

(No Model.)

T. BARNES.
BOILER.

No. 578,538.

Patented Mar. 9, 1897.

Fig. 2.

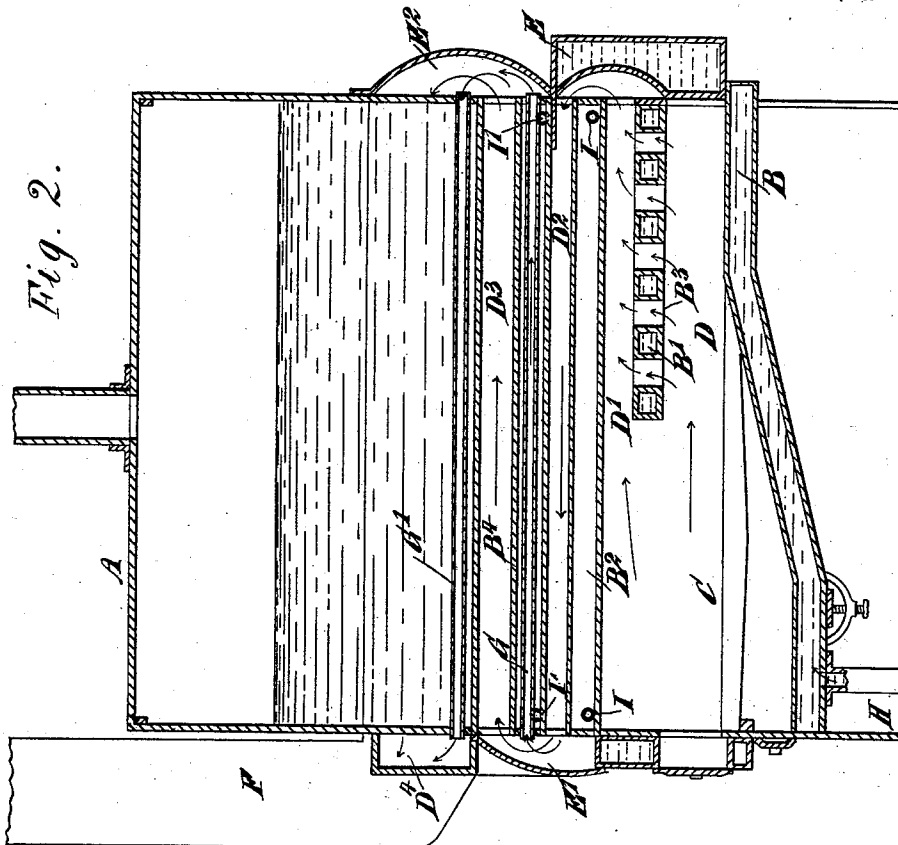
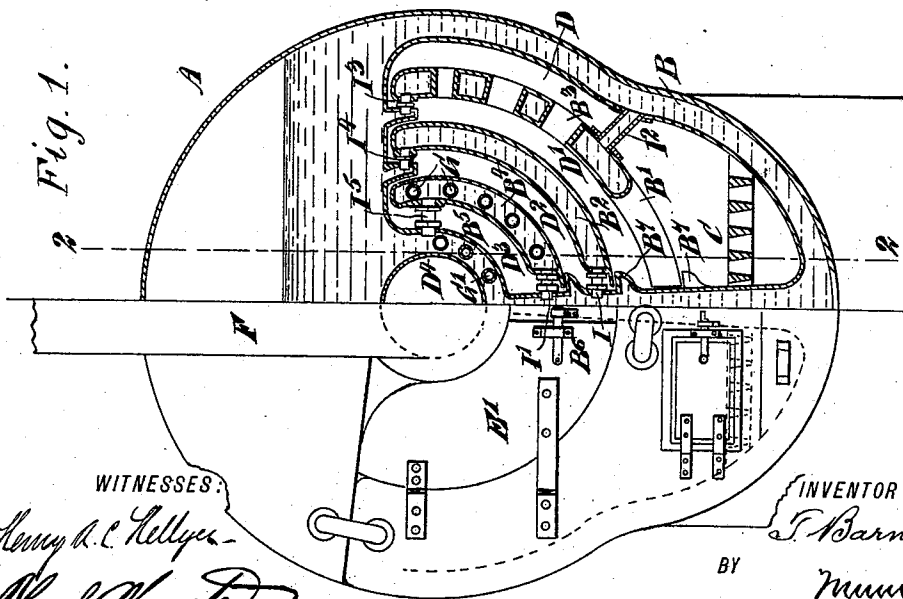


Fig. 1.



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BOILER.

SPECIFICATION forming part of Letters Patent No. 578,538, dated March 9, 1897.

Application filed February 25, 1896. Serial No. 580,683. (No model.)

To all whom it may concern:

Be it known that I, THOMAS BARNES, of Vancouver, British Columbia, Canada, have invented a new and Improved Boiler, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved boiler which is simple and durable in construction and arranged to utilize the heat generated in the fire-box to the fullest advantage and without any appreciable loss.

The invention consists principally of a series of segmental and longitudinally-extending water-legs which form a series of similarly-shaped passages or channels for the products of combustion, said channels being connected together alternately at opposite ends of the boiler, whereby such products are caused to traverse said channels consecutively.

The invention also consists of certain parts and details and combinations of the same, as will be fully described hereinafter and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in both figures.

Figure 1 is a front elevation of the improvement with one-half in section, and Fig. 2 is a longitudinal section of the same on the line 2 2 of Fig. 1.

The improved boiler is provided with an auxiliary shell A, formed in its lower half with a water-leg B, the front end of which is depressed, as plainly shown in Figs. 1 and 2, so as to form sufficient room for a fire-box C, containing the usual grate, ash-pit, and firing and ash-pit doors. The fire-box C opens at its rear end into two channels or passages D D', extending longitudinally and formed by the water-legs B B' B², of which the leg B' is segmental in cross-section, and extends about half-way the length of the boiler from the rear forward, as is plainly shown in Fig. 2.

The other water-leg, B², extends from one head of the boiler to the other and is likewise segmental and concentric to the leg B' and the main part of the shell A.

The leg B' is formed with radial smoke passages or pipes B³, and the rear end of the channel D is closed by the rear end of the leg B' to cause the heat and smoke in the channel D to pass through the pipes B³ to reach the channel D'. The channel D' connects at its rear end with a water-jacketed hood E, held on the rear head of the shell A, it being understood that said channel extends through the head of the shell, as plainly indicated in Fig. 2. The hood E also opens upon a channel D², formed by the water-leg B² previously mentioned and by another water-leg B⁴, likewise extending longitudinally and concentric to the other water-legs.

The front end of the channel B² opens into a hood E', held on the front head of the boiler, and this hood E' opens into another channel D³, formed by the water-leg B⁴ and a water-leg B⁵, of which the latter is concentric to the water-legs B⁴, E², and B'. The rear end of the channel D³ opens into a hood E², held on the rear head of the shell A, and this hood opens into a channel or flue D⁴, concentric with the leg B⁵ and opening at its front end into a smoke-stack F for carrying off the smoke and gases.

Through the water-legs B⁴ and B⁵ extend the flues G, also passing through the heads of the boiler-shell to open at their ends into the hoods E' and E² and the stack F, as plainly shown in the drawings. The flues G are somewhat less in diameter exteriorly than the inside width of the corresponding water-leg, so that each flue is completely surrounded by the water in the leg. The hoods are preferably made in the shape of hinged segmental doors, so that they can be readily opened for conveniently cleaning the channels D D' D² D³ D⁴, as well as the flues G.

The water-leg B is provided in its lowermost portion with a water-feed pipe H, and

from this lowermost portion of the leg B extends the vertical leg or stand-pipe B⁶, which opens at its upper end into the lower portion of the leg B⁵, as plainly indicated in Fig. 1.

5 The vertical leg B⁶ also connects by feed-nipples I I' with the lower portions of the legs B³ B⁴, and branch pipes I² connect the legs B B' with each other near their lower ends.

The upper ends of the legs B' B² are connected by nipples I³ with the general water-compartment in the shell A, (see Fig. 1,) and similar nipples I⁴ connect the upper ends of the legs B³ B⁴ with the water-compartment, and nipples I⁵ connect the upper ends of the legs B⁴ B⁵ with each other. By the arrangement thus described a complete circulation of the water is established through the several water-legs. The lower ends of the water-legs B' B² B⁴ rest on jacketed lugs B⁷, formed on the vertical water-leg B⁶, as plainly indicated in Fig. 1.

Now it will be seen that when the hoods E E' E² are closed and heat is generated in the fire-box C the smoke and gases pass into the channels D and D' from the former through the passages B³ into the channel D' near the rear end thereof, the smoke and gases from the channel D' passing through the hood E into and through the channel D² to the forward end of the boiler and into the hood E', to then pass rearwardly through the channel D³ and flues G into the rear hood E², to then again travel forwardly through the channel D⁴ and flue G' into the smoke-stack F. The boiler is also provided with suitable drain-pipes and manholes to clean the water-legs from sediment and other impurities.

It will be seen that by the arrangement described the heat circulates through the boiler and comes in contact with a large heating-surface, so that the heat generated in the fire-box is utilized to the greatest advantage and with hardly any loss of units of heat.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. A boiler, provided with a series of segmental and longitudinally-extending water-legs which form a series of similarly-shaped channels for the products of combustion, said channels being connected together alternately at opposite ends of the boiler, whereby

said products are caused to traverse said channels consecutively, a vertically-disposed water-leg for connecting the lowermost water-leg with the uppermost water-leg, and provided with openings in its sides and nipples for connecting said openings in the sides of the vertical water-leg with the intermediate water-legs, substantially as shown and described. 55 60

2. A boiler, comprising a shell having longitudinally-extending water-legs forming between them conveying-channels, and hoods at the opposite ends of the boiler, for alternately connecting the ends of the channels to circulate the heat through the channels or flues to the smoke-stack, the lower hoods being provided with water-jackets, substantially as set forth. 65 70

3. A boiler comprising a shell, a series of segmental and longitudinally-extending water-legs which form a series of similarly-shaped channels for the products of combustion, a fire-box formed between the lowermost of said water-legs, and an intermediate segmental water-leg between the two lowermost legs and extending from the rear end of the boiler to the fire-box, substantially as shown and described. 75 80

4. A boiler comprising a shell, a series of segmental and longitudinally-extending water-legs which form a series of similarly-shaped channels for the products of combustion, a fire-box formed between the lowermost of said water-legs, and an intermediate segmental water-leg between the two lowermost legs and extending from the rear end of the boiler to the fire-box, said intermediate water-leg being formed with pipes or passages for the smoke and gases to pass from a bottom channel to the next channel above, substantially as described. 85 90

5. A boiler, substantially as described, comprising a shell, and a plurality of segmental water-legs arranged one above the other in said shell, the lower portion of the lowermost water-leg terminating short of the front end of the boiler, as set forth. 95

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Witnesses:

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