

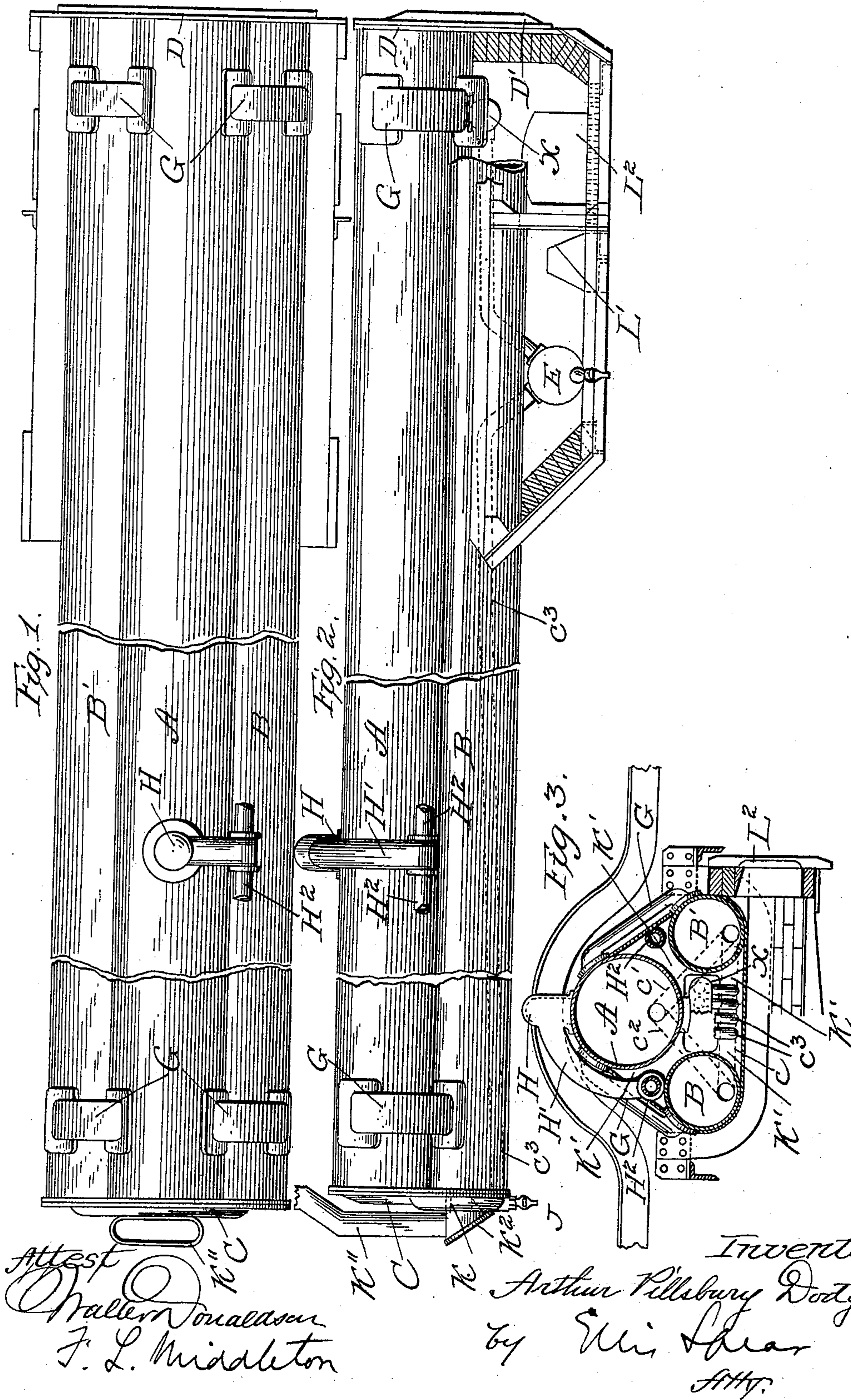
No. 616,088.

Patented Dec. 20, 1898.

A. P. DODGE.
STEAM BOILER.

(Application filed Dec. 1, 1897.)

(No Model.)



UNITED STATES PATENT OFFICE.

ARTHUR PILLSBURY DODGE, OF NEW YORK, N. Y.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 616,088, dated December 20, 1898.

Application filed December 1, 1897. Serial No. 660,416. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR PILLSBURY DODGE, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Steam-Boilers, of which the following is a specification.

My invention relates to steam-boilers, and particularly to a form of boiler adapted for use on motor-cars for street-car service.

The object of my invention is to provide a boiler of an elongated type adapted to be placed below the motor-car, as in Letters Patent No. 585,624, dated June 29, 1897; and I aim to provide a boiler having a quick and effective circulating system, one which may be made up of seamless tubes, and one which will provide a large heating-surface and in which the liability of priming or passing water to the cylinders will be prevented.

In the accompanying drawings, Figure 1 is a plan view of the boiler. Fig. 2 is a side view, partly in section; and Fig. 3 is a cross-sectional view looking from the right-hand end of Fig. 2, with parts broken away.

The boiler comprises three seamless tubes A B B', of which the one marked A is the largest and constitutes the upper part of the boiler, the smaller tubes B B' being arranged below and on each side of the large tube A, with spaces between. At one end these tubes are connected by a head D, common to all three and forming a connection and a rigid support for the tubes, and this head may be provided with a cold-air draft or observation hole at D'. At the rear end of the boiler the tubes are connected and supported by a compound head C, which head rigidly supports the tubes, as does also the head D, both collectively and separately. The compound head C has passages $c\ c'\ c^2$, forming a circulating connection between the three tubes at this end of the boiler to permit the water to circulate freely from the upper tube downward to the lower parts of the lower smaller tubes through the passages $c'\ c^2$. From the lower cross-passage c in the compound head C circulating-pipes c^3 extend forwardly and incline upwardly to the combustion-chamber, where they are bent down at an inclination to the mud-drum, and from thence they ex-

tend upwardly at an inclination toward the front to connect with a manifold X. This manifold is connected with the front end of the large tube of the boiler, at the bottom thereof. This provides a circulation from the rear end of the lower tubes B B', through the circulating-tubes c^3 , to the front, up through the manifold, into the upper large tube, and thence to the rear through the large tube, down through the compound head, to the lower tubes, and then through the cross-passage c to the circulating-pipes. The three tubes are covered by an asbestos or other non-conducting shell, forming a boiler of substantially triangular cross-sectional shape, and this provides heating and flue spaces K' between the various tubes through which the products of combustion may pass and circulate about the tubes and circulating-pipes to heat the same to the highest degree possible from a given amount of heat in the fire-box. This fire-box opens directly into the casing at one end, so that all the products of combustion are discharged over the bridge-wall L', and at the rear these products pass through the opening K in the compound head into the flue or smoke-stack K'', a hand-hole being provided at K² for cleaning purposes. The inclined connection of the circulating-pipes c^3 with the mud-drum provides for the expansion and contraction of the pipes without straining the connection with the mud-drum E. Equalizing-pipes G connect the lower tubes B B' with the upper tube A. The steam is taken from the dome H, arranged centrally of the upper tube, through the pipe H', which extends down into the space within the jacket of the boiler and from the lower end of which steam-pipes H² lead off to the cylinders, these pipes H² being located within the flue or heating space of the boiler to be superheated by the passage of the products of combustion.

L² represents the fire-door of the fire-box.

The water may be fed into the boiler at the point J. Scale, which will collect in the mud-drum as water circulates through it, will be blown out at the end of the drum, where the drum is provided with a blow-off.

The heads of the mud-drum project outside the combustion-chamber, and they may be

readily removed for the purpose of cleaning the drum.

The hot gases from the fire-box pass over the mud-drum and longitudinally of the pipes c^3 in a direction opposite to the circulation of water through the tubes c^3 , thus securing the highest degree of efficiency in heating the water, as the hottest gases meet the hottest water, while the cooler gases meet the cooler water, and thus a thorough interchange of heat is secured.

While I have described the tubes A B B' as being large and small, with the large pipe uppermost, I do not limit myself to this arrangement or relative sizes of the tubes.

I claim—

1. In combination, a portable boiler of elongated type for locomotives comprising a series of large tubes arranged in different planes, a casing inclosing the same forming passages for the products of combustion within the casing and adjacent to the tubes, and circulating-pipes for the water in connection with the tubes at the lower part at one end and with the upper tube at the other end, said pipes extending longitudinally of the boiler and between the tubes thereof, said boiler having a fire-box to discharge the products of combustion into the casing, substantially as described.

2. In combination in a portable boiler of elongated type for locomotives, a series of large tubes extending longitudinally thereof with spaces between them for the products of combustion, a casing inclosing the tubes and flue-spaces, water-circulating pipes within the casing and connecting with the lower tubes at one end and with a higher tube at the other end, said pipe being within the flue-spaces and a fire-box discharging the products of combustion into the flue-spaces, a steam-dome arranged centrally of the upper tube of the boiler, the steam pipe or pipes within the casing to be acted upon by the products of combustion and a connection extending down from the steam-dome to the steam-pipe, substantially as described.

3. In combination in a boiler of elongated type, the series of large tubes arranged with spaces between them, a jacket inclosing the tubes, a head supported at one end and having a series of passages therein connecting the tubes and circulating-pipes extending longitudinally of the boiler and between the tubes, said circulating-pipes being connected with one of the passages in the boiler-head, substantially as described.

4. In combination in a boiler of elongated type, a series of tubes comprising an upper tube A and two tubes B B' below the same and on each side of the center thereof, a jacket inclosing the tubes a head at one end of the boiler having passages connecting the tubes, a series of pipes connected with one of said passages and extending longitudinally of the boiler between the tubes and a mani-

fold forming a connection between said circulating-pipes and the upper tube of the boiler, substantially as described.

5. In combination in a boiler of an elongated type, a series of large tubes, a casing inclosing the same, the furnace at one end, the mud-cylinder at one end and below the tubes, the circulating-pipes extending between the tubes and having inclined connections with the mud-cylinder, said pipes being connected with the upper tube of the boiler at one end and with the lower tube at the other end, substantially as described.

6. In combination, the boiler, comprising the series of large tubes, the jacket forming flue-spaces between the tubes, the furnace at one end of the boiler, a head C at the other end of the boiler having passages therein connecting the tubes and having a flue-opening and a smoke-stack leading therefrom, substantially as described.

7. In combination, a boiler of elongated form made up of a series of tubes, the heads at the ends of the tubes a jacket surrounding the tubes and forming flue-spaces, the equalizing connections G between the tubes and the circulating-pipes within the jacket and between the tubes connecting the end of one lower tube with the opposite end of an upper tube.

8. In combination with the boiler comprising the large tubes, the jacket about them, the fire-box discharging into the space within the jacket and the superheater-pipes extending within the jacket to be acted upon by the products of combustion, the said jacket fitting the tubes closely and providing a portable boiler for locomotives and the like, substantially as described.

9. In combination with the tubes A, B, B', the heads connecting the tubes and removable therefrom, the mud-drum having its ends projecting outside of the walls of the combustion-chamber, the removable heads thereon and the blow-off device, substantially as described.

10. A portable boiler for locomotives and the like comprising the three large tubes, the lower ones being arranged toward each side of the center of the upper one, a jacket of sheet metal inclosing the tubes, a dome on the upper tube, the steam-pipe in the space between the tubes and within the jacket, a connection leading down from the dome to the said steam-pipe, the water-circulating pipes connected to the lower tubes at one end and to the upper tube at the other end, said circulating-pipes extending through the flue-space between the tubes a furnace at one end of the boiler and equalizing connections between the tubes, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

ARTHUR PILLSBURY DODGE.

Witnesses:

HORACE F. HODGES,
WM. W. THOMAS, Jr.