(12) **United States Patent**
**Scarbrough**

(10) **Patent No.:** **X8756**
(45) **Date of Patent:** **Apr. 8, 1835**

(54) **STEAM, GENERATING**

(76) Inventor: **William Scarbrough**

William Scarbrough, Savannah, Georgia

# Letters Patent

The schedule referred to in these Letters Patent and making part of the same Containing a description in the words of the said William Scarbrough himself of his Improvement in the generation of Steam in the boiler of Steam Engines &c.

To all to whom these presents shall come, Be it known, that I William Scarbrough of the City of Savannah in the County of Chatham & State of Georgia have made new and useful improvements in the generating Steam in the boilers of Steam Engines &c and that the following is a full and exact description thereof.

It is first premised as a fact that the Steam already generated within a boiler is equal in its force upon the surface of the water from which fresh Steam is to be generated & that in the parts of the boiler above the surface of the Water it is next assumed that in proportion to the extent of this surface the particles or Molecules of this water are compressed together; and that in proportion to this Compression is the difficulty of obtaining admission or entrance for the Caloric or heat to the various particles or molecules of this Water which are to furnish the required Vapour or Steam. That this is to a certain theory, we have the confirmation in the influence of the pressure of the Atmosphere on water which has to undergo Ebullition at Vera Cruz we find the boiling point of water to be 201° 2/10 degrees of the Thermometer of Mr. Fahrenheit in Consequence of 1/30 part of Japans Elevation in said Country, whereas reduction in the temperature of the boiling point & when the pressure of the Atmosphere is nearly entirely removed it will be seen in fact in vacuo the boiling point does almost totally vanish. But there exist another & stronger illustration of the fact in point. When the Experiments were first made at the Navy Yard in order of Count Rumford for producing Ebullition in a separate boiler by the introduction of Steam into the liquid in it from a detached boiler or generator every attempt to produce the required effect failed while the Steam was cooled or even so far as to check the boiling of the liquid. Why was this? Because the Steam & Thermometer of compressed & Compressed the particles or molecules of the liquid together & in consequence found the admission or entrance for the Caloric or

heat it Contained. But the Steam thrown down to the bottom Could then act in some
in a different manner for the liquid formed room for expansion at once and this
expansion permitted the easier introduction of the Caloric and Consequently the dis-
integration of the particles or Molecules from each other. Now what is this dis-
integration? Does it not at once explain the whole theory of absorption
and Evaporation? The fact is most clearly elucidated and illustrated by the simple
act of holding before a fire a wet towel or Napkin. The heat from the fire has
scarcely reached it before we perceive the vapour or Steam flying off from it.
Is it not as much Vapour or Steam
as if it arose from boiling water? And if so how came it that a temperature
so very much below the boiling point so instantaneously produced a Similar effect?
Was it or was it not the disintegration of the particles or Molecules of the
water from each other caused by the absorption of the minute hygrometic fibres of
which the towel or Napkin was composed? If this supposition be admitted again
immerse the same towel or Napkin and wring out the water it had imbibed
these particles or Molecules are reunited or reintegrated and the temperature
of the boiling point has to be attained before the water will throw off its Vapour
or Steam. The same fact is exemplified by water placed in an unglazed Clay
Vessel. The minute pores of the Clay disintegrate the particles or Molecules of the
water & they arrive at the outside fly off more or less rapidly according to the
prevalent temperature it must be the Vapour from the towel or Napkin
to make room for successors. The earth itself performs the same operation on an
enlarged scale. These facts have been noticed and so fully detailed upon the
better to elucidate the great importance of this disintegration in raising the
vapour the generative of Steam. We will now proceed to state Certain Means
for producing this disintegration in Steam boilers.
It is known that the Caloric or heat ascends
from the Centre of the ordinary way is first transmitted to the rest of the fluid
by that part of it next in Contact with the fire or heat and that heat gradually
makes its way towards the Centre. To get over this difficulty it is proposed to have
built as much as possible of this Caloric through the medium of small hollow
vertical or diagonal pipes or tubes to the Centre which will have the effect of
immediately decomposing or Compressing against the same Central and Cool

...of the fluid in consequence of the greater expansion of the part of it nearest the Contact with the Caloric. But the better to accomplish the desired object I obtain the Space in the boiler will permit of, hollow Cones are to be placed with their Small base resting as near as possible to admit the Circulation of the water below on that part of the boiler under which the flame passes with their apeyes or apells 2 or 3 or more inches above the level of the water in the Boiler.

The effect thereby produced will be to cause the heated water from below and to eject it from the apey of the Cone in the same manner as lava from a Crater of a Volcano or Cold water from a Creek from a Rock. These pipes or Cones are not designed to be fixtures in the boilers but are merely placed in them and can at pleasure be taken out & put in & removed in whole or in part. — And not at all unlikely the purpose & design of this invention may be especially aided by placing a little below the apeys of each one a sort of Calender with very small orifices through which the ejected hot water may be made to percolate through these very small apertures which by the diminished Surface will have the effect greatly to accelerate the conversion of them particles into Steam or Vapour Notwithstanding the proceeding idea that the temperature of Steam can be no higher than that of the water from which it has been generated, for the latent Heat retains the latent heat which the former gave up in becoming Vapour. The next object is to overcome the Compactness of the particles or Molecules of the water in the boiler by the pressure of the already generated Steam upon it. The remedy for this has in some measure been already anticipated by what has been said of the difficulty experienced in Carrying Count Rumford's Suggestion of procuring Circulation by Steam from another boiler into effect.

If the Steam generated in an adjacent boiler Could be made to answer the desired purpose by throwing the Steam & the bottom of the fluid in the other boiler, by shutting out the Steam already generated in this Steam tight boiler & throwing in the same manner below the water by means of pipes connected with the Steam reservoir or Chamber from which it is constantly supplied. For by this operation the Steam thus thrown & the bottom and flame heated nearly in contact with the Caloric would by its increasing expansibility the more readily insinuate itself into and through the superincumbent water and thereby accelerate the generation of fresh Steam. But although it may not be

essential for obtaining the desired disintegration. That is to say
force that atmospheric air in either cold or hot (perhaps the former preferred on
account of its greater density and capacity for expansion) might be forced to
the middle or bottom of the water from which the steam is generating and
its expansibility might be materially assisted in the proposed disintegration
and at the same time impart an increased force to the steam story whereby
its easier Condensation would materially relieve the labors of the air pump
of a low pressure or Condensing Engine. The principles above set forth it will be seen
that may be applied to boilers of almost every description whether vertically horizontally or
obliquely placed; or whether they be of high or low pressure and the Consequent rapid generation of the steam ought to Cause a Material
reduction in the Consumption of fuel.

What I Claim as my own invention and not
previously known in the above described Steam boiler for generating Steam of high
or low pressure; is the principle of transmitting the Caloric through the Medium
of Small bore metal tubical or diagonal pipes or tubes at once to the Center or
other part of the fluid which will have the effect of preventing the Compacting or
Compressing against the more Central and Calor parts of the said fluid in
Consequence of the greater expansion of that part of it nearest in Contact with
the Caloric

Also raising the water from below and discharging the steam through
the upper of the Case or through the pipes or tubes above or below the level of the water
in the boiler as above specified and described. There may be many methods for
producing the same effect but I Claim the principle as set forth in my spe-
cification, however performed Washington City D.C. of Columbia D.C. March 8th

Witnesses
W.B. Mordecai
George Bomall

Wm. Strobridge

1800 acres