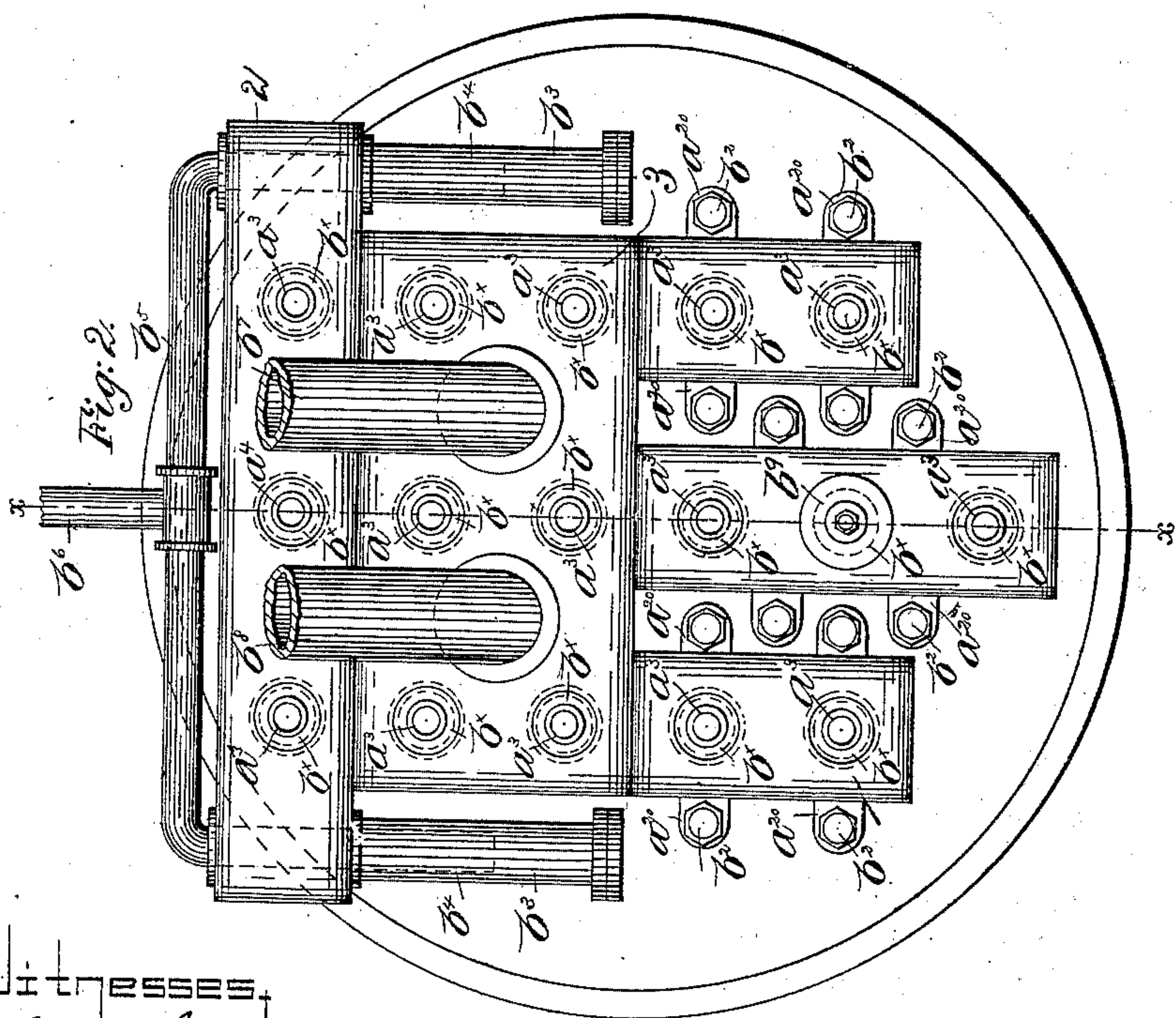
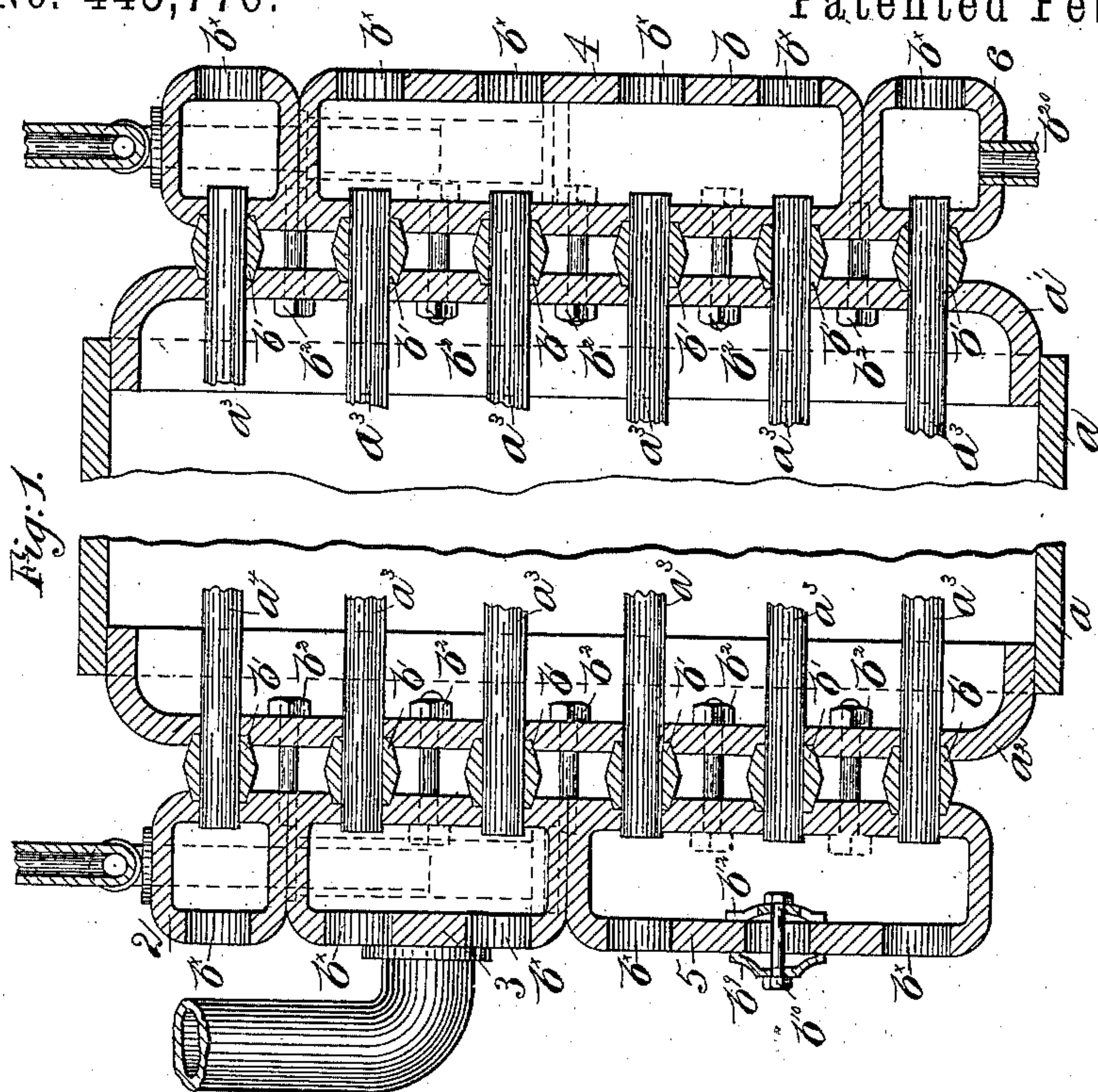


(No Model.)

T. GAUNT.  
EVAPORATING APPARATUS.

No. 445,776.

Patented Feb. 3, 1891.



Witnesses,

Geo. C. Huntington  
Fred S. Greenleaf

Inventor,

Thomas Gaunt,  
by Crosby & Gregory attys



# UNITED STATES PATENT OFFICE.

THOMAS GAUNT, OF BROOKLYN, NEW YORK.

## EVAPORATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 445,776, dated February 3, 1891.

Application filed September 1, 1890. Serial No. 363,662. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS GAUNT, of Brooklyn, county of Kings, State of New York, have invented an Improvement in Evaporating Apparatus, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

10 This invention relates to an evaporating apparatus in which the evaporating-surface is composed of tubes or pipes.

My present invention has for its object to improve the construction of evaporating apparatus whereby the tubes or pipes constituting the evaporating-surface are extended loosely through the heads or ends of the inclosing shell and into hollow castings or boxes secured to the said heads or ends, so that the  
20 said castings may be made in one piece and the castings and tubes may be readily removed when desired, and the tubes may be lengthened or shortened as the metal comprising the tubes is expanded or contracted  
25 under varying conditions of temperature, the said apparatus being rendered steam and vacuum tight, as will be described.

My invention in an evaporating apparatus therefore consists in the combination, with an  
30 inclosing case, of an evaporating-surface composed of tubes or pipes extended loosely through the opposite ends of the inclosing case, one or more hollow couplings, preferably castings or boxes loosely fitted upon the extended ends of the said tubes, and means interposed between the said tubes and the ends  
35 of the inclosing case to render the apparatus steam and vacuum tight, substantially as will be described.

40 Figure 1 is a longitudinal section, partially broken out to save space in the drawing, of one form of evaporating apparatus embodying my invention; and Fig. 2, an end view of the apparatus shown in Fig. 1.

45 The inclosing case of the evaporator is herein shown as cylindrical in form and composed of a body  $a$  and heads or ends  $a'$   $a^2$ , which, as herein shown, are extended into the body  $a$ , and may be secured therein in  
50 any suitable or usual manner.

The inclosing case contains within it the

evaporating-surface, composed of, as herein shown, horizontal tubes or pipes  $a^3$ , preferably arranged in vertical rows, there being three such rows herein represented in Fig. 2. As  
55 herein shown, each vertical row of tubes  $a^3$  has co-operating with it a liquid supply, preferably a tube or pipe  $a^4$ , located above and in line with each vertical row of tubes. The tubes or pipes  $a^3$ , comprising the evaporating-  
60 surface, and preferably the tube or pipe  $a^4$ , forming the liquid supply for the same, as herein shown, are loosely extended through the ends or heads  $a'$   $a^2$  of the inclosing case, and have fitted upon their extended ends hol-  
65 low couplings, preferably made as boxes or castings  $b$ . The tubes or pipes are rendered steam and vacuum tight in the inclosing case and in the hollow couplings or castings or boxes  $b$  by means of a suitable packing, pref-  
70 erably of rubber, herein shown as a sleeve  $b'$ , fitted upon the extended ends of the tubes between the boxes and the ends or heads  $a'$   $a^2$ , the said packing being rendered steam and vacuum tight by suitable bolts  $b^2$ , which  
75 secure the boxes  $b$  to the inclosing case, the said bolts being preferably extended through suitable ears or lugs  $a^{20}$ , secured to or forming part of the said castings or boxes. The castings or boxes  $b$  are made of suitable size  
80 and are arranged so as to couple the evaporating-tubes together to obtain a continuous circulation from the uppermost of the evaporating-tubes to the lowermost of the said tubes.

As herein represented, the apparatus is  
85 constructed for a surface evaporation, in which the liquor or substance to be treated is discharged upon the outside of the evaporating-tube.

When the apparatus is constructed as de-  
90 scribed for a surface evaporation, the liquid-feed pipes  $a^4$  have their ends extended into a single casting or box at each side of the apparatus, the said box or casting, herein marked  
95 2, being provided with dependent legs  $b^3$ , (see Fig. 2,) forming wells, into which are extended the ends  $b^4$  of a branch pipe  $b^5$ , connected to a supply-pipe  $b^6$ . The supply-pipes  $b^6$  at the opposite ends of the apparatus are in practice preferably connected to a common  
100 supply-pipe. (Not herein shown.)

As shown in Fig. 1, the two uppermost



tubes of the evaporating surface on the left side of the apparatus are extended into a casting or box marked 3, which is of sufficient size to have extended into it the two uppermost tubes of the three vertical rows of tubes herein shown, the said box or casting having communicating with it pipes  $b^7$   $b^8$ , which communicate with a boiler or other source of heat. The opposite ends of the two uppermost tubes of each vertical row are extended into a casting  $b$ , marked 4, which is made of sufficient size, as herein shown, to have extended into it the next two lower tubes of the evaporating-surface, and the opposite ends of the two lower evaporating-tubes are extended into a box or casting marked 5, into which is extended one end of the lowest tube of the evaporating-surface, the opposite end of the said tube being extended into a single casting marked 6, which, as shown, is provided with an outlet  $b^{20}$ .

The castings or boxes  $b$  are preferably provided at substantially opposite ends of each tube or pipe with an opening  $b^x$ , which is normally closed by a removable cover  $b^9$ , herein shown as secured to its casting by means of a bolt  $b^{10}$  and crow foot or bar  $b^{12}$ . I prefer to provide each casting with an opening  $b^x$  opposite each tube or pipe; but I do not desire to limit myself in this respect, as each casting may have any desired number of openings or have its front side as a single removable cover, or, if desired, the castings or boxes may be made in one piece without any cover, for by reason of the evaporating-tubes being loosely extended into the castings or boxes the latter may be readily removed without disturbing the said tubes.

I have herein shown my invention as embodied in an apparatus in which the evaporation takes place on the outside of the evaporating-surface; but I do not desire to limit myself in this respect, as it is evident my invention is equally well adapted for use in connection with an apparatus in which the liquid or substance to be evaporated is caused to pass through the evaporating-tubes, and the heating agent is admitted directly into the inclosing case or shell. In either form of apparatus the evaporating tubes or pipes are free to elongate and shorten as the metal of which they are composed expands or contracts under varying conditions of temperature, and if it is desired to remove, clean, or otherwise repair the evaporating-surface one or more of the castings or boxes may be readily removed from the projecting ends of the tubes, or one or more of the removable covers may be taken off, and, if desired, any one of the evaporating-tubes may be readily drawn out and a new one put in, or the said evaporating-tube may be drawn out and cleaned or otherwise repaired and then placed back again.

I have herein shown the tubes comprising

the evaporating-surface as arranged in vertical rows; but I do not desire to limit myself in this respect, as it is evident that the said tubes may be arranged in any desired manner within the inclosing case.

I have herein shown the inclosing case as tubular in form; but it is evident that the said case may be made oblong or of other desired shape.

By extending the evaporating-tubes loosely into the hollow couplings and securing them therein steam and vacuum tight the construction of the apparatus may be simplified and cheapened, for the hollow couplings may be cast complete, with only a substantially rough opening at their rear sides, through which the tubes are extended, and which it is not necessary to machine in order to fit the tubes therein, as the packing material, preferably rubber or other usual material, will be compressed sufficiently to form a tight joint.

I claim—

1. In an evaporating apparatus, the combination, with an inclosing case, of an evaporating-surface composed of tubes or pipes extended loosely through the opposite ends of the inclosing case, one or more hollow couplings fitted loosely upon the extended ends of the said tubes, and means interposed between the said hollow couplings and the ends of the inclosing case to render the apparatus steam and vacuum tight, substantially as described.

2. In an evaporating apparatus, the combination, with an inclosing case, of an evaporating-surface composed of tubes or pipes extended loosely through the opposite sides or ends of the said case, a liquid-supply located above the said evaporating-tubes within the inclosing case, one or more castings or boxes loosely fitted upon the projecting ends of the said tubes, and means interposed between the said castings or boxes and the ends of the case to render the same steam and vacuum tight, substantially as described.

3. In an evaporating apparatus, the combination, with an inclosing case, of an evaporating-surface composed of horizontal tubes or pipes arranged in vertical rows and extended loosely through the opposite sides or ends of the said case, a liquid-supply located above the said vertical rows of horizontal tubes or pipes, one or more castings or boxes loosely fitted upon the projecting ends of the said tubes or pipes, and a packing upon the extended ends of the tubes or pipes between the said castings or boxes and the ends of the case to render the apparatus steam and vacuum tight, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

THOMAS GAUNT.

Witnesses:

JAS. H. CHURCHILL,

A. S. WIEGAND.