

July 23, 1929.

G. A. ZEITLER
VACUUM EVAPORATOR

1,721,760

Filed April 8, 1929

2 Sheets-Sheet 1

Fig. 1.

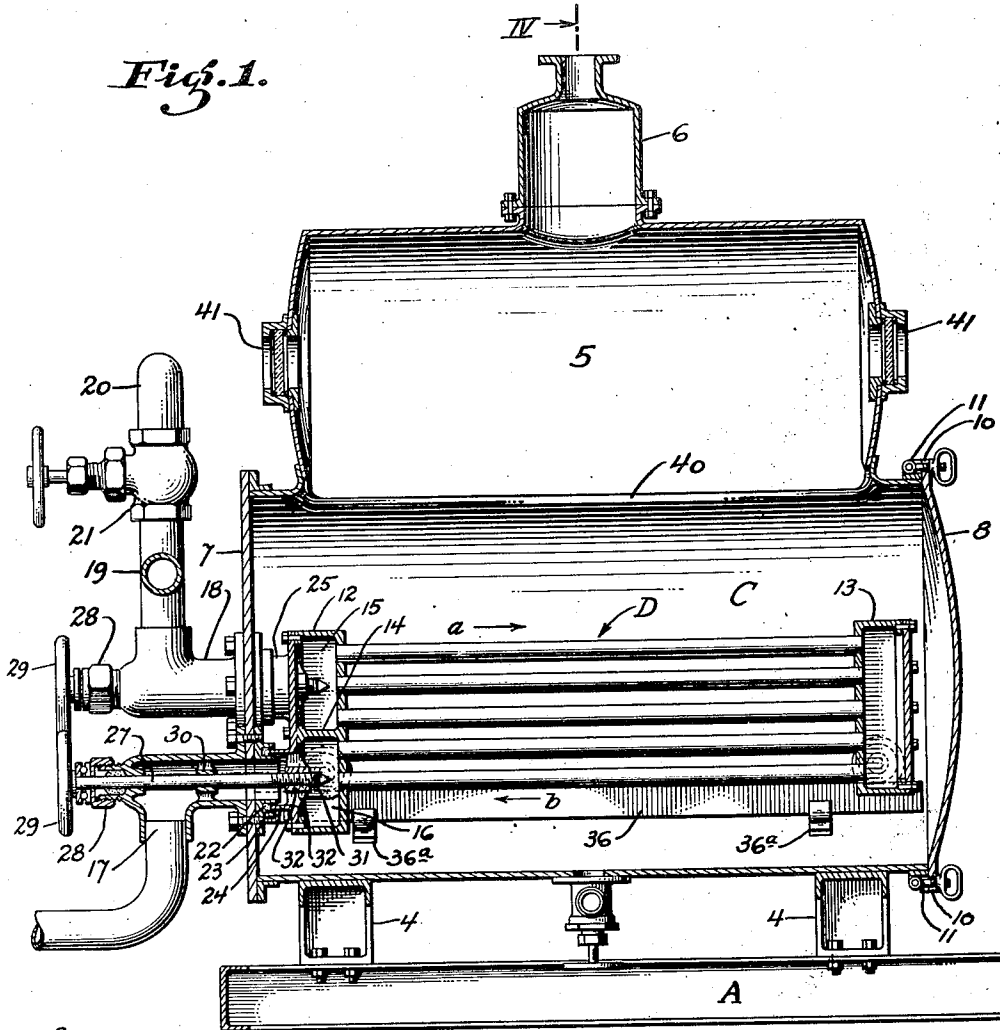
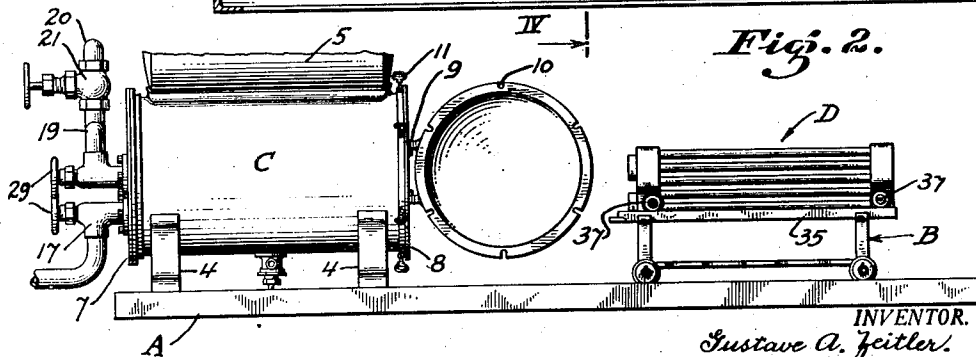


Fig. 2.



INVENTOR.

Gustave A. Zeitler.

BY
Louisa d. Loftus & Abbott
ATTORNEYS.

July 23, 1929.

G. A. ZEITLER

1,721,760

VACUUM EVAPORATOR

Filed April 8, 1929

2 Sheets-Sheet 2

Fig. 3.

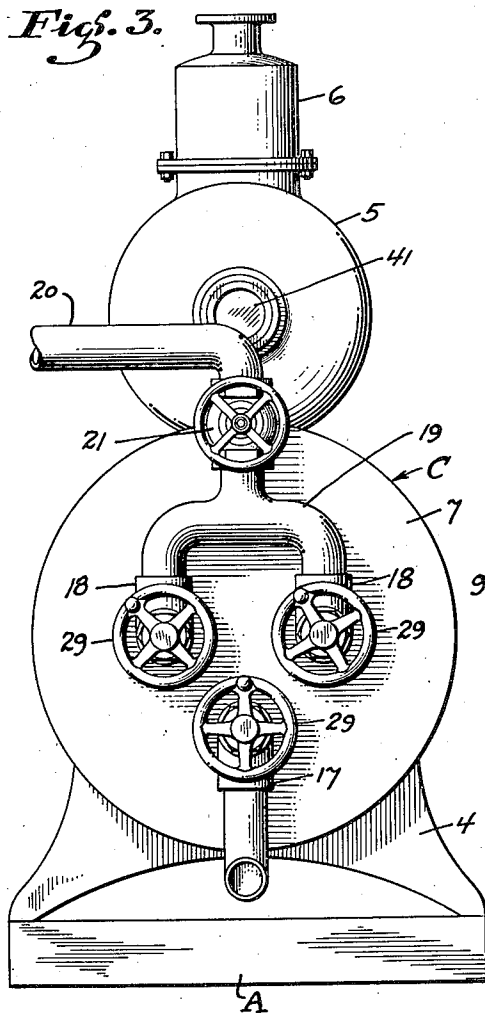


Fig. 4.

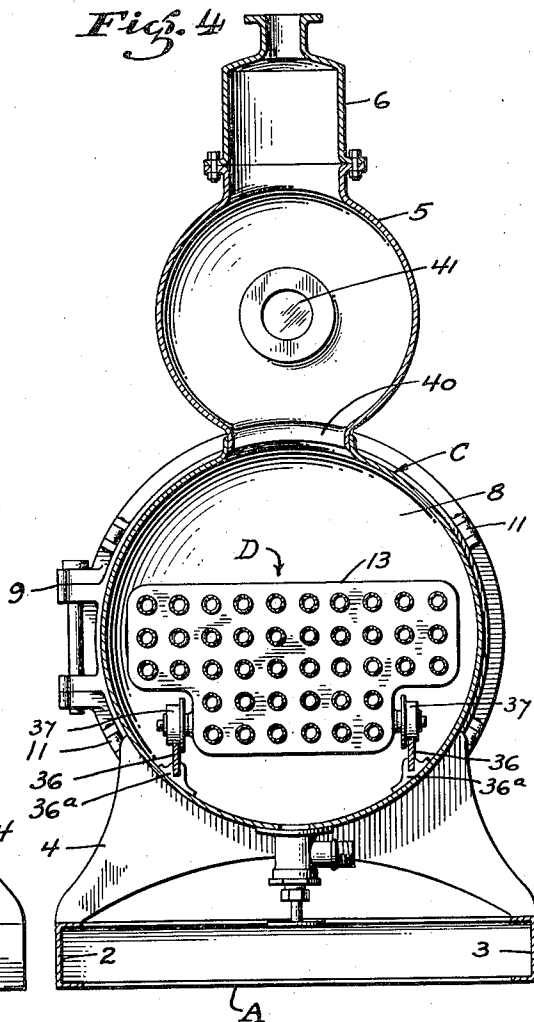
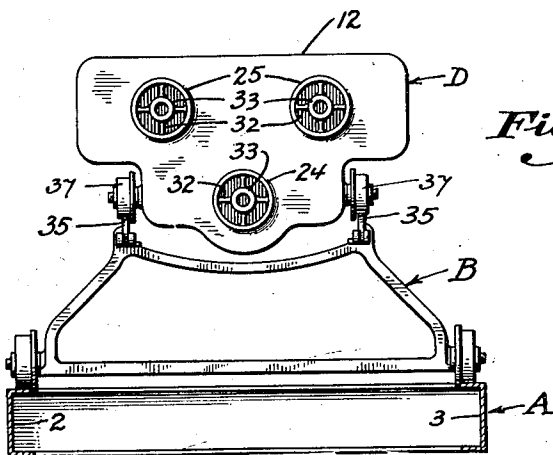


Fig. 5.

INVENTOR.
Gustave A. Zeitler.
BY
Lounsard, Loftus & Atteatt
ATTORNEYS

Patented July 23, 1929.

1,721,760

UNITED STATES PATENT OFFICE.

GUSTAVE A. ZEITLER, OF OAKLAND, CALIFORNIA.

VACUUM EVAPORATOR.

Application filed April 8, 1929. Serial No. 353,420.

This invention relates to evaporators, and especially to a removable heating unit therefor.

The object of the present invention is to generally improve and simplify the construction and operation of evaporators; to provide a heating unit in the form of a tube bundle which may be readily withdrawn from the evaporator for cleaning, inspection and repair; to provide permanent steam inlet and exhaust connections on the evaporator and in conjunction therewith means for quickly connecting or disconnecting the heating unit with relation to said permanent connections; to provide a heating unit capable of presenting a large heating surface so as to increase the vapor output with relation to the size of the evaporator; to provide an evaporator which presents unobstructed smooth surfaces throughout so as to be readily accessible for cleaning; and further to provide a large vapor escape passage so as to reduce priming and foaming to a minimum.

The evaporator is shown by way of illustration in the accompanying drawings in which Fig. 1 is a central vertical longitudinal section of the evaporator showing the heating unit in place and connected with the permanent steam inlet and exhaust connections.

Fig. 2 is a side elevation of the evaporator, the upper portion thereof being partially broken away, said view showing the heating unit removed for cleaning.

Fig. 3 is an end view of the evaporator showing the permanent steam inlet and exhaust connections.

Fig. 4 is a central vertical section taken on line IV-IV of Fig. 1.

Fig. 5 is an end view of the heating unit showing it removed from the evaporator and supported upon the carriage.

Referring to the drawings in detail, particularly Figs. 1 and 2, A indicates a base member which, in this instance, is constructed of a pair of parallel interspaced channel beams, such as indicated at 2 and 3, said beams in addition to functioning as a base also serving as rails for a carriage generally indicated at B.

Mounted upon a pair of pedestals 4, which in turn are secured to the channel beams 2 and 3, is a cylinder C. Disposed on top of the cylinder is a vapor receiving chamber 5, and disposed on top of the vapor receiving chamber is a vapor dome 6 which is adapted to be connected with a vacuum pump or con-

denser, as will hereinafter be described. The cylinder C is provided with head members 7 and 8 at opposite ends, the head member 7 being permanently secured, while the head member 8 is hingedly supported, as shown at 9 so that it may be opened. The peripheral edge of the head is slotted, as shown at 10 and hinge bolts 11 are provided to secure the head when in closed position.

The hinged head is provided to permit insertion and removal of a heating unit, generally indicated at D. This heating unit consists of a pair of head members, generally indicated at 12 and 13 between which are secured a plurality of tubes D. The head member 12 is centrally divided by a partition member 14 to form an upper chamber 15, and a lower chamber 16. Steam is admitted to the upper chamber 15 and passes through the upper tubes in the direction of arrow *a*. The steam, after passing through the upper tubes, enters the head 13 and then returns through the lower tubes in the direction of arrow *b*, to compartment 16 of head 12. It is then directed into an exhaust or condensate pipe, generally indicated at 17. Steam is admitted to the upper chamber 15 of head 12 through a pair of inlet connections shown at 18, said connections being made through means of a Y-shaped elbow 19, which in turn is connected with a steam supply pipe 20, the flow of steam being regulated by a valve 21. The fittings 17 and 18 through which steam is admitted and exhausted are permanently connected with the head member 7. They project through this head member, as clearly shown in Fig. 1 and the inner ends of the connections are provided with annular seats 22 in the bottom of which are seated gaskets 23. The lower chamber 16 of the head 12 is provided with an annular flange 24 which is adapted to enter the annular seat 22 and engage the gasket 23.

The chamber 15 of the head 12 is provided with a pair of annular flanges 25 and these enter annular seats similar to that shown at 22 and they engage gaskets similar to that shown at 23. The annular flanges 24 and 25 which form a part of the head 12 are pulled tightly against the gaskets so as to make steam-tight connections. This is accomplished as follows:

Extending through the fitting 17 is a rod 27, the outer end extending through a stuffing box 28, and it is provided with a hand wheel 29. The rod is guided as at 30, and

the inner end is threaded as shown at 31. The annular flange 24 is provided with inwardly extending arms or webbs, such as shown at 32 (see Figs. 1 and 5) and these webbs carry a central hub or collar 33 which is interiorly threaded to engage the threads 31 of the rod 27. The fittings 18 are similarly constructed, hence if it is desired to make a steam tight connection between the annular flanges 24 and 25 and the fittings 17 and 18 it is only necessary to turn the hand wheels 29 in a direction to pull the flanges tightly against the gaskets 23. Conversely, if it is desired to break the connection it is only necessary to turn the hand wheels in the opposite direction when the threaded ends 31 of the rods will become disconnected with relation to the internally threaded hub members 23.

In actual operation, if it is desired to remove the heating unit, indicated at D, it is first necessary to release the bolts 11 and then to swing the head member 8 about the hinges 9 to assume an open position. The carriage B then is moved along the trackway or channel bars 2 and 3 until it engages the end of the cylinder C. The carriage B has a pair of track members 35 mounted thereon, and these track members will align with a pair of track members 36 which are mounted interiorly of the cylinder C. These track members, by the way, support the heating unit as the head members 12 and 13 are provided with flanged wheels 37 which engage the track members 36 and support the heating unit with relation thereto. When the track members 35 of the carriage align with and engage the ends of the track members 36 the heating unit may be disconnected by releasing the threaded ends 31 of the rods 27 with relation to the internally threaded hub members 33. The heating unit, when disconnected, is then pulled outwardly from the cylinder onto the carriage B and the carriage may then be moved along the base of channel members 2 and 3 to the position shown in Fig. 2 where it is accessible for cleaning, inspection and repair.

The track members 36, by the way, are nothing more or less than a pair of straight bars (see Fig. 4) which are supported in slotted lugs 36^a secured on the inner surface of the cylinder C. These rails may be lifted out of the slotted lugs and removed, and the entire inner surface of the cylinder is thus free and unobstructed so that it can be thoroughly cleaned and sterilized.

The evaporator is particularly intended for evaporating such liquids as milk and the like. Priming or foaming is one of the usual troubles of evaporators. Priming and foaming is prevented in the present instance by providing a liberal escape passage from the cylinder. That is, a passage 40 is formed between the cylinder C and the vapor chamber 5. This passage is fairly wide, as shown in

Fig. 4 and it is so long as to extend from end to end of the vapor chamber (see Fig. 1) in this manner providing a liberal large passage through which the vapors from the evaporating chamber or cylinder C may freely escape. The vapor chamber is furthermore provided with observation or peekhole windows at opposite ends, as shown at 41, so that the process of evaporation may be observed from time to time.

The vapors entering the chamber 5 finally escape into a dome 6 and as this in turn is connected at its upper end with a vacuum pump or condensor of suitable form or construction, it is obvious that the vapors will be removed continuously as they are formed, and without any danger of causing priming or foaming.

Evaporators of this character must be daily cleaned and sterilized. It is for this reason that a liberal sized unobstructed cylinder C, vapor chamber 5 and steam dome 6 have been provided. Furthermore, it will be noted that all interior surfaces are smooth, free and unobstructed, thereby promoting accessibility and insuring thorough cleanliness and ease of sterilization.

It will also be noted that as the heating unit or tube bundle may be entirely removed from the cylinder it may be cleaned and sterilized at a point exterior thereof, as shown in Fig. 2.

It will furthermore be noted that it is supported in a position on the carriage B where all parts are accessible. It is obvious too, that a heating unit of large area may be employed, thus permitting a large vapor output with relation to the size of the evaporating cylinder.

While certain features of the present invention are more or less specifically described, I wish it understood that various changes may be resorted to within the scope of the appended claims, similarly, that the materials and finishes of the several parts employed may be such as the manufacturer may decide, or varying conditions or uses may demand. Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. An evaporator comprising a shell for the reception of liquid to be evaporated, a stationary head on one end thereof, a detachable head on the opposite end to give access to the interior, a heating unit insertible in the shell through the end having the detachable head, permanent steam inlet and exhaust connections on the stationary head and a detachable connection between said permanent steam inlet and exhaust connections and the heating unit.

2. An evaporator comprising a shell for the reception of liquid to be evaporated, a stationary head on one end thereof, a detachable head on the opposite end to give access to the interior, a heating unit insertible in the shell through the end having the detachable head,

said heating unit consisting of a pair of head members connected by a plurality of heating tubes, permanent steam inlet and exhaust connections on the stationary head, steam inlet and exhaust connections on one of the heads on the heating unit, and detachable means whereby the connections on the heating unit may be connected with the permanent steam inlet and exhaust connections on the stationary head.

3. An evaporator comprising a shell for the reception of liquid to be evaporated, a stationary head on one end thereof, a detachable head on the opposite end to give access to the interior, a heating unit insertible in the shell through the end having the detachable head, said heating unit consisting of a pair of head members connected by a plurality of heating tubes, permanent steam inlet and exhaust connections on the stationary head, steam inlet and exhaust connections on one of the heads of the heating unit, and detachable means operable from the exterior of the stationary head whereby the connections on the heating unit may be connected with the permanent steam inlet and exhaust connections on the stationary head.

4. An evaporator comprising a shell for the reception of liquid to be evaporated, a stationary head on one end thereof, a detachable head on the opposite end to give access to the interior, a heating unit insertible in the shell through the end having the detachable head, said heating unit consisting of a pair of head members connected by a plurality of heating tubes, permanent steam inlet and exhaust connections on the stationary head terminating on the inner face in annular gasket supporting seats, steam inlet and exhaust con-

nections on one of the heads of the heating unit, said connections terminating in annular flanges which are adapted to engage the gaskets on the inner ends of the first named steam inlet and exhaust connections, and means extending through said first named steam inlet and exhaust connections for drawing the flanged ends of the steam inlet and exhaust connections on the head of the heating unit tightly into engagement with the gaskets on the stationary head.

5. An evaporator comprising a shell for the reception of liquid to be evaporated, a stationary head on one end thereof, a detachable head on the opposite end to give access to the interior, a heating unit insertible in the shell through the end having the detachable head, said heating unit consisting of a pair of head members connected by a plurality of heating tubes, permanent steam inlet and exhaust connections on the stationary head terminating on the inner face in annular gasket supporting seats, steam inlet and exhaust connections on one of the heads of the heating unit, said connections terminating in annular flanges which are adapted to engage the gaskets on the inner ends of the first named steam inlet and exhaust connections, stuffing boxes formed in the first named steam inlet and exhaust connections, rods extending there-through, said rods being threaded on their inner ends and nut-like members within the flange-like projections on the head of the heating unit to receive the threaded ends of the rods, and means for rotating the rods to draw the flanged members on the heating unit head tightly against the gaskets on the stationary head.

GUSTAVE A. ZEITLER.