No. 787,495. PATENTED APR. 18, 1905.

H. M. BURNELL & M. E. MOGG.

FLASH BOILER.

APPLICATION FILED OCT. 13, 1904.

2 SHEETS—SHEET 1.

Fig. 1.

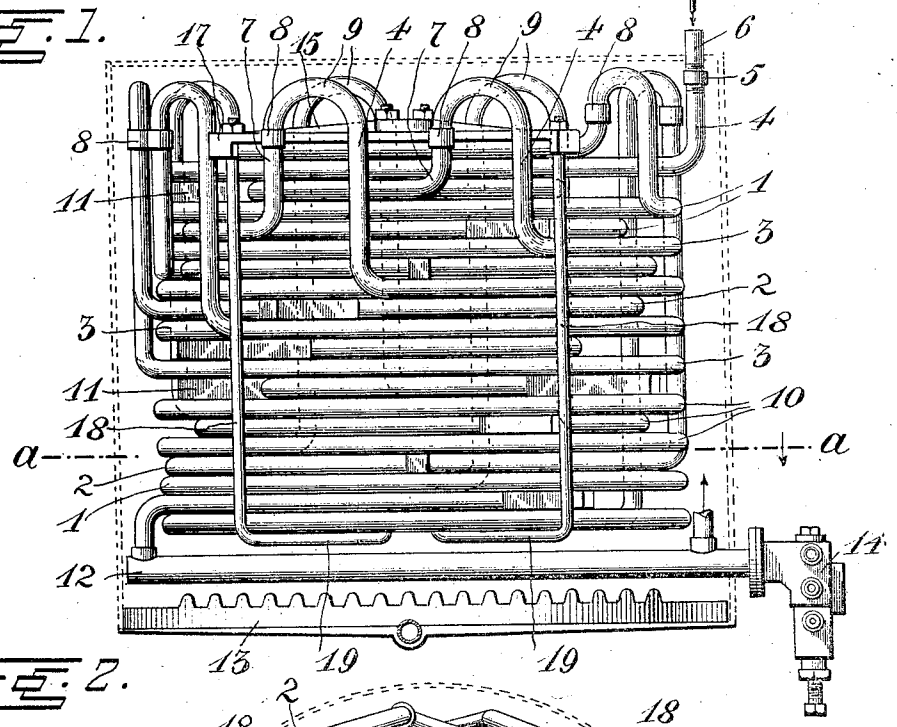
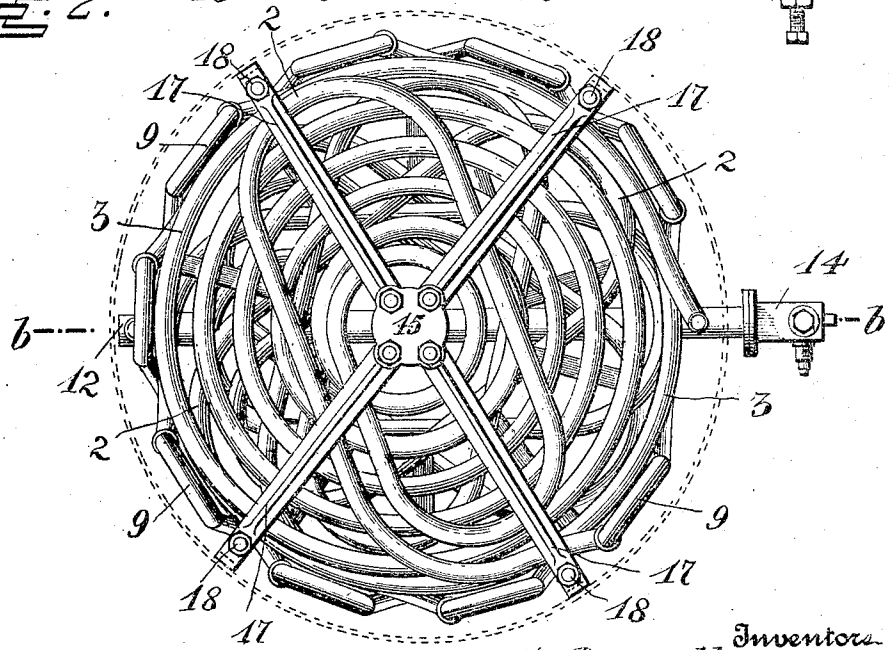


Fig. 2.



Witnesses

C. Muntzer

C. H. Griesbauer.

Inventors

Harry M. Burnell

and Millard E. Mogg

by A. B. Wilson

Attorney

No. 787,495. PATENTED APR. 18, 1905.

H. M. BURNELL & M. E. MOGG.

FLASH BOILER.

APPLICATION FILED OCT. 13, 1904.

SHEETS—SHEET 2.

Fig. 3.

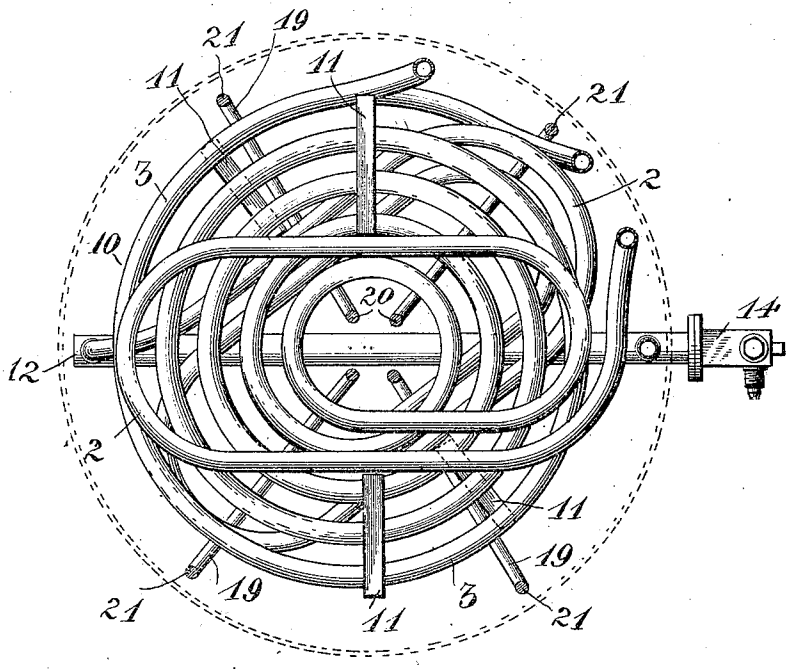
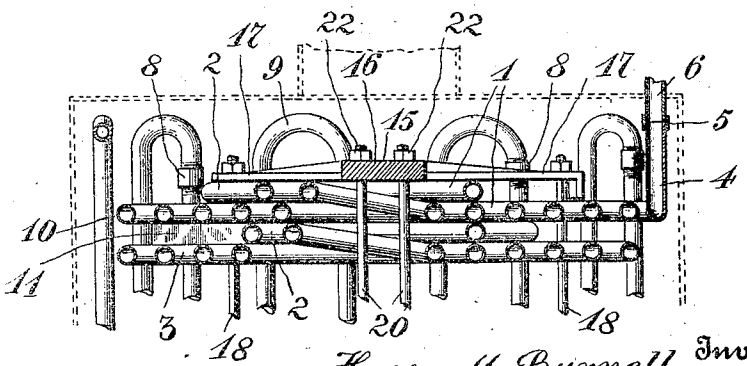


Fig. 4.



Witnesses
C. Munter
C. H. Griesbauer.

Inventors
Harry M. Burnell
and Millard E. Mogg
by A. B. Wilson
Attorney

No. 787,495. Patented April 18, 1905.

UNITED STATES PATENT OFFICE.

HARRY M. BURNELL AND MILLARD E. MOGG, OF CHICAGO, ILLINOIS.

FLASH-BOILER.

SPECIFICATION forming part of Letters Patent No. 787,495, dated April 18, 1905.

Application filed October 13, 1904. Serial No. 228,356.

To all whom it may concern:

Be it known that we, HARRY M. BURNELL and MILLARD E. MOGG, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Flash-Boilers; and we do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Our invention relates to improvements in flash-boilers especially adapted for use on automobile-vehicles and also adapted for other uses; and it consists in the construction, combination, and arrangement of devices hereinafter described and claimed.

The object of our invention is to provide an efficient, cheap, simple, and compact flash-boiler which is not affected by changes in its position or by the motion of the vehicle which carries it and which is provided with improved means to prevent the passage of water by gravity therethrough to enable the respective units thereof to be readily assembled and taken apart and to superheat the steam generated thereby.

In the accompanying drawings, Figure 1 is a side elevation of a flash-boiler embodying our improvements. Fig. 2 is a top plan view of the same. Fig. 3 is a horizontal sectional view of the same, taken on the plane indicated by the line *a a* of Fig. 1; and Fig. 4 is a vertical sectional view of the same, taken on the plane indicated by the line *b b* of Fig. 2.

Our improved boiler is composed of a plurality of superimposed units 1, which are preferably separately formed, so that they may be readily separated to enable any of them to be replaced or repaired, as may be required.

The respective coils of the units of the boiler are dissimilar in form, and each unit compries an upper coil and a lower coil. Each upper coil 2 is angular in form, and each lower coil 3 is spiral in form. The members or leads of each coil lie in planes that intersect those of the members or leads of the next adjacent coil vertically. The lowermost coil of each unit is in more direct communication with the source of feed-water supply, while the uppermost coil of each unit is in more direct connection with the engine or that instrumentality to which the steam is to be supplied. These units are so joined in succession that the top coil of each unit is in connection with the bottom coil of the next subjacent unit. Each lower coil 3 begins with a riser-offset 4, which in the uppermost unit is connected by a coupling 5 to the feed-water pipe 6, through which water is forced by a suitable pump, which is not here shown, as it forms no part of our present improvements. Each upper coil 2 terminates in a riser-offset 7, which is connected by a coupling 8 to the riser-offset 4 of the lower coil of the next subjacent unit, so that the water in descending through the boiler flows through the lower coil of the upper unit, then through the upper coil of the upper unit, then through the riser-offset and the coupling which connects the said upper coil to the lower coil of the next subjacent unit, and so on. The said riser offsets and couplings form traps 9, which traps are disposed on the outer side of the mass of coils and are arranged around the same and are progressively higher as the units approach the bottom of the mass, the upper portions or heads of the traps being all disposed in the same horizontal plane. These traps prevent the water from circulating by gravity through the coils of the boiler and render it necessary for the pump to be at work in order to force water from the coils of one unit to the coils of the next unit below. This construction and arrangement of the coils of our boiler renders the same especially useful as a locomobile-boiler, as it remains unaffected by changes in the position and the motion of the vehicle. Spacers 11 are disposed between the said units on the outer sides of the narrower coils thereof and between the broader spiral coils of adjacent units. The lower coil of the bottom unit is connected to a steam-pipe 12, which extends through and across the boiler at or near the bottom thereof and directly across the flame from the burner 13. A thermostatic regulator 14 for the burner is connected to this steam-pipe. The burner and the

thermostatic regulator are not more fully shown and described in this specification, as they constitute no part of our present improvements.

On the upper side of the boiler is a spider 15, comprising a central portion 16 and radial arms 17. U-shaped stay-rods 18, one for each arm of the spider, are employed in connection with the spider to detachably secure the units and groups of the boiler together. The intermediate lower portions 19 of the stay-rods are disposed radially under the bottom coil of the boiler, their inner arms 20 being extended up through the central spaces in the boiler formed by the centers of the coils, and the outer arms 21 of the stay-rods are disposed on the outer side of the mass of boiler-coils. The upper ends of the vertical arms of the stay-rods are screw-threaded, passed through openings in the spider, and provided with clamping-nuts 22, which are screwed thereon and coact with the spider and the said stay-rods to firmly clamp the units and groups of the boiler-coils together.

From the foregoing description, taken in connection with the accompanying drawings, the construction and operation of the invention will be readily understood without requiring a more extended explanation.

Various changes in the form, proportion, and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. A flash-boiler composed of a plurality of superimposed coils, a spider on the upper side thereof, and U-shaped stay-rods coacting with the spider to secure the coils together, substantially as described.

2. A flash-boiler composed of a plurality of superimposed coils, a spider on the upper side thereof, and U-shaped stay-rods, having their lower, intermediate portions radially disposed under the bottom coil, their inner arms extending up through spaces in the center of the mass of coils and their outer arms disposed on the outer side of the mass of coils, the said arms of the said stay-rods being secured to the spider, substantially as described.

3. A flash-boiler comprising superimposed units each having an upper coil and a lower coil, the width of one coil being less than that of the other, means to clamp the said units together, and spacers between said units disposed on the outer side of the narrower coils thereof and clamped between the broader coils thereof, substantially as described.

In testimony whereof we have hereunto set our hands in presence of two subscribing witnesses.

HARRY M. BURNELL.
MILLARD E. MOGG.

Witnesses:
WM. A. THIELWALL,
M. F. MOGG.