

W. H. WINSLOW,

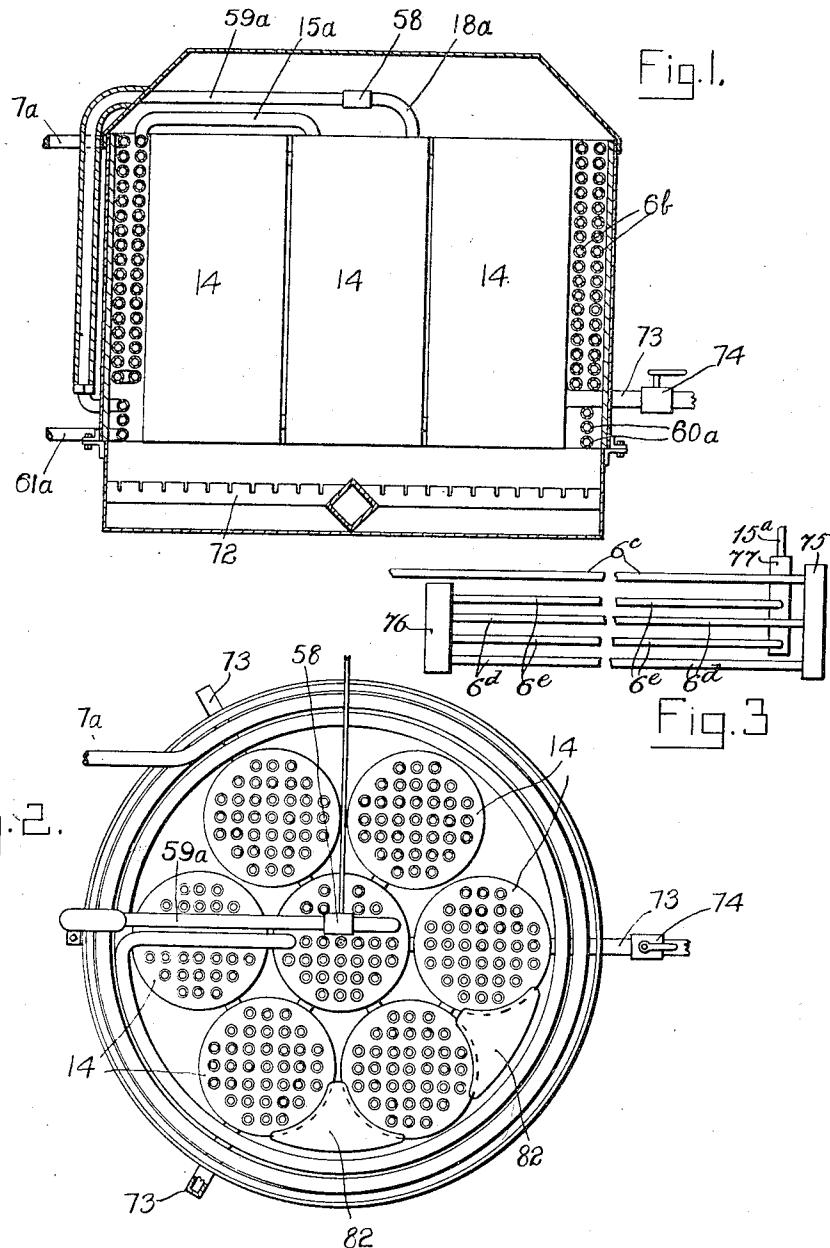
BOILER,

APPLICATION FILED NOV. 3, 1910.

1,289,340.

Patented Dec. 31, 1918.

2 SHEETS—SHEET 1.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 4.

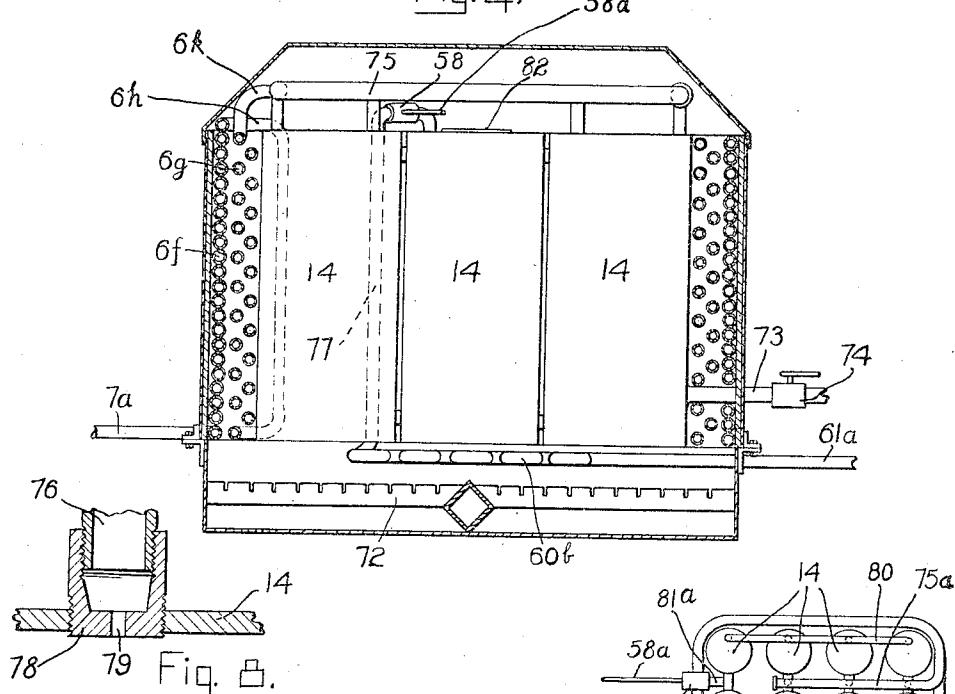


Fig. 6.

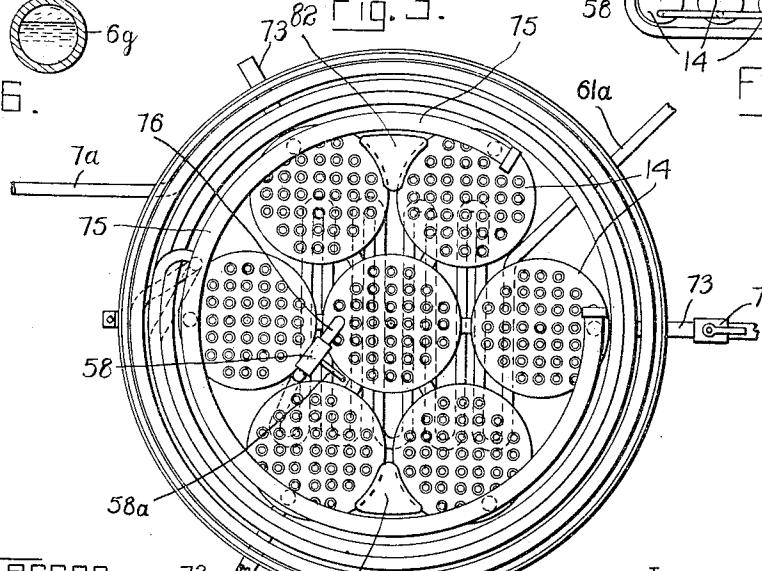
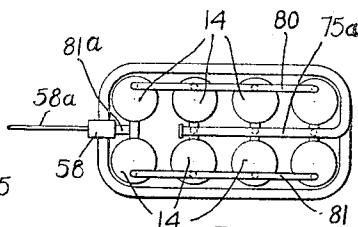


Fig. 7.



WITNESSES

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# UNITED STATES PATENT OFFICE.

WILLIAM H. WINSLOW, OF CHICAGO, ILLINOIS, ASSIGNOR TO WINSLOW SAFETY HIGH-PRESSURE BOILER CO.

## BOILER.

1,289,340.

Specification of Letters Patent. Patented Dec. 31, 1918.

Application filed November 3, 1910. Serial No. 590,512.

To all whom it may concern:

Be it known that I, WILLIAM H. WINSLOW, a citizen of the United States, residing at Chicago, in the county of Cook and State 5 of Illinois, have invented a certain new and Improved Boiler, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

10 My invention relates to an improved form of boiler construction particularly adapted for high pressure and quick steaming, such construction being characterized by means 15 for superheating the steam produced and also means for storing the steam in sufficient quantity to supply unusual demands that may be made upon the boiler for short periods of time.

20 My invention is particularly adapted for the construction of small portable boilers and consists of a first portion of the flash boiler type adapted to instantaneously convert water into steam and a second portion 25 of tubular type adapted to superheat and store the steam produced in the first portion.

My invention further consists in a novel 30 construction of the tubular portion of the boiler by which a plurality of cells is employed which may have additional superheating means as desired or not. The cells 35 employed may be related to each other in a number of different ways, depending upon the use to which the boiler is to be put and each cell is preferably constructed so that 40 it may be heated red hot without injury. This I accomplish by fusing the parts together by means of the oxyacetylene flame so that each cell constitutes practically a 45 single homogeneous mass of metal not subject to change or injury by being heated red hot and subsequently cooled by the introduction of water or steam. My invention further contemplates a means by which 50 either or both of the boiler portions above referred to may be connected for use, it sometimes being desirable to use one portion of the boiler and cut out the other portion in case of accident. My invention also provides automatic means for controlling the 55 fire under the portions of the boiler so that steam of practically constant temperature and pressure is delivered from the boiler.

The several drawings illustrating my invention are as follows:

Figure 1 shows partially in side elevation and partially in section, a boiler construction in which the cellular portion of the boiler is centrally disposed and the flash portion is located around the cellular portion.

Fig. 2 is a plan view of the parts shown in Fig. 1 with the cover of the boiler removed.

Fig. 3 shows in developed view a modified 65 form of construction of flash coil adapted for use in the construction shown in Figs. 1 and 2.

Figs. 4 and 5 show a construction similar to Figs. 1 and 2, the coils and cells being 70 differently connected.

Fig. 6 is an enlarged sectional view of one of the heating coils shown in Figs. 4 and 5 to illustrate the operation of the coil 75 in producing steam.

Fig. 7 shows in diagrammatic plan view a modified arrangement of coils and cells that may be used.

Fig. 8 is a detail view showing the connection of the steam delivery pipe to one of 80 the boiler cells.

Similar numerals refer to similar parts throughout the several views.

In the construction shown in Figs. 1 and 2, the cells 14 are so disposed that the flash 85 portion 6<sup>b</sup> of the boiler may be constructed in the form of a circular coil surrounding such cells. In the construction shown the flash portion 6<sup>b</sup> consists of a small tube into which the water is introduced at 7<sup>a</sup> and conducted through successive convolutions of the tube 6<sup>b</sup> disposed one below the other until it reaches nearly the lower ends of the cells 14 after which it is conducted through similar convolutions disposed just within 90 the first set, the second set of convolutions being disposed in parallel relation within the first set immediately outside of the cells 14. The steam and water delivered from the flash portion 6<sup>b</sup> is conducted by the 100 pipe 15<sup>a</sup> to the central one of the cells 14. The steam delivered from the cells 14 is conducted by a pipe 18<sup>a</sup> to a throttle valve 58 from which it is conducted through the pipe 59<sup>a</sup> through the convolutions of a 105 superheating coil 60<sup>a</sup> disposed around the

lower ends of the cells 14 immediately above the fire produced by the burner 72. Superheated steam is delivered from the superheating coil by a pipe 61<sup>a</sup> to the engine to be driven.

In this construction three supporting members 73 are employed equally spaced and secured to alternate ones of the outer row of cells 14. These supports 73 consist of 10 pipes which open into the cells to which they may be secured by fusion as a result of which they constitute water legs and are thus prevented from being burned by the fire passing around them. Two of the supports 73 are closed at their outer ends while the third one shown at the right in the drawings is connected with the valve 74 to constitute a blow-off connection for the boiler. Each of the supports 73 may be similarly 15 provided with a blow-off valve if desired.

In the modified arrangement shown in Fig. 3, the tube 6<sup>e</sup> is supplied with water at its lower end and delivers the heated water from its upper end into the header 75 20 from which the parallel tubes 6<sup>a</sup> extend in the inner series of convolutions to a header 76 at the lower end of the boiler from which the parallel tubes 6<sup>e</sup> disposed between the tubes 6<sup>a</sup> extend upward and constitute alternate 25 ones of the inner series of convolutions and terminate in a steam header 77 at the upper end of the boiler from which the steam is delivered by a pipe 15<sup>a</sup> to the superheating coil 60<sup>a</sup>, or if desired directly to the 30 steam engine. The tube 6<sup>e</sup> in this modification constitutes the entire outer series of convolutions. As a result of this construction, the water after becoming heated to a certain degree is distributed uniformly between two 35 parallel paths in which it is further heated and it is then again mixed together and uniformly distributed to two other parallel paths disposed between the first two paths mentioned. In this manner the water and 40 steam in each tube is heated to practically uniformity and if any unbalanced conditions produce different temperatures in the several tubes, there is a tendency to equalize the difference since the tubes conducting the 45 water and steam in one direction alternate and are in close proximity to the tubes conducting the water and steam in the other 50 direction.

As a means for protecting the flues used 55 in constructing the cells 14 so that they will not be attacked by the steam or water in such cells, I have found it of advantage to treat them as follows: The tubes are first sand blasted outside and inside, preferably 60 so that the surface is made uniformly clean and the tubes are then coated by means of the well known Bower-Barff process which produces a thin coating of magnetic oxid of iron both outside and inside of the tubes. 65 The coating of oxid thus produced perfectly

protects the tubes from corrosion by the water and steam and also protects the tubes inside from the attack of the flames passing through them. It is also to be noted that the coating of oxid on the tubes does not 70 interfere with fusing them to the boiler heads by means of the oxyacetylene flame referred to above. If desired the heads and shells of the cells may be similarly treated by the Bower-Barff process.

As shown in Figs. 4 and 5, the cells 14 are arranged in a manner similar to that shown and described above in connection with Figs. 1 and 2. In this modification, however, the cells 14 are surrounded by two coils 6<sup>f</sup> and 6<sup>g</sup>, the outer coil 6<sup>f</sup> consisting of a plurality of convolutions above each other and so disposed that such coil forms a practically continuous wall between the casing of the boiler and the inner mechanism. The inner coil 85 6<sup>g</sup> consists of a plurality of separated or staggered convolutions so placed that the fire from the burner 72 may readily pass up outside of the cells 14 and through such convolutions to engage the inner surfaces of the 90 convolutions 6<sup>f</sup> and to come in contact with the upper convolutions of the coil 6<sup>g</sup>. Water is admitted by the pipe 7<sup>a</sup> to the lower convolutions of the coil 6<sup>f</sup>, and the water thus admitted passes up through the coil 6<sup>f</sup>, and 95 is discharged from such coil by the pipe 6<sup>h</sup> down between two of the cells 14 and into the lower end of the coil 6<sup>g</sup>, through which it again passes upward through the successive convolutions of the coils 6<sup>g</sup>, and is delivered by means of the pipe 6<sup>k</sup>, either as 100 highly heated water or very wet steam, to the header 75, by which it is delivered to the outer cells 14, the connectors from the header 75 connecting with these cells at their 105 upper ends as far as practicable from the center of the boiler. The water and steam thus delivered to the outer cells pass between all of the flues in these cells to reach the outlet openings connecting these cells 110 with the central cell 14, as a result of which the steam is in dry and more or less superheated condition by the time it reaches such central cell. The central cell 14 is provided with an outlet connection 76, in which the 115 throttle valve 58 is located, and from the throttle valve 58 a pipe 77 extends downward between the cells 14 to a super-heating coil 60<sup>b</sup>, the super-heated steam being delivered from such coil by a pipe 61<sup>a</sup> connected with the engine to be supplied.

The connection of the pipe 76 to the cell 14 is indicated in detail in Fig. 8, in which there is shown a reducing connection 78 having a comparatively small opening 79 for 125 the passage of the steam from the cell 14 into the pipe 76. This small opening 79 has the effect of preventing an undue rush of steam into the pipe 76, and thus an undue reduction of pressure in the central cell 130

14, as a result of which the quality of the steam in the central cell 14 is maintained and dry steam is supplied by the pipe 77 to the super-heating coil 60<sup>b</sup>.

5 It is desirable that the coil 6<sup>g</sup> be made of pipe larger than the coil 6<sup>f</sup>, so that ample space may be provided in the coil 6<sup>g</sup> as indicated in Fig. 6 to accommodate any steam that is produced above the water flowing through the pipe. This separation of steam produced from the water flowing in the convolutions of the coil 6<sup>g</sup> may readily occur, since the convolutions are so nearly in a horizontal plane, and the steam thus 10 separated from the water may pass upward through the successive convolutions and be discharged into the header 75 in better separated condition than if the coil 6<sup>g</sup> were made of pipe of smaller diameter.

20 In the boiler arrangement indicated in Fig. 7, 8 cells 14 are employed, which are disposed in rectangular arrangement and provided with coils around them similar to those shown and described in connection 25 with Figs. 4 and 5. In this modification the water delivered from the coils surrounding the cells is communicated to a header 75<sup>a</sup>, which is in connection with all but the two left-hand cells, such connections serving to 30 deliver the water and steam from the header 75<sup>a</sup> to the inner portions of the cells from which the water and steam pass through the cells to the delivery openings located near the outer portion of the cells to pipes 35 80 and 81, by which the steam and water are communicated to the left-hand cells 14, after passing through which they are delivered by a pipe 81<sup>a</sup> to the throttle valve 58, and thus either to a superheating coil or not, 40 as desired, and to the engine to be driven. This arrangement of boiler is desirable for certain constructions of vehicles upon which steam motive power is employed.

It is to be borne in mind that in any 45 modification in which the steam passes

through the throttle valve 58 before being superheated and delivered to the engine the valve is controlled by a rod 58<sup>a</sup> extending into the boiler casing, as indicated.

It is to be understood that if desired baffle 50 plates 82 may be used with the cellular portion of the boiler structure, as shown in Figs. 2 and 5, to effect a more uniform distribution of the fire through the tubes of the 55 cells 14.

I have indicated above that the cells are preferably made by welding the tubes through the tube sheet and by welding the shell to the tube sheet or sheets in accordance with the teaching of my prior patents Nos. 60 1046132 and 1046133, granted to me on December 3rd, 1912, and others.

While I have shown my invention in the particular embodiments herein described, I do not, however, limit myself to this construction, but desire to claim broadly any equivalents that may suggest themselves to those skilled in the art.

What I claim is:

In a boiler, the combination of a casing, a 70 boiler unit disposed therein, a header communicating with said boiler unit, an inner coil surrounding said boiler unit, said inner coil comprising a plurality of convolutions separated to allow the fire gases to pass 75 therethrough, said inner coil communicating with said header, an outer coil comprising a plurality of convolutions disposed substantially in contact with each other to form a continuous wall between the casing and the 80 inner coil, said outer coil communicating with said inner coil, and a water supply connection communicating with said outer coil.

In witness whereof, I hereunto subscribe my name this 28th day of October, A. D. 85 1910.

WILLIAM H. WINSLOW.

Witnesses:

ALBERT C. BELL,  
LEONARD E. BOGUE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."