invention relates to a plunger or piston type of homogenizer having a novel construction for facilitating the supply of liquid to a homogenizing chamber.

Various processes of homogenizing liquids containing fatty substances have been in use for some time. In a homogenizing operation the liquid is discharged under high pressure through a homogenizing valve having a relatively small opening. Since the liquid is discharged under high pressure the process results in breaking down the globules of fat and thereby produces an improved product in which the non-fatty constituents are held together with the fatty substances and the tendency for the particles to separate is greatly diminished.

Applicant has provided an improved homogenizing structure of the plunger or piston type. In applicant's construction the supply can is securely supported on a housing structure containing the power unit for the homogenizer. A piston guide is positioned beneath the supply can and the guide contains a chamber which may be placed into communication with the supply can. A piston reciprocates within the piston guide, the piston being arranged to force liquid under pressure through an improved homogenizing valve structure. The piston is provided with an elongated recess at its lower end. As the piston is moving in one direction liquid contained within the chamber is forced under high pressure through a homogenizing valve. The piston then moves in a second direction within the piston guide, thus causing a vacuum depression within the homogenizing chamber. The piston continues the movement in this last mentioned direction until the elongated recess is in communication with the supply can, whereupon the vacuum depression within the chamber causes the succeeding quantity of liquid to rapidly be sucked into the chamber just prior to the movement of the piston in its first direction, whereby the liquid within the chamber is homogenized.

It is the prime object, therefore, of applicant's invention to provide an improved homogenizing valve structure wherein a piston or plunger is utilized for forcing the liquid through the homogenizing valve.

A still further object is to provide an improved plunger type of homogenizer wherein the plunger includes a longitudinally extending recess formed at its lower end, the recess providing an inlet

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conduit for the entrance of liquids into the homogenizing chamber.

These and other objects will become more readily apparent upon examination of the drawing when examined in connection with the specification.

In the drawing:

Fig. 1 is a cross-sectional view through the improved homogenizer structure.

Fig. 2 is an enlarged cross-sectional view of a homogenizer valve showing the improved plunger construction.

Fig. 3 is a detail view in elevation of a recessed end portion of a homogenizing piston.

Fig. 4 is a detail sectional view taken substantially on the line 4—4 of Fig. 2.

Fig. 5 is a sectional view through a homogenizing valve taken substantially along the line 5—5 of Fig. 2.

A homogenizer structure is generally designated by the reference character 10. The homogenizer 10 includes a supporting housing 11 which has a boss or supporting member 12 projecting outwardly of the housing 11. The boss 12 is adapted to support a fluid supply member 13 by means of a bolt and nut connection 14. The fluid supply member 13 in turn supports a fluid supply can 15. The supply can 15 is open at its top and includes a fluid discharge opening 16.

The fluid supply member 13 includes a piston guide 17 which is defined by a vertically extending bore 18. The bore 18 is in communication with the opening 16 in the supply can 15. The lower end of the bore 18 is provided with a homogenizing chamber which is generally designated at 19.

A valve retainer 20 is threaded onto a projection 21 formed integrally with the fluid supply member 13. The valve retainer 20 is provided at its lower end with a fluid discharge outlet 22 which is adapted to direct fluid from the homogenizing chamber 19 to a suitable container (not shown) which may be provided for the purpose of receiving the liquid.

The homogenizing structure within the valve retainer 20 includes a breaker ring 23. The breaker ring 23 is rigidly secured between an undercut shoulder 24 of the valve retainer 20 and the projection 21 of the fluid supply member 13. The breaker ring 23 includes a bore 25 which is positioned in axial alignment with the chamber 19 and is in communication therewith. The breaker 23 also includes a conical or annular homogenizing surface 26.

A homogenizing valve 27 is provided with a

valve stem 28, the valve stem 28 being arranged to reciprocate within the bore 25 of the breaker ring 23. The valve stem 28 also includes a plurality of longitudinally extending recesses 29 as best shown in Fig. 4. The recesses 29 provide means whereby liquid under pressure may be forced down against the homogenizing valve 27. The valve 27 is also provided with a conical or annular surface providing a valve seat 30. The valve seat 30 is adapted to engage the conical homogenizing surface 26 of the breaker ring 23 in complementary relation.

A valve support 31 is adapted to support the valve 27. The valve support 31 includes an annular pocket 32 which is arranged to receive and securely support the valve 27. An annular homogenizing wall 31' is provided at the upper end of the valve support 31 and is perpendicular to the homogenizing surface 26. The valve support 31 includes a plurality of peripherally extending projections 33 as best shown in Fig. 5 which provide a plurality of vertical passages 34. The valve support 31 is resiliently mounted on a spring 35 which is biased to move the valve 27 and its conical surface 30 into complementary relation with respect to the homogenizing surface 26.

A piston or plunger 36 is adapted to reciprocate within and with respect to the supply can 15. The piston 36 is provided at its lower end with a longitudinally extending recess which in effect forms a conduit 37 which is open at its ends. The piston or plunger 36 is arranged to reciprocate and is pivotally connected to a shaft 38. The shaft 38 is rotated in an eccentric manner by means of an eccentric drive shaft 39. The drive shaft 39 is journaled in bearings 40 supported on the housing 11. The drive shaft 39 is rotated by means of a pulley 41 which is rotated by means of a V-belt 42 from a drive pulley 43. The drive pulley 43 is driven by an electric power unit 44.

In operation, the supply can 15 is filled with liquid to be homogenized. The power unit 44 is placed into operation and the piston 36 is arranged to reciprocate by means of the eccentric drive shaft 39. As the spring 35 is adapted to securely position the conical valve seat 30 against the homogenizing surface 26 of the breaker ring 23 the chamber 19 is resiliently sealed. As the piston 36 is driven in a first or upper direction, a vacuum depression is formed in the chamber 19. The piston continues its upward travel until the recess 37 is in communication both with the chamber 19 and the interior of the supply can 15. In view of the vacuum depression within the chamber 19, a sufficient quantity of liquid is immediately sucked into the chamber 19. Thus, the chamber is completely and immediately filled. The piston thereupon moves in a downward or second direction, whereupon the recess 37 is no longer in communication with the supply can 15. The chamber 19 is thus again closed and continued downward movement of the piston forces the liquid out of the chamber and down through the undercut recesses 29 of the valve stem 28. The fluid is then forced under pressure between the conical surfaces 26 and 30 since the pressure built up within the chamber 19 is sufficient to move the valve 27 and the valve support 31 against the spring 35, thereby compressing the spring. As the liquid is moved between the conical surfaces 26 and 30 thereupon striking the homogenizing wall 31', the homogenizing action takes place. The liquid thereupon passes outwardly through the vertical passages 34 and out-

wardly of the structure as it merges through the opening 22.

Applicant has provided a novel and practical homogenizing structure which is readily adapted for use in the home or on the farm. By virtue of the recessed piston construction a sufficient quantity of liquid to fill up the chamber 19 is at all times assured since the vacuum depression created in the chamber 19 immediately sucks in the necessary quantity to fill the chamber. This is especially important since the reciprocation of the piston is extremely fast by virtue of the electrical power drive connection.

A simple and inexpensive homogenizing structure has been disclosed. It is believed that the advantages and improvements have been concisely and clearly described in the specification and have been properly claimed. It must be understood, of course, that various changes and modifications may be made which do not depart from the spirit of the invention as disclosed nor the scope thereof as defined in the appended claims.

What is claimed is:

1. In a homogenizer, a supply can having a fluid discharge opening, a piston guide connected to the can, said guide having a bore defining a chamber in communication with the fluid discharge opening, a homogenizing structure including a valve retainer connected to the piston guide, said retainer including an opening adapted to discharge fluid from the chamber, a breaker ring connected to the retainer, said ring having a bore adapted to communicate with the bore in said guide, a conical surface on said breaker ring, a valve having a stem longitudinally slidable in the bore of said ring, said valve including a conical valve seat adapted to engage the conical surface of said ring in complementary relation, a valve support for said valve, resilient means engaging the support for urging said valve seat into engagement with the breaker ring, a piston arranged to reciprocate within the bore of the piston guide, a longitudinally extending recess formed in one end of said piston, said recess being arranged to provide for communication between the supply can and the chamber during one position of said piston, and means for moving said piston to a second position whereby the chamber is closed with respect to said supply can.
2. In a homogenizer, a supply can having a fluid discharge opening, a piston guide having a bore defining a chamber in communication with the fluid discharge opening, a homogenizing structure including a valve retainer connected to the piston guide, said retainer including an opening adapted to discharge fluid from the chamber, a breaker ring supported by the retainer, said ring having a bore adapted to communicate with the bore in said guide, an annular surface on said breaker ring, a valve slidable in the bore of said ring, said valve including a valve seat adapted to engage the annular surface of said ring in complementary relation, a valve support for said valve, resilient means engaging the support for urging said valve seat into engagement with the breaker ring, a piston arranged to reciprocate within the bore of the piston guide, a conduit formed in one end of said piston, said conduit being arranged to provide for communication between the supply can and the chamber during one position of said piston, and means for moving said piston to a second position whereby the chamber is closed with respect to said supply can.

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3. In a homogenizer, a fluid supply can, a supply member having a bore defining a chamber, said member being in communication with the fluid supply can, a homogenizing structure associated with said supply member, said structure including a valve retainer having an opening adapted to discharge fluid from the chamber, a breaker ring connected to the retainer, said ring having a bore adapted to communicate with said chamber, a homogenizer valve slidable with respect to said ring, a valve support for said valve, resilient means engaging the support for urging said valve into engagement with the breaker ring, a piston arranged to reciprocate within the bore of the supply member, a longitudinally extending conduit formed in one end of said piston, said conduit being arranged to provide for communication between the supply can and the chamber during one position of said piston, and means for moving said piston to a second position whereby the chamber is closed with respect to said supply can.

4. In a homogenizer, a supply can having a fluid discharge opening, a piston guide connected to the can, said guide having an elongated bore defining a chamber in communication with the fluid discharge opening, a homogenizing structure including a valve retainer connected to the piston guide, said retainer including an opening adapted to discharge fluid from the chamber, a breaker ring connected to said retainer, said ring

having a bore in communication with the chamber, a homogenizer valve slidable with respect to said ring, means resiliently urging said valve into engagement with said breaker ring, a piston arranged to reciprocate within said chamber, a longitudinally extending recess in said piston, said recess having an opening opening outwardly of the lower extremity of said piston, said recess being arranged to communicate with the supply can during one position of said piston wherein a portion of said recess is disposed outwardly of the chamber, and means for moving said piston to a second position whereby said recess is disposed entirely within said chamber and the chamber is closed with respect to said supply can.

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