Nov. 17, 1925. 1,561,663

H. C. PROX

BOILER

Filed July 3, 1922

Fig. 1.

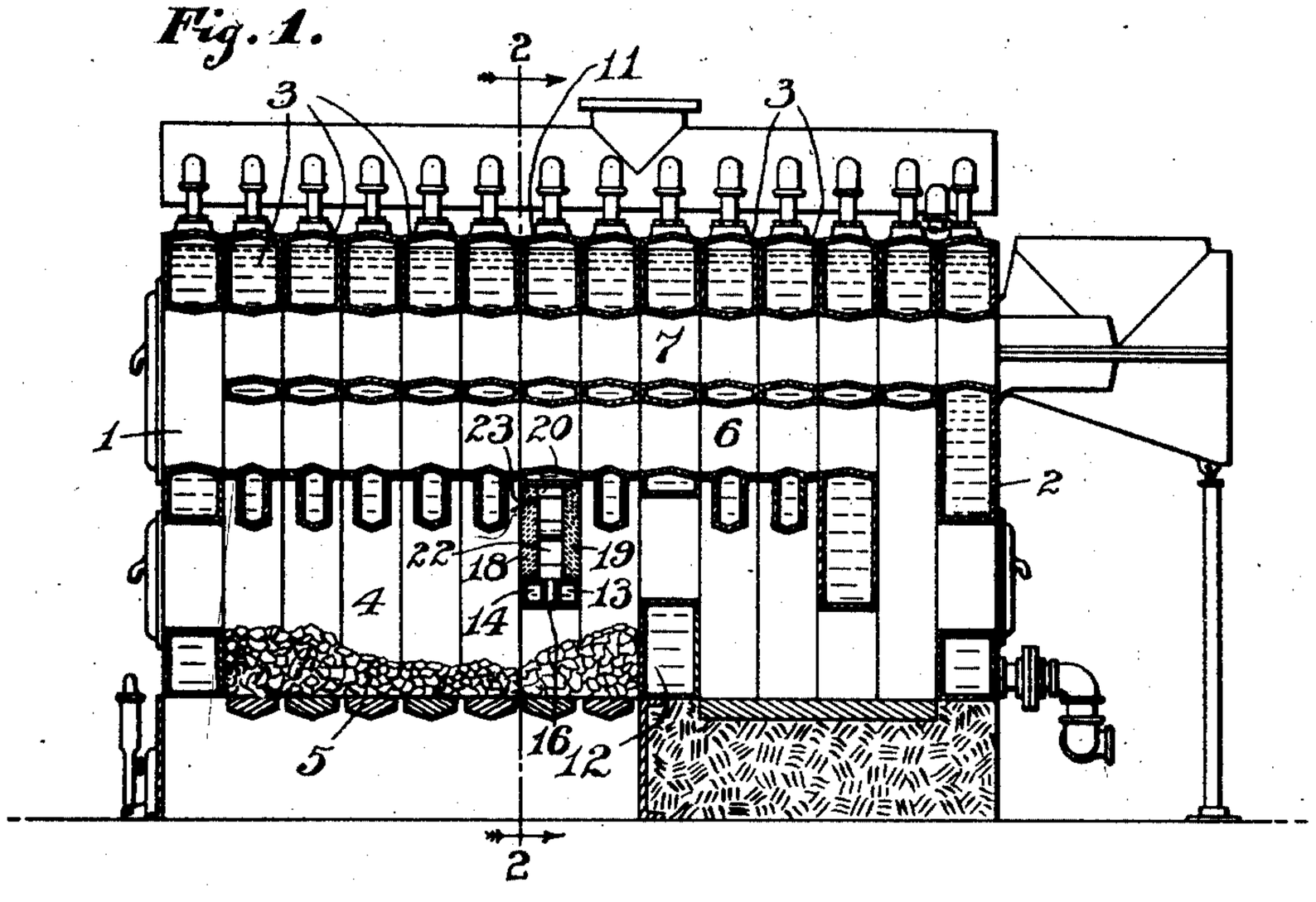


Fig. 2.

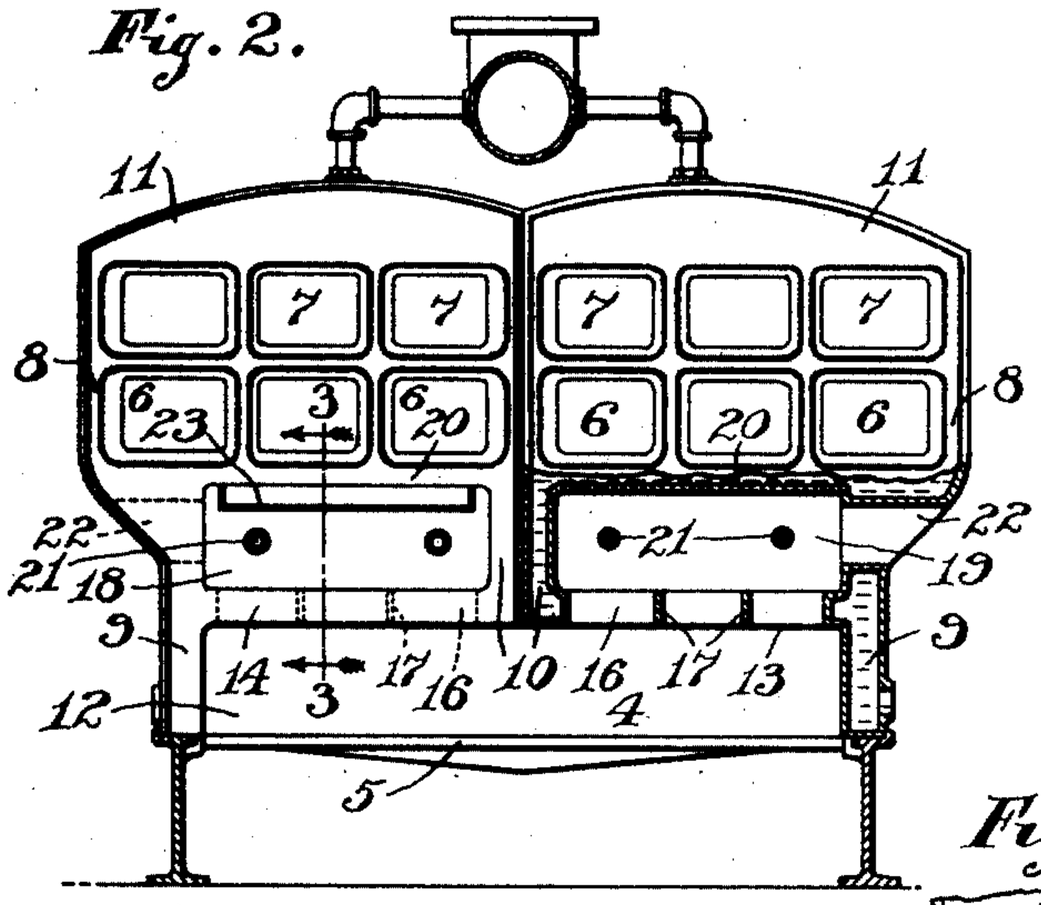


Fig. 3.

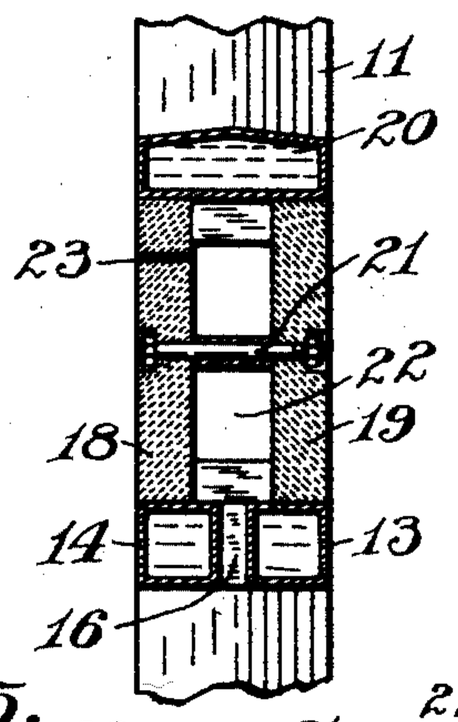


Fig. 4.

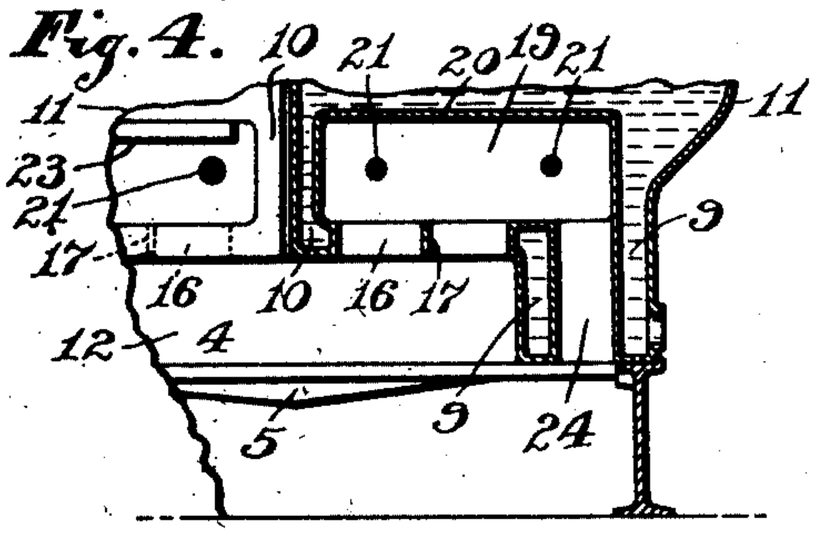
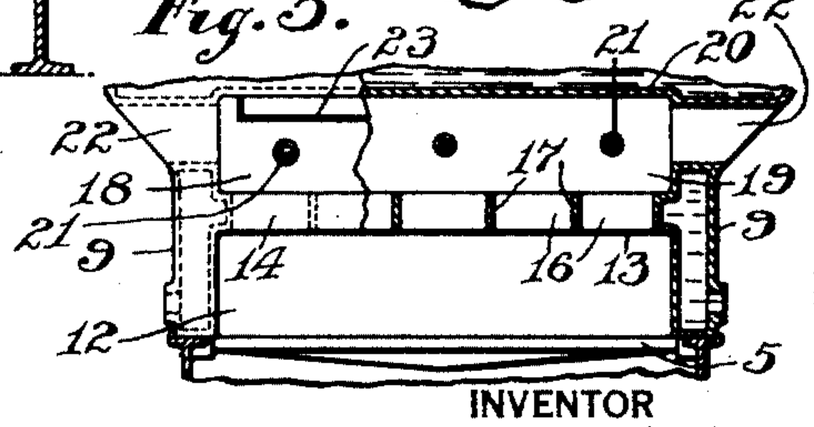


Fig. 5.



INVENTOR

Herman C. Prox,

BY

Arthur M. Hood.

ATTORNEY

Patented Nov. 17, 1925. 1,561,663

UNITED STATES PATENT OFFICE.

HERMAN C. PROX, OF TERRE HAUTE, INDIANA.

BOILER.

Application filed July 3, 1922. Serial No. 572,537.

To all whom it may concern:

Be it known that I, HERMAN C. PROX, a citizen of the United States, residing at Terre Haute, in the county of Vigo and State of Indiana, have invented a new and useful Boiler, of which the following is a specification.

My invention relates to improvements in heating boilers and has for its object the prevention of undue smoke in the boiler during combustion of the fuel.

More particularly my invention has for its object to provide means for supplying in the combustion chamber preheated secondary air which when supplied to the products of combustion aids in the complete consumption of the smoke given off by fuel. A further object of my invention is to cause that portion of the smoke from the fuel which tends to rise to the top of the fire chamber to mingle with pre-heated secondary air so as to cause a complete combustion thereof.

For the purpose of disclosing my invention I have illustrated certain embodiments thereof in the accompanying drawings, in which:

Fig. 1 is a longitudinal section of one form of boiler embodying my invention;

Fig. 2 is a sectional view on the line 2—2 of Fig. 1;

Fig. 3 is an enlarged section on the line 3—3 of Fig. 2;

Fig. 4 is a detail sectional view showing a modification; and

Fig. 5 is a partial view showing another modified form.

In the embodiment illustrated my invention is shown as being applied to one of the usual types of sectional boilers formed of front sections 1 and rear sections 2 and intermediate sections 3. These sections are so formed and assembled as to provide a fire box 4 in which is arranged the usual grate 5 and smoke flues 6 extending from the rear of the boiler forwardly and smoke flues 7 extending from the forward portion of the boiler rearwardly. The front and intermediate sections are preferably divided in halves for convenience in forming and handling and are hollow to provide suitable water ways for the water in the boiler. Each half section in the structure illustrated has side water ways 8 which extend downwardly into the side legs 9 and side water ways 10. In addition to the water ways formed in the intermediate sections, each half of one of the intermediate sections 11 in front of the usual bridge wall 12 is provided with transversely extending hollow spaced apart ways 13 and 14 which at either end communicate with the water ways 9 and 10 and are arranged with their bottoms at a point substantially in the same plane as the top of the bridge wall 12. These water ways are spaced apart to form an air throat 16 and are braced at intermediate points by the cross webs 17.

Supported upon the water ways are closure and heating members 18 and 19 which extend between the top of the water ways 13 and 14 and the bottom of the cross water ways 20 immediately above. These closure members 18 and 19 are supported by the bottom water ways 13 and 14 which form water backed supports therefor and are held in position by means of cross bolts 21 preferably countersunk in the face of the closure members. These closure members are preferably formed of refractory material and form between them a secondary air conduit which receives the secondary air through suitable openings 22 formed in the side of the section. At the top of the front cover member 18 is formed a slot or opening 23 which provides a communication between the top of the fire box and the secondary air chamber.

In operation the boiler is fired in the usual manner with coal on the grate 5 and the main air supply passes up through the grate and fuel so that combustion takes place on the top of the fuel. The hot gases then pass backwardly impinging against refractory cover plate 18 and passes beneath the deflector comprising the plates 18 and 19 and the water ways 13 and 14 thence back to the rear of the boiler thence forward through the smoke flue 6 and rearwardly again through the smoke flue 7 to the smoke box of the boiler. The refractory material of the covers 18 and 19 becomes highly heated by being in contact with the hot gases at this point and the interior of the secondary air passage is thus heated so that the secondary air which is drawn in through the openings 22 and passes between the cover plates 18 and 19 becomes highly heated before it is discharged through the throat 16 where it mingles with the burning gases passing beneath the deflector and supplies additional oxygen to assist in the combustion of the gases and free carbon in the

form of smoke passing therebeneath. Furthermore that portion of free carbon in the form of smoke which accumulates in the top of the fire box is drawn in through the openings 23 and is additionally supplied with air in the secondary air passage so that it is supplied with sufficient oxygen to cause complete combustion whereby the boiler is rendered smokeless. The two supporting cross members 13 and 14 being in the form of water ways and the material therefor being water backed these members are prevented from burning out. Furthermore the water contained in these cross water ways rapidly absorbs the heat from the products of combustion.

In the structure shown in Fig. 4 the secondary air instead of being taken in through a passage formed in the side of the section is taken in through a vertically extending passage or opening 24 communicating with the ash pit.

I claim as my invention:

1. In a sectional boiler the combination with front and rear sections and intermediate sections, each of the intermediate sections having vertical water ways and transverse horizontal water ways extending between the vertical water ways, of a pair of integral supplemental horizontal water ways extending between and communicating with the vertical water ways of one of the intermediate fire box sections, said supplemental water ways being spaced apart from each other from front to rear to form therebetween a throat, and arranged below and spaced from the bottom transverse water way of the section, walls formed of refractory material each supported on one of said supplemental water ways spaced apart from front to rear to form an air passage therebetween and extending to the bottom transverse water way of the section to completely fill the space between said transverse water way and the supplemental water ways, said air passage being arranged to have communication with the atmosphere.

2. In a sectional boiler, the combination with front and rear sections and intermediate sections, each of the intermediate sections having vertical water ways and transverse horizontal water ways, of a pair of integral supplemental water ways extending between and communicating with the vertical water ways of one of the intermediate fire box sections, said supplemental water ways being spaced apart from front to rear to form therebetween a throat and arranged below and spaced from the bottom transverse water way of the section, and walls of refractory material each supported on one of said supplemental water ways and spaced apart from front to rear to form an air passage therebetween and extending to the bottom of the adjacent transverse waterway of the section to completely fill the space between said transverse water way and the supplemental water ways, said air passage being arranged to communicate with the atmosphere and the front of said refractory walls being provided near the crown of the fire box with openings for connecting said air passages with the top of the fire box.

In witness whereof, I, HERMAN C. PROX, have hereunto set my hand at Terre Haute, Indiana, this 30th day of June, A. D. one thousand nine hundred and twenty two.

HERMAN C. PROX.