J. WILLMANN.

HOMOGENIZER.

APPLICATION FILED JUNE 21, 1912.

1,070,218.

Patented Aug. 12, 1913.

2 SHEETS—SHEET 1.

Fig. 5.

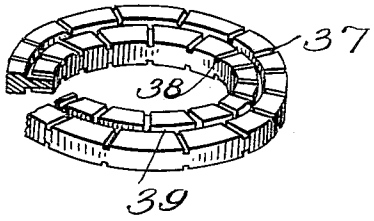
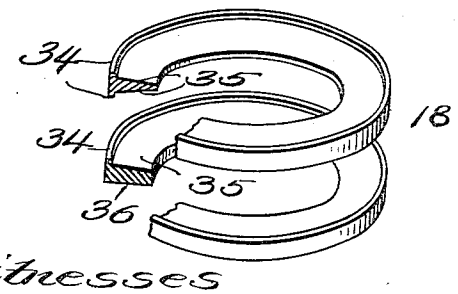
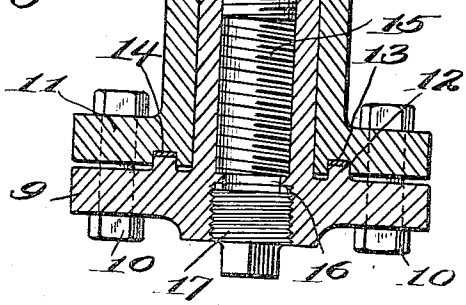


Fig. 1.

Fig. 4.





Witnesses

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2 SHEETS—SHEET 2.

Fig. 3.

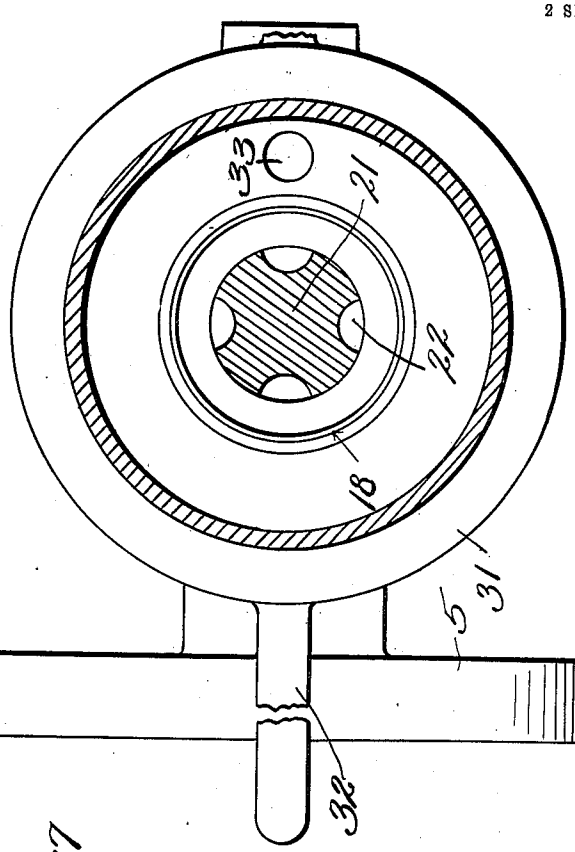
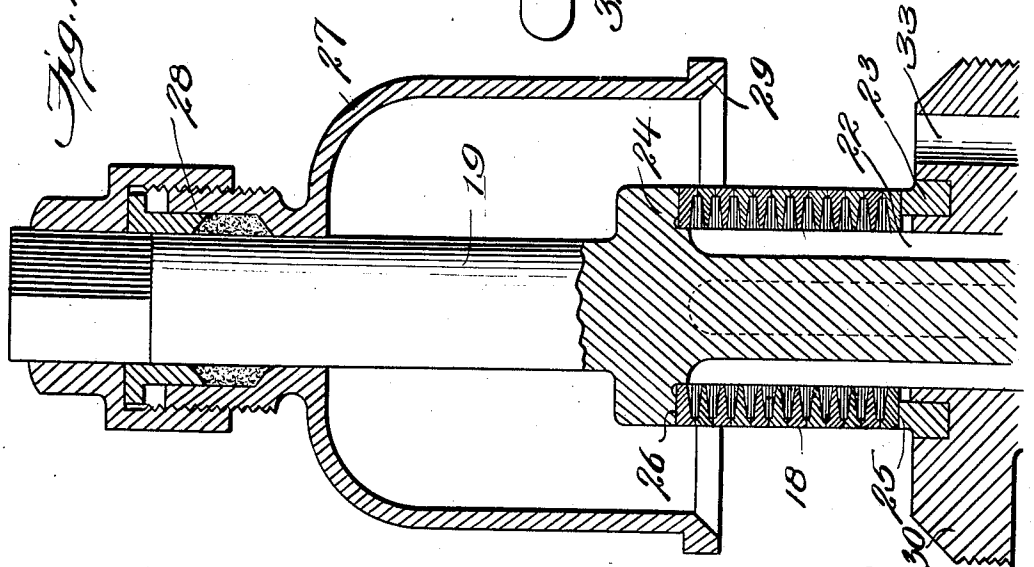


Fig. 2.



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JOSEPH WILLMANN, OF DERBY, CONNECTICUT.

HOMOGENIZER.

1,070,218. Specification of Letters Patent. Patented Aug. 12, 1913.

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To all whom it may concern:

Be it known that I, JOSEPH WILLMANN, a citizen of the United States, residing at Derby, in the county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Homogenizers, of which the following is a specification.

This invention relates to improvements in apparatus for homogenizing substances, especially milk and cream, and the primary object of the invention is to provide improved apparatus of this character which is capable of operating efficiently to render the constituents of the substances homogeneous and which can be readily adjusted to operate at the desired homogenizing pressure, the parts, moreover, being so constructed and related as to enable the apparatus to be cleaned with facility.

Another object of the invention is to provide an improved apparatus of this character which enables the homogenizing elements thereof to be readily exposed for inspection while the apparatus is in operative condition and a liquid is being forced between the elements, thereby enabling the operator to determine precisely the working condition of the apparatus.

Further objects of the invention are to provide an improved construction for the members which coöperate with the homogenizing elements whereby such elements are accurately held rigidly in fixed operative relation and the surfaces with which such elements coöperate may be accurately ground one against the other, and to provide an improved thrust plug and removable bushing with which the screw portion of the plug engages, facilitating the manufacture of these parts and enabling them to be removed readily when necessary.

To these and other ends, the invention consists in certain improvements, and combinations and arrangements of parts, all as will be hereinafter more fully described, the novel features being pointed out particularly in the claims at the end of the specification.

In the accompanying drawing:—Figure 1 represents a central longitudinal section of a homogenizer constructed in accordance with the present invention; Fig. 2 represents an enlarged section of the upper portion of the homogenizing elements of the apparatus showing the collecting dome or hood adjusted to expose the homogenizing elements for inspection; Fig. 3 represents an enlarged transverse section through the device on the line 3—3 of Fig. 1; Figs. 4 and 5 are perspective views of homogenizing elements or disks adapted to be used in connection with a homogenizer embodying the present invention.

Similar parts are designated by the same reference characters in the several views.

The present invention is applicable generally to homogenizers of different types, the pumps which supply the liquid or substances under certain pressure being shown diagrammatically and may be of any suitable construction, and the accompanying drawing shows one specific embodiment of the improved apparatus which will be hereinafter described in detail. It will be understood, however, that the invention is not limited to the particular construction shown and described, as modifications and changes may be made within the scope of the invention.

In the present instance, 1 designates the liquid receiver or manifold which receives the liquid or substances to be treated continuously by the action of the pumps 2, any suitable number of which may be employed, the homogenizer embodying the present invention being coupled to the flange 3 on the end of the manifold or receiver. The homogenizer embodying the present invention comprises a casing 4 having a coupling flange 5 which is bolted or otherwise secured to the complemental flange 3 on the manifold, and the casing has an inlet passage 6 through which the liquid or substance to be treated flows from the manifold and into a chamber 7 in the casing. A bushing 8 is removably fitted into one end of the casing 4, this bushing in the present instance embodying a sleeve which fits into a chamber formed for its reception in the casing and it has a flange 9 which is secured by bolts 10 or equivalent means to a flange 11 on the respective end of the casing. To prevent leakage of liquid past the bushing, the latter may be formed with a circular rib 12 to fit into a corresponding groove 13 in the respective end of the casing, and a gasket or packing ring 14 may be fitted in the groove to form a tight joint. The interior of the sleeve portion of the bushing is threaded as shown at 15 and the bottom of the bushing is preferably provided with an opening 16 for the discharge of water or other material

during washing or cleaning of the apparatus, this opening, however, being closed during the operation of the apparatus by a screw plug or equivalent device 17.

According to the present invention, a plurality of homogenizing elements 18 are employed which are positively held in fixed relation and form a number of very small openings through which the liquid to be homogenized is forced at high pressure, the liquid being thereby subdivided into a number of relatively minute streams which pass between the surfaces of the homogenizing elements at sufficiently high velocity to cause an intimate mixing of the constituents of the liquid, and in the homogenizing of milk and cream, the fat globules are disintegrated or broken up and become homogeneous with the watery part of the milk. Different means may be provided for positively and firmly holding the homogenizing elements in proper fixed relation during the homogenizing operation, a plug 19 being preferably employed which has a threaded end 20 which coöperates with the threaded portion 15 of the removable bushing 8, and the upper portion of this plug is enlarged as at 21 so as to fit the chamber 7 of the casing, the enlarged portion of the plug, however, being grooved or fluted to form axially extending passages 22 which serve to conduct the liquid from the inlet of the casing to the homogenizing elements. This enlarged portion of the plug also serves to center the homogenizing elements in the form of a pile or stack, the pile or stack of homogenizing elements being supported at one end by a seat which is preferably composed of a ring 23 of hard, non-corrosive metal which is seated in a groove in the respective end of the casing while the opposite end of the stack or pile of homogenizing elements is engaged by a seat which is formed by a shoulder or collar 24 on the plug, the surfaces 25 and 26 provided by the parts 23 and 24 being opposed, and to insure perfect results, they must be ground accurately one against the other. The grinding of these surfaces may, according to the present invention, be effected with facility, the stack of homogenizing elements and the bushing 8 being removed, thus allowing the plug to descend in the casing so as to bring the surfaces 25 and 26 into contact, thereby rotating the plug, and while these surfaces are in contact and supplied with a suitable grinding substance, a perfect relation of these surfaces can be readily obtained. During the grinding of these surfaces, the fluted or grooved enlarged portion 21 of the plug serves as a centering means for the plug owing to its fit in the chamber 7 of the casing.

It will be observed that the liquid to be homogenized is introduced to the homogenizing elements at the inner sides thereof and consequently the streams issuing between the homogenizing elements will be projected outwardly, the exterior of the homogenizing elements being otherwise free from pressure. To collect and properly conduct away the homogenized liquid projected from the homogenizing elements, a collecting device preferably in the form of a dome or hood 27 is provided, this dome or hood having a stuffing box 28 which fits the upper end of the stem 19 and its lower end forms a liquid-tight joint with the top of the casing, a flange 29 being formed on the lower edge of the dome or hood in the present instance and the respective end of the casing is formed with a flange 30 which receives the flange 29, conical surfaces being preferably used as shown to insure a proper fit of these parts, and a nut 31 having handles 32 for manipulation thereof is threaded on the flange 30 of the casing and coöperates with the flange 29 of the dome or hood, thereby providing means for securing the dome or hood in operative position, the liquid being collected within the hood and discharged through the outlet port or passage 33. By unfastening the nut 31 and raising the dome or hood on the plug 19, it is evident that the homogenizing elements are exposed for inspection and the condition thereof can be readily determined upon observation of the streams of liquid issuing from between them.

Homogenizing apparatus of the character described is capable of operating with homogenizing elements of different kinds. In Fig. 4, one type of homogenizing element is shown which has proven satisfactory, each element embodying a ring or disk having plane smooth surfaces of narrow radial extent 34 on the upper and lower sides thereof while the inner portions of the disk are reduced and are of conical or tapered form to present bevel or divergent surfaces 35. The uppermost and lowermost elements, however, have the homogenizing surface 34 and the beveled surface 35 only at one side, the other side of these elements being flat as at 36 to fit properly against the surfaces 25 and 26. Homogenizing elements such as shown in Fig. 5 may also be used wherein each element embodies a disk having sets of circumferentially spaced radial grooves 37 and 38 arranged in staggered relation and a connecting circumferential groove 39, these grooves being formed in the plane surfaces at opposite sides of the disks and serving to subdivide the liquid into numerous minute streams which it has been found operate to thoroughly and efficiently homogenize milk and cream. By rotating the plug by the aid of a hand-wheel or wrench applied to the squared end thereof,

the homogenizing elements can be readily adjusted relatively toward or from one another to produce the desired homogenizing pressure of the liquid, and such pressure when produced will be maintained owing to the rigid construction provided.

I claim as my invention:—

1. A homogenizing device embodying a casing having means for receiving liquid at homogenizing pressure, homogenizing elements located exteriorly of said casing and between which such liquid is to be forced, and means for maintaining the homogenizing elements in fixed coöperative relation embodying a plug having means for conducting the liquid from the casing to the interior of said elements, and a part removably related to the casing and coöperative with the plug to sustain the thrust thereof.

2. A homogenizing device embodying a casing having means for receiving liquid at homogenizing pressure, homogenizing elements located exteriorly of the casing and between which such liquid is to be forced, and means for maintaining the homogenizing elements in coöperative relation embodying a plug extending axially through said elements, and a bushing removably fitted in said casing and adjustably connected to said plug.

3. A homogenizing device embodying a casing having means for receiving liquid at homogenizing pressure, homogenizing elements located exteriorly and seated at one end of the casing and between which such liquid is to be forced, a plug extending into the casing and coöperative with said homogenizing elements, and a bushing removably applied to the opposite end of the casing and adjustably connected to said plug.

4. A homogenizing device embodying a casing having means for receiving liquid at homogenizing pressure, homogenizing elements located exteriorly and seated at one end of the casing and between which such liquid is to be forced, a plug having a threaded portion at one end arranged in the casing and having a shoulder coöperative with the homogenizing elements, and a bushing having a removable fluid-tight connection with the opposite end of the casing and coöperative with the threaded portion of the plug.

5. A homogenizing device embodying a casing having means to receive a liquid at homogenizing pressure, a seat on the casing, homogenizing elements coöperative with said seat and arranged exteriorly of the casing, and a plug extending through the homogenizing elements and having a thrust shoulder bearing thereon.

6. A homogenizing device embodying a casing having a passage to receive a liquid at homogenizing pressure, homogenizing means having an interior passage to receive liquid at homogenizing pressure from said passage in the casing, and a hood adapted to inclose said homogenizing means and to collect homogenized liquid therefrom.

7. A homogenizing device embodying a casing having a passage to receive liquid at homogenizing pressure, and a set of hollow homogenizing elements between which the liquid is to be forced and forming an interior passage to receive the liquid at homogenizing pressure from said passage in the casing.

8. A homogenizing device embodying a casing having a passage to conduct a liquid at homogenizing pressure, a set of superposed homogenizing elements having an interior passage to receive liquid at homogenizing pressure from said casing and between which such liquid is forced outwardly, and means for collecting the homogenized liquid exteriorly of the homogenizing elements.

9. A homogenizing device embodying a casing having a passage to conduct a liquid at homogenizing pressure, a set of superposed homogenizing elements having an interior passage to receive liquid at homogenizing pressure from said casing and between which such liquid is forced outwardly, and a collecting hood adapted to inclose the homogenizing elements and movable to expose such elements for inspection.

10. A homogenizing device embodying a casing having a passage to conduct a liquid at homogenizing pressure, a set of superposed homogenizing elements having an interior passage to receive liquid at homogenizing pressure from said casing and between which such liquid is forced outwardly, a plug coöperative with said elements to maintain them in coöperative relation, a collecting hood fitted on said plug and adapted to inclose said homogenizing elements, and means for securing said hood to the casing.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JOSEPH WILLMANN.

Witnesses:
FLORENCE K. WATSON,
HOWARD B. PECK.