Aug. 20, 1968 D. W. MAYS 3,398,261

ELECTRODE-TYPE STEAM BATH STEAM GENERATOR

Filed March 3, 1967 2 Sheets-Sheet 1

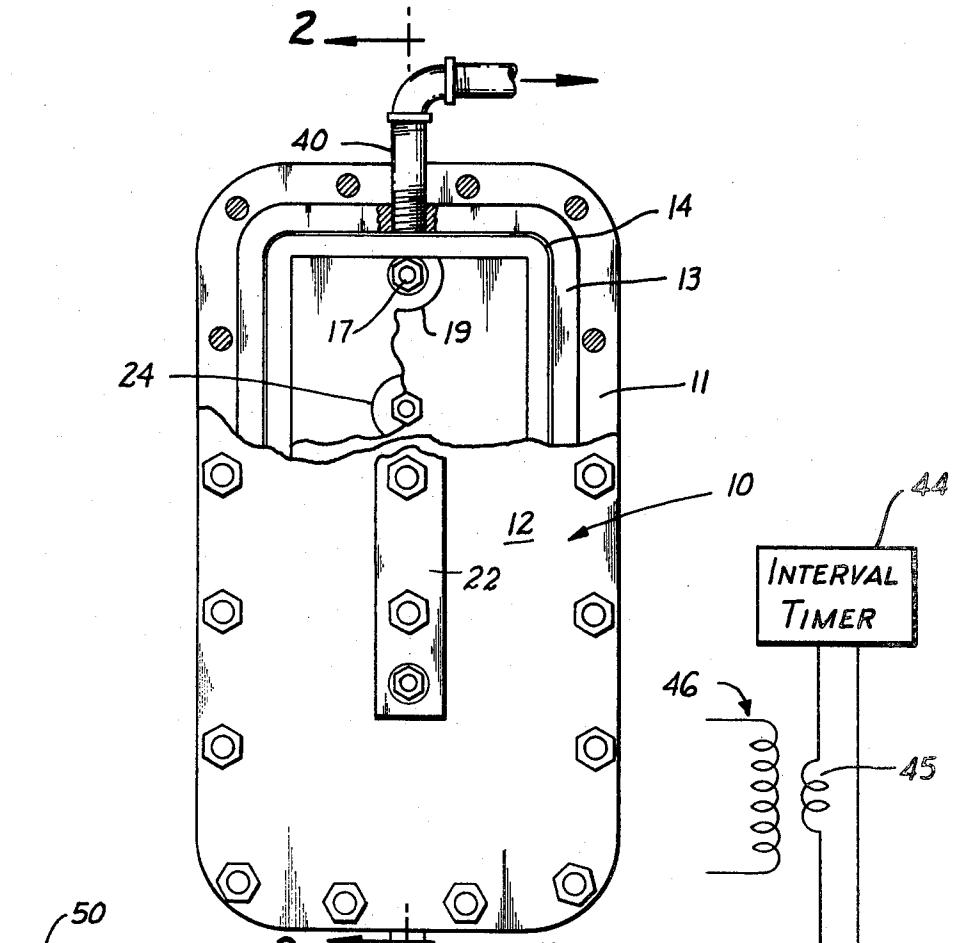


Fig. 1

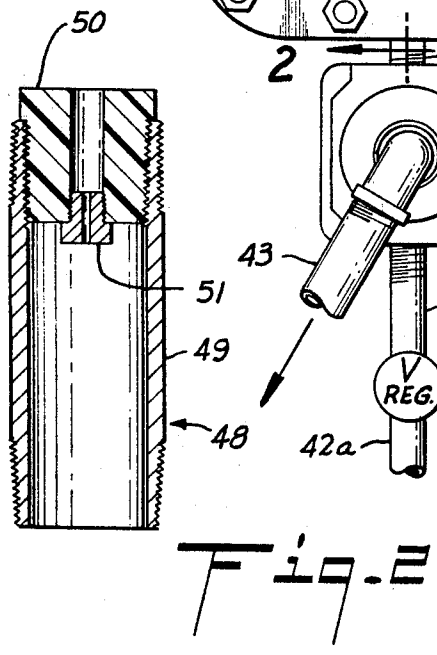


Fig. 2

DURWARD W. MAYS
INVENTOR.

BY Browning, Jenning, Hyer & Eickenroht
ATTORNEYS

Aug. 20, 1968 D. W. MAYS 3,398,261

ELECTRODE-TYPE STEAM BATH STEAM GENERATOR

Filed March 3, 1967 2 Sheets-Sheet 2

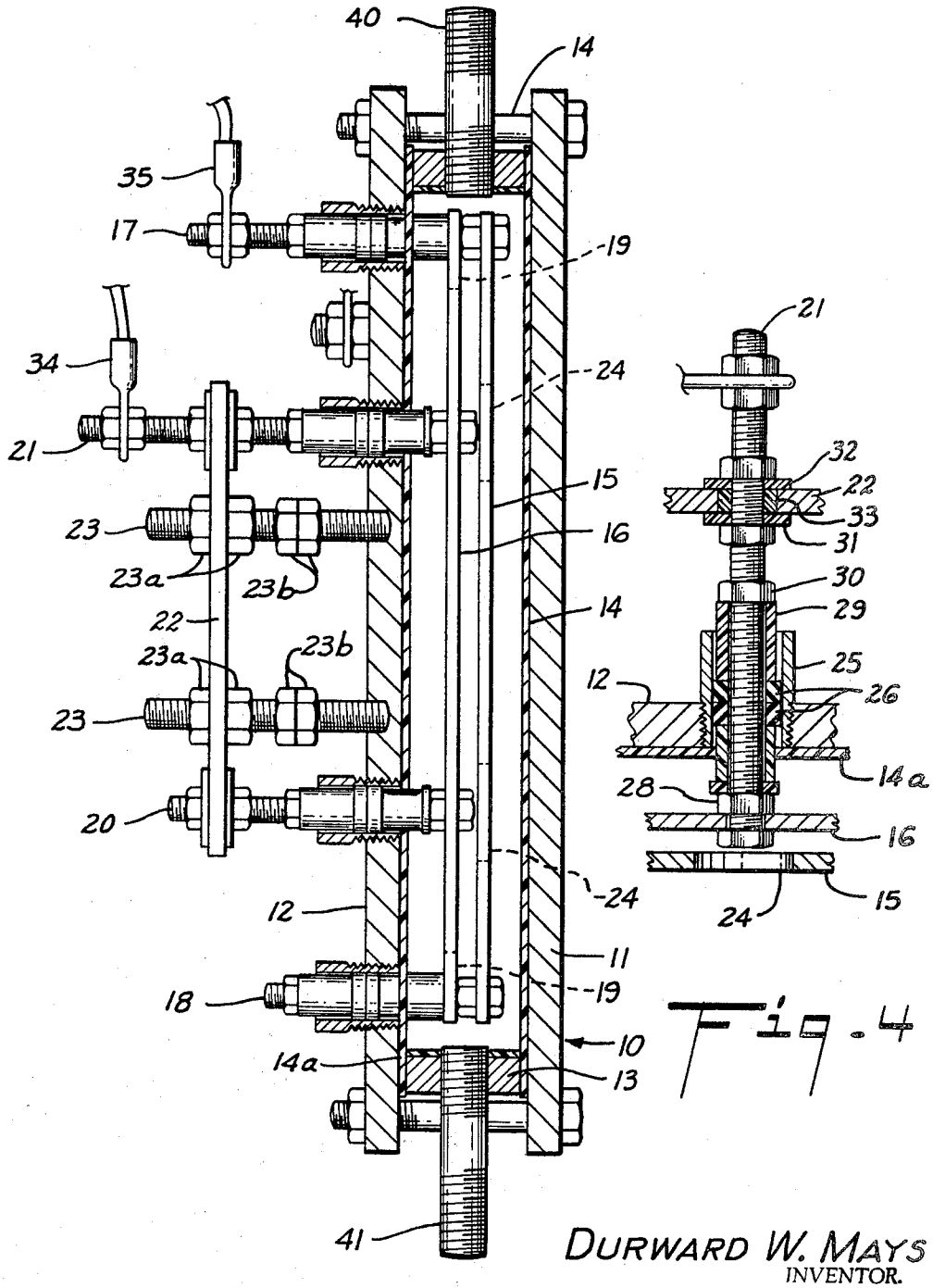


Fig. 3

Fig. 4

DURWARD W. MAYS
INVENTOR.

BY Browning, Bruner, Hyer & Eichenwald
ATTORNEYS

United States Patent Office 3,398,261 Patented Aug. 20, 1968

3,398,261

ELECTRODE-TYPE STEAM BATH STEAM GENERATOR

Durward W. Mays, 708 Statti St., Humble, Tex. 77338

Continuation-in-part of application Ser. No. 401,319, Oct. 5, 1964. This application Mar. 3, 1967, Ser. No. 636,579

3 Claims. (Cl. 219—285)

ABSTRACT OF THE DISCLOSURE

A steam generator employing electric current flow between a pair of electrodes, the spacing of which is adjustable from the exterior of the generator, uses a timer to control the period of steam generation. The timer operates a solenoid valve. In one position the valve permits water to flow into the generator at a regulated rate. When the timer terminates the steam generating cycle, the valve is switched to its other position, simultaneously terminating flow of water to the generator and opening the generator to a drain so as to remove water containing increased concentrations of salt each time the generator is operated.

This application is a continuation-in-part of my U.S. application Ser. No. 401,319, filed Oct. 5, 1964, now abandoned.

This invention relates to improvements in apparatus for generating steam for use in steam baths which apparatus is of the type employing electric current flowing between two electrodes to heat the water and thereby generate steam.

The principle of heating water to convert it into steam by causing an electric current to flow through it has been suggested in the past as a means for generating steam. Where such principle has been embodied in apparatus for generating steam for steam baths, there have been encountered a number of difficulties. First, as the water is evaporated in the generator, the salt content thereof tends to be concentrated due to the vaporization of steam. In many areas, particularly those where there is considerable calcium and magnesium hardness, this has resulted in scaling of the electrodes between which the current flows. As a result, the capacity of the unit decreases and the unit may eventually become plugged with the calcium and magnesium deposits.

Another problem is that the salinity (i.e., salt content with the term "salt" being used in its broadest chemical sense) will vary from area to area. This variation will cause a corresponding variation in the amount of water evaporated per unit of time for any given size of electrode and any given spacing between the electrodes. In order to compensate for this varying salinity, it would be desirable to have some means for easily adjusting the spacing between the electrodes. In the prior art, the various means for adjusting the electrode spacing have been complicated and largely have necessitated dismantling the unit in order to adjust the spacing.

It is accordingly an object of this invention to provide an apparatus for generating steam for steam baths in which the concentrated "brine" remaining in the unit at the end of each period of use is automatically dumped to waste, thereby minimizing the formation of scale in the unit, and also automatically turning the unit off.

Another object is to provide such an apparatus in which the spacing between the electrodes can be readily adjusted from the exterior of the unit without having to first dismantle the unit.

Another object is to provide such an apparatus which is relatively simple in construction and yet which produces adequate quantities of substantially dry steam within a minimum of time after the unit is turned on.

Another object is to provide such an apparatus in which the electrodes are arranged so that the steam which is evolved flows betwen the electrodes so that it emerges in a substantially dry state.

Other objects, advantages and features of the invention will be apparent to one skilled in the art upon consideration of the specification, the appended claims and the attached drawings wherein:

FIG. 1 is a front elevation of a preferred embodiment of the invention with parts of the apparatus being broken away in order to better illustrate the interior construction and also schematically showing an electrical control system;

FIG. 2 is a cross sectional view of a preferred form of a rate of water flow control;

FIG. 3 is a view taken on the line 3—3 of FIG. 1; and

FIG. 4 is a view, partially in section, illustrating the construction of typical mounting and electrode posts.

Like characters of reference will be used throughout the several views to indicate like parts.

The apparatus includes a fluid-tight housing designated generally as **10**. In a preferred form, the housing comprises a pair of plates **11** and **12** separated by a spacer ring **13** and clamped by a series of bolts **14**. In order to eliminate any odors in the generated steam and to reduce corrosion and the deposit of scale, the housing is lined with a suitable medium, such as "Teflon" as indicated at **14**. This medium extends between the spacer ring and plates, as at **14***a* to provide a seal therebetween.

An electrode means is disposed within the housing and electrically insulated therefrom in such a way that water within the housing will flow between the electrodes to conduct current between them, thereby generating steam. In the preferred form, the electrodes comprise a pair of spaced-apart, parallel plates **15** and **16**. These plates extend substantially the full length of the housing for a purpose which will be described later. In the illustrated embodiment, the electrode plate **15** is held in fixed position by a suitable mounting means here illustrated as comprising mounting stud **17** and the electrode stud **18**. As indicated in FIGS. 1 and 3, these studs extend through openings **19** in electrode plate **16** so that there is no electrical connection between these studs and the plate **16**.

As indicated above, it is frequently necessary to adjust the spacing between the electrode plates in order to compensate for variations in salinity of the incoming water. In accordance with this invention, the electrode plate **16** is mounted in the housing by an adjusting means permitting the plate to be moved toward and from the fixed electrode plate **15** by an adjustment which can be made exteriorly of the housing. Thus the adjustable electrode plate is carried by a stud **20** and an electrode stud **21** which extend through openings in the housing wall and are secured to the adjustable electrode **16**. A link or yoke **22** extends between these studs and also is connected to a pair of adjustment studs **23**. Thus by appropriate turning of the respective ones of nuts **23***a*, the position of the link **22** and hence that of moveable electrode **16** can be adjusted to give the desired spacing between the two electrodes.

A pair of stop nuts **23***b*, or other suitable stops, can be provided to limit movement of electrode **16** toward electrode **15** thereby assuring that the two electrodes can never come into direct contact with one another. Also, openings **24** can be provided in electrode plate **15** so that the inner ends of the studs **20–21** cannot contact the electrode when the electrodes are spaced closely together.

Means are provided for forming a seal between each stud and the wall of the housing through which it extends. This seal is such that it will permit adjustment of the

longitudinal position of the various studs. A typical arrangement is shown in FIG. 4 for stud **21**. Thus the housing plate **12** is provided with an opening formed by a bushing **25**. Disposed within this opening and around the stud **21** are a pair of resilient seal rings **26**, which preferably are of rubber. Means are provided for expanding these seal rings radially into sealing engagement with the wall of bushing **25** and with stud **21**. In this instance, this means comprises a spacer **27** abutting on the nut **28** and another spacer **29** on the other side of the seal rings. Thus by screwing down on nut **30**, the two seal rings can be expanded radially into sealing engagement as aforesaid.

The sleeves **27** and **29** should be made of some sort of insulating material, such as nylon.

Since stud **21** serves to conduct electricity to plate **16**, it is electrically insulated from the case by the sleeve-resilient ring arrangement and is also electrically insulated from link **22** by washers **31** and **32** and a sleeve **33**. These all may be made of insulating material such as nylon.

Studs **21** and **17** have electrical connectors **34** and **35** connected thereto so as to be able to apply the desired voltage across plates **15** and **16**. In a preferred embodiment, this voltage is 220 volts.

Referring now to FIG. 1, it will be seen that the housing is provided with a steam outlet **40** which can be connected to any desired enclosure in which the steam bath is to be taken. The housing is also provided with a water inlet **41** having a valve means. This valve means alternately connects inlet **41** with a source of water and to a drain. The valve means desirably is in the form of a two-way valve **42** having an inlet connected to a water pipe **42***a* and a waste pipe **43**. Valve **42** may be solenoid operated and is available on the open market. It is of the type that when it is not energized, the inlet **41** will be in fluid communication with waste line **43** so that any water remaining in the housing **10** will be drained to waste. When the solenoid is actuated, it interrupts communication with the waste line and turns the water into the unit through the inlet **41**.

Conrol means are provided for controlling the solenoid valve. Preferably this takes a form of an interval timer **44** which is of the type that when manually set to desired interval of time, will close a set of contacts to complete the circuit from the secondary **45** of transformer **46** to the solenoid valve to energize the same. Upon lapse of the time interval, the circuit is broken by the timer and the valve de-energized. Thus it will be seen that when the timer is set to take a steam bath, the solenoid valve will be actuated to turn water into the housing. As the water rises therein, it will eventually immerse a portion of plates **15** and **16** whereupon current can flow between these two plates to heat and vaporize the water. It will be noted that these plates are continuously energized so that the steam bath unit is actually turned on and off by flowing water into and draining it from the unit. Thus when the timer times out, it de-energizes the solenoid valve which shuts off the inlet water and opens the unit to drain. This permits the liquid in the housing to drain out and thereby interrupt formation of steam. This also results in draining the concentrated "brine" from the housing after each steam bath so that there is less likelihood of formation of scale, etc.

The inlet to the solenoid valve is preferably provided with a pressure regulator **47** which reduces normal city water pressure to a lower controlled but super atmospheric value, say of the order of 20 p.s.i.g. In order to regulate the rate of water flow into the unit, there is provided orifice flow nozzle **48** shown in detail in FIG. 2. It comprises a nipple **49** having a bushing **50** screwed thereinto, which bushing holds a replaceable orifice **51**. Thus by regulating the setting of regulator **47**, a constant pressure upstream of the orifice is provided so that the pressure drop across the orifice, and hence the flow rate through it, is constant.

In this connection, it has been found that the water level in an operating unit is normally in the lower half of the housing and sometimes in the lower one-fourth. As a result, the steam which emerges from the water passes upwardly between the two electrode plates and emerges as substantially dry steam.

From the foregoing, it will be seen that this invention is one well adapted to attain all of the ends and objects hereinabove set forth, together with other advantages which are obvious and which are inherent to the apparatus and structure.

It will be understood that certain features and subcombinations are of utility and may be employed without reference to other features and subcombinations. This is contemplated by and is within the scope of the claims.

As many possible embodiments may be made of the invention without departing from the scope thereof, it is to be understood that all matter herein set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

The invention having been described, what is claimed is:

1. An apparatus for generating steam for steam baths comprising a housing, a steam outlet from an upper portion of the housing and a water inlet to a lower portion of the housing, first and second spaced apart electrode plates, means mounting the first plate in the housing and electrically insulating it therefrom, means mounting the second plate in the housing parallel to the first plate and including first and second parallel elongate members attached to the second plate and extending through respective openings in a side wall of said housing and insulated therefrom, means exteriorly of the housing for adjusting the longitudinal position of said members and hence the spacing of the second plate with respect to the first plate and including a rigid link connecting the two elongate members together, said adjusting means also including means for moving said link so as to move said members in unison, and means providing a fluid tight seal between each of said members and said housing, said apparatus including means for connecting said electrode plates to a source of power.

2. The apparatus of claim **1** wherein said seal includes a resilient ring around each of said members adjacent the housing, and means for compressing said ring to expand it radially into sealing engagement with both the elongate member and the housing.

3. The apparatus of claim **1** wherein said means for connecting said electrode plates to a source of power includes an electrical connector at the outer end of at least one of said elongate members so that it acts as a conductor of electricity to said second plate.

References Cited

UNITED STATES PATENTS

2,821,614	1/1958	Jansons	219—285
3,104,308	9/1963	Wilson	219—293 X
1,424,340	8/1922	Cavitt	219—286
1,665,793	4/1928	Sandborgh	219—286
2,542,439	2/1951	Tatem et al.	219—288
2,783,355	2/1957	Vassilier	219—295 X
2,790,890	4/1957	Kasuga	219—287
3,083,288	3/1963	Vischer	219—288

FOREIGN PATENTS

472,479	9/1937	Great Britain.
784,163	4/1935	France.
629,894	9/1949	Great Britain.
245,010	6/1947	Switzerland.

ANTHONY BARTIS, *Primary Examiner.*