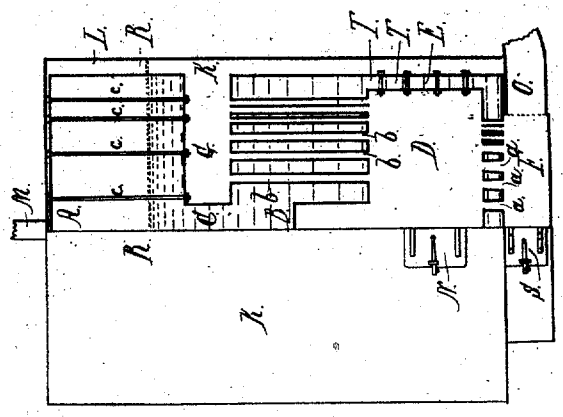
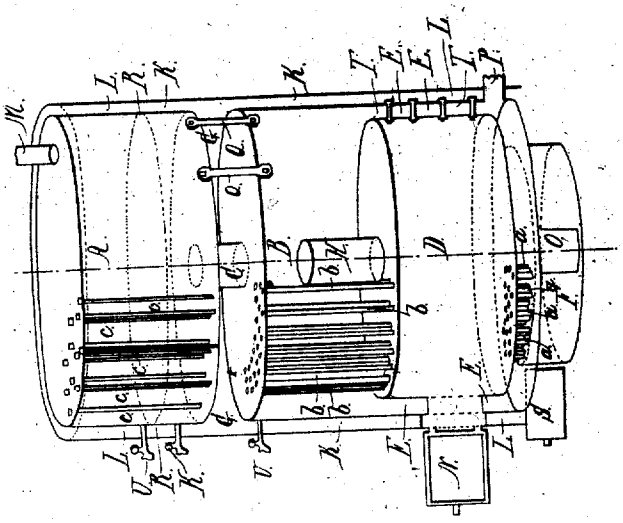
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P. Cooper,

Steam-Boiler Fire-Box.

Patented Oct. 13, 1831.





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Peter Cooper
Letters Patent

The Schedule referred to in these Letters Patent and making part of the same containing a description in the words of the said Peter Cooper himself of his improvement in the construction of Steam Boilers

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To all men by these presents. That I Peter Cooper of the City and State of New York have invented a new and useful improvement in Manner of constructing Boilers for the purpose of generating Steam which I shall name "Cooper Steam Boiler" and that the following is a full and exact description of the construction and operation of the said improvement as invented by me, The Boiler in the improvement that I have invented is composed of two upright cylinders (Plate 1 fig 1) A and B placed one directly above the other but not in contact of equal diameter but different heights Each of these is closed at the ends except as hereinafter described and they are connected together and a communication established between their inner areas by a smaller cylinder or pipe C having the same perpendicular axis with the larger cylinders and of such length and diameter as the size and relative speed of the two larger cylinders may require. The upper of these cylinders I shall for the sake of clearness "The upper chamber" and the lower B "The lower chamber of the Boiler." Within the lower chamber B there is a concentric cylinder D closed likewise at the ends except as hereafter described, between whose outer cylindrical side and the inside of the lower chamber there is a space E of two inches more or less all around according to circumstances, and the bottom of which is three inches from the bottom of the lower chamber. This inner cylinder forms the furnace and is to outline. The bottom of the furnace is supported on the bottom of the lower chamber by bolts a, a, a, a, of about one inch in diameter at the top and an inch and a quarter at the bottom in the shape used in screw bolts screwed to the area of the bottom of the furnace and forming a communication between the interior of the furnace and the outside of the lower chamber as at b.b.b. through these holes the cylinder fits into the cast bolts and through these also

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a current of air is introduced into the fire. The increased size of these at the bottom is to prevent the possibility of their being choaked up with ashes. The top of the furnace is connected with the upper part of the lower chamber by similar tubes b, b, b, b, of about three quarters of an inch in diameter through which the draft of the furnace carries the heated air, smoke and dust into the open space C, between the upper and lower chambers. From the top of the furnace there is a perpendicular pipe or small cylinder E. of the same size with that which supports the upper chamber and closed at the top intended to increase the surface acted upon by the heat. The top and bottom of the upper chamber are fastened together by a sufficient number of bolts c, c, c, c, and in the lower chamber the office of these bolts is performed by the tubes b, b, b, b. Over the whole upper part there is a cylindrical covering called the jacket K, K, K, K. the top of which rests upon the hole made in the top of the upper chamber of the boiler and between the sides of which (the jacket) and the sides of the upper and lower chambers there is an open space all round of about an inch and three quarters L, L, L, L. The jacket is open at the bottom. The steam pipe connecting with the cylinder of the engine proceeds from the top of the upper chamber M. Sheaves of the furnace New in the middle most convenient. On one side of the ash hole there is an opening O. for the current of air to the fire. The water is supplied by means of a pipe P. entering the lower chamber near the bottom. The upper and lower chambers besides being connected by the cylinder or pipe C. are further connected and preserved always in the same relative position by bars or stays called R, R. The draft which is essential to this boiler is best produced by a fan, although other means may be used. When in operation the boiler is filled with water to that the upper chamber may be about one third full of R, R. The water is then in the lower chamber, surrounding all the tubes at the bottom of the furnace a, a, a, a, through which the air is introduced, and which do the office of the openings between the bars of a common grate, and surrounding also the fire itself, and the bottom of the furnace b, b, b, b, through which the heated air passes. The water is also in the tube between the two chambers and in the upper chamber to the height of the upper indicator at R, R. The fire being made, and sufficient coal is

proceed

purpose on all occasions although ashes or wood or bituminous coal may be used if the fan or other means used to create a strong draft forms a current of air into the ash hole the door of which being shut the air enters through the ash pit of the furnace and then passes highly heated through the upper tubes into the space between the upper and lower chambers whereby it is more highly rarefied and prevented from expanding by the jacket of vapour in contact with the outside of the two chambers of the boiler still further heating the water within and is finally by the same draft that introduced it drawn out below the bottom of the furnace or by such other outlet as may be found convenient. When this fuel boiler is used for locomotive engines the smoke and dust pipe out under the carriage. By this arrangement the greatest possible surface of water is opposed to the action of the fire, and the steam generated is in proportion, while the grate upon which the fire is to be kept filled with coals at all times is not liable to be burnt out like the ordinary grates. The water by which is below the fire receives that portion of the heat which has been lost in the usual mode of constructing boilers here entirely lost to the objects of the machine. The fire being nowhere in contact with the upper chamber no accidents need be apprehended from the water in it sinking (though caused so) below the height here indicated. When a fan is used to produce the draft it must be worked by hand until the steam is raised so high that it may be worked by the machinery. In a locomotive engine when the fire is first put into the furnace the working wheels should be raised a little from the rail which may be readily done by a screw or lever. Very little steam will be sufficient there to move the machinery and along with it the fan. By stopping the fan a draught is at once put upon the fire there being no draught except what the fan produces and by changing the velocity of the fan the degree of draught and the intensity of the heat may be regulated at will. In the apparatus here described I claim as new and as my own invention and discovery as follows 1st The mode of constructing the bottom of the furnace of parallel plates through which the air is introduced by means of tubes to the fire and between which a considerable superficies of water is kept opposed to the action of the fire preventing by the same

Mine

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time the surface upon which the fire acts from the destructive effects of intense heat. N.B. Grates have been constructed with tubes contain(ing) water. The fire however converted the water into steam which being driven out the tubes were liable to be burnt in two, as the solid bars have been and the water getting to the fire an explosion would take place. In my invention the air is introduced through tubes and the vol(ume) of water is so great that there must always be sufficient for the purpose intended. 2 I also claim as my own the separation of the boiler into two parts and the tubing of the lower one. 3. I also claim as my own the outer covering or jacket by which the smoke and dust are forced in a downward direction out from the bottom of the boiler or carriage. 4. And I also claim as my own the combination and form herein described as applicable as well as in detail.

Witnesses
B. C. Postmans
Jno. H. B. Latrobe

Peter Cooper

1635 mb

Ex?
CMcW.