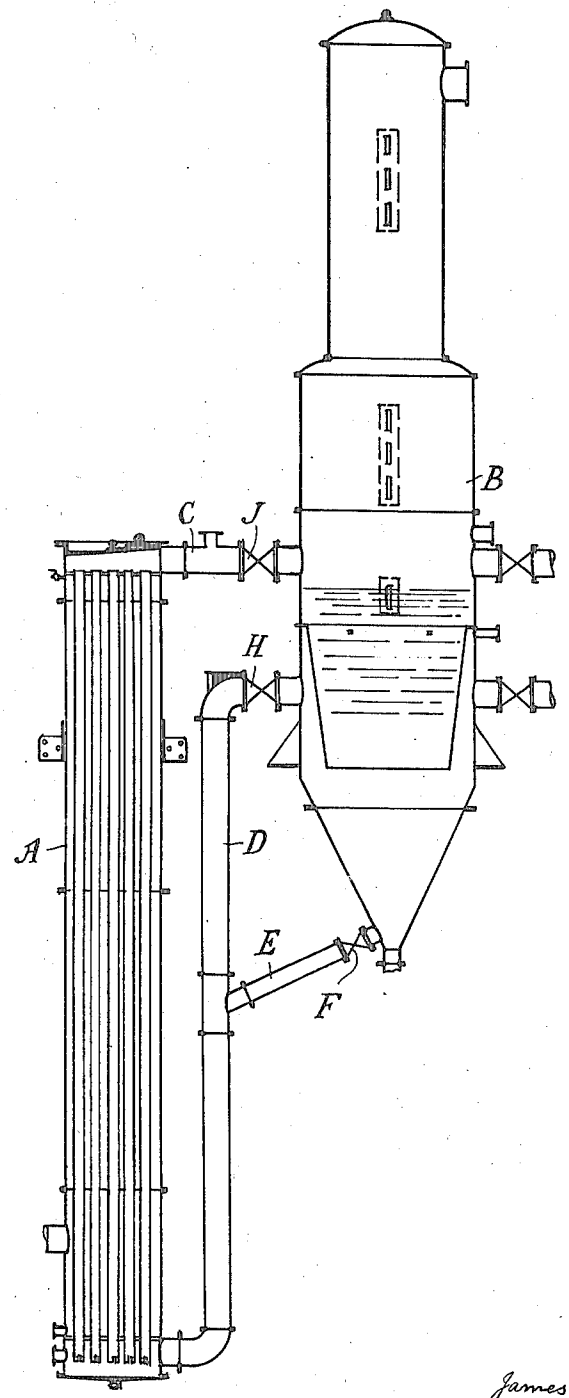
J. A. REAVELL & W. G. MANN.

EVAPORATING APPARATUS.

APPLICATION FILED NOV. 12, 1917.

1,263,467. Patented Apr. 23, 1918.



Inventors:
James Arthur Reavell
Wilfred George Mann
by Heard Smith & Tennant.
Attys.

UNITED STATES PATENT OFFICE.

JAMES ARTHUR REAVELL AND WILFRED G. MANN, OF LONDON, ENGLAND.

EVAPORATING APPARATUS.

1,263,467. Specification of Letters Patent. Patented Apr. 23, 1918.

Application filed November 12, 1917. Serial No. 201,673.

To all whom it may concern:

Be it known that we, JAMES ARTHUR REAVELL and WILFRED GEORGE MANN, subjects of the King of Great Britain and Ireland, both residing at London, England, have invented new and useful Improvements in and Relating to Evaporating Apparatus, of which the following is a specification.

This invention has reference to improvements in and relating to evaporating apparatus (for use, *inter alia*, in effecting the desalting of saline solutions) of the type comprising a heater and a separator for separating the vapor from the liquor through both of which the liquor—while being concentrated—circulates, the return flow of the liquor from the separator to the heater being through a conduit or pipe connected to the separator at a point as near as may be to the level of the liquid therein.

Owing to the return flow being thus from the upper part of the body of liquor in the separator (which is as it should be when once the apparatus is in full operation because the upper part is least concentrated) there is, when first starting, a large body of liquor in the lower part of the separator which remains practically cold even after the upper part is boiling, and this body of cold liquor can only be heated by conduction, there being no convection currents.

As a consequence, even in the case of what might be considered quite small apparatus, it is rarely possible to heat up the whole body of liquor to the desired temperature in less than four hours, and in the case of large apparatus it takes from 10 to 12 hours—frequently much longer.

Further, the apparatus itself will be unequally heated and, owing to the resultant unequal expansion, strains and stresses in the pipes and connections generally are set up which—more especially in the case of large apparatus—fairly soon lead to leakage and at times even fracture, particularly if the apparatus has to be comparatively frequently closed down, say for cleaning.

The object of our invention is to obviate this and to this end it consists in providing the apparatus with an additional return flow pipe which is connected at one end as near as may be to the bottom of the separator and at its other end directly or indirectly to the heater.

A known construction of evaporation apparatus of the type referred to, having our invention applied to it, is illustrated—more or less diagrammatically—in sectional side elevation in the accompanying drawing.

In said drawing A designates the heater and B the separator. These are connected in the known manner by pipes C and D having valves J and H respectively. The pipe C allows the liquor to flow from the heater to the separator and the pipe D (which as is shown is connected to the separator as high up as it conveniently can be) allows of the return flow of the liquor from B to A when the apparatus is in full working.

Connected at one end as near as may be to the bottom of the separator and at its other end to the return flow pipe D is a pipe E having a valve F. It is by the installation of this pipe, and its use as a return flow when the apparatus is first started, that the defects referred to are obviated.

On first starting the apparatus—all the liquor being then cold—steam will be admitted to the heater and the valve F at once opened. After a time the liquor will begin to circulate, flowing from A through C into B and from B through E into A so that liquor at the bottom of the separator is at once withdrawn to be replaced by the warmer liquor above. After a comparatively short time the whole of the liquor will have been raised to the desired temperature. When this is reached the valve F should be closed so that thereafter the return flow from B to A will be through the valve H and pipe D.

Owing to the whole body of liquor having thus had its temperature raised equally the apparatus will also be heated equally and the stresses and strains referred to obviated.

When the valve F is open for the purpose stated, the valve H may also be open either partly or completely, and instead of connecting up the pipe E with the pipe D as shown, it may be connected up directly with the heater A—preferably at or near the bottom thereof.

Apparatus of the type in question need to be cleaned or washed out from time to time and for this purpose the pipe E will also be useful to some extent.

After the steam or water has passed through the apparatus via the valve H and pipe D to clean the apparatus in the usual manner, the valve H may be closed and the

valve F opened for a short time to remove any sediment or the like at the bottom of the separator.

We wish it to be understood that while our invention is necessarily limited in its application to an evaporator of the type described, we do not limit ourselves to the particular constructional form illustrated, as this—representing as it does a form of such type of apparatus which is in use for desalting saline solutions and to which we have applied our invention—is given merely by way of example.

What we claim as our invention and desire to secure by Letters Patent is:—

1. In an evaporating apparatus, the combination of a heater, a separator, pipes connected to the upper part of the separator and leading to the top and bottom respectively of the heater through which pipes the circulation of the liquor takes place when in full working operation, the heater being arranged substantially below the level of the liquor in the separator whereby circulation takes place from the heater through the upper pipe into the separator and from the separator through the lower pipe to the heater, and an additional pipe leading from the bottom of the separator to the lower part of the heater substantially as and for the purpose set forth.

2. In an evaporating apparatus, the combination of a heater, a separator, pipes connected to the upper part of the separator and leading to the top and bottom respectively of the heater through which pipes the circulation of the liquor takes place when in full working operation, the heater being arranged substantially below the level of the liquor in the separator whereby circulation takes place from the heater through the upper pipe into the separator and from the separator through the lower pipe to the heater, and an additional pipe leading from the bottom of the separator, to the pipe connecting with the bottom of the heater and through said pipe to the lower part of the heater, substantially as and for the purpose set forth.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

J. ARTHUR REAVELL.
WILFRED G. MANN.

Witnesses:
CHAS. BAUER,
A. CRAWLEY.