(No Model.)

A. F. KINGSLEY.

LOCOMOTIVE OR OTHER BOILER FURNACE.

No. 506,595. Patented Oct. 10, 1893.

Fig. 1.

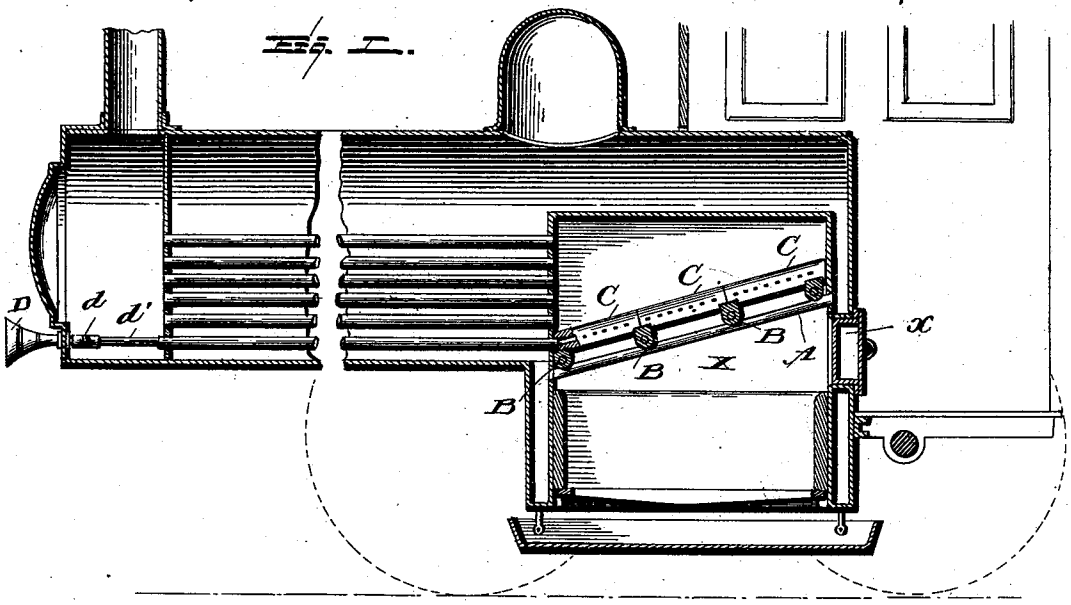


Fig. 2.

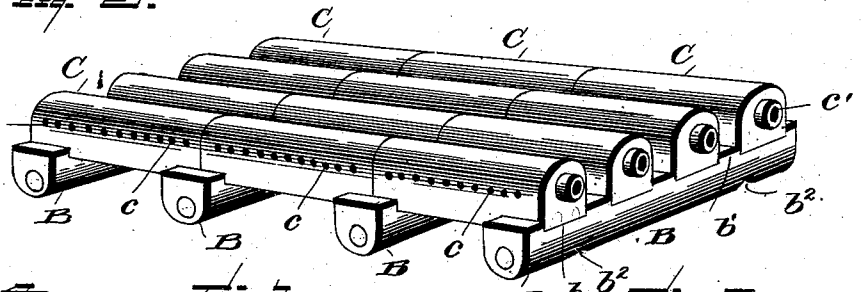


Fig. 4.

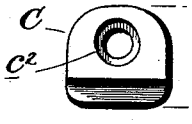


Fig. 3.

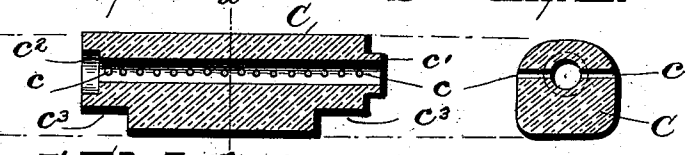


Fig. 5.

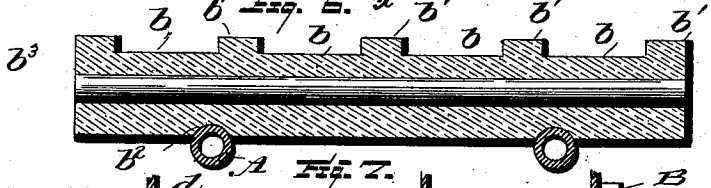
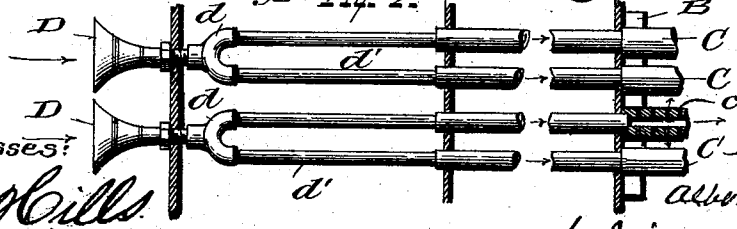


Fig. 7.



Witnesses:
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A. D. Cox.

Inventor:
Albert F. Kingsley
by Marcellus Bailey
his Atty.

UNITED STATES PATENT OFFICE.

ALBERT F. KINGSLEY, OF WASHINGTON, DISTRICT OF COLUMBIA.

LOCOMOTIVE OR OTHER BOILER FURNACE.

SPECIFICATION forming part of Letters Patent No. 506,595, dated October 10, 1893.

Application filed August 7, 1893. Serial No. 482,541. (No model.)

To all whom it may concern:

Be it known that I, ALBERT FRANKLIN KINGSLEY, of the city of Washington, in the District of Columbia, have invented a new and useful Improvement in Locomotive or other Boiler Furnaces, of which the following is a specification.

The object of this invention is to effect in boiler furnaces perfect combustion of the products of combustion, which in escaping unconsumed occasion not only a serious loss of fuel, but also much dirt and inconvenience.

The invention can be applied to boiler furnaces generally but inasmuch as it has been designed and adapted by me with special reference to the needs of locomotive boiler furnaces, I shall describe it in that connection.

In my prior application for Letters Patent, filed April 1, 1893, Serial No. 468,700, and now pending in the United States Patent Office, I have described and claimed a boiler furnace in which the fire box and flues are combined with perforated fire clay air conduits located above and in proximity to and extending over the grate surface, through the constricted intervals between which conduits the products of combustion in subdivided condition must pass to the flues, and water pipes or bars communicating with the boiler space, supporting and holding in place said fire clay air conduits against dislodgment, but having no rigid connection therewith.

The perforated air conduits are saddled each upon a pair of water pipes which extend beneath and parallel with the conduits supported by them. The air conduits, to secure good results, should be placed close together so that there will be, in an ordinary furnace, usually from four to six of them. As each one requires two longitudinal water bars, there will be twice as many bars as conduits. This multiplicity of pipes is decidedly objectionable and is a drawback to the introduction and use of the device on locomotives. The cutting and fitting of so many pipes, and tapping them and connecting them with the boiler walls, is troublesome and increases liability to leakage. It is besides very difficult to get at all these pipes to clean their interiors, a thing which must be done at suitable intervals, especially where alkaline water or other water from which solid matter is precipitated and deposited is used. It is to obviate these and other objections, which detract from the availability of the device for general industrial use, that the improvements which form the subject of my present application have been devised.

Under my present plan only two water bars, at the most, are required for the support of the grating. These two water bars extend from front to rear of the fire box, tolerably near the side walls, and are connected at these points to the water space of the boiler, occupying in fact about the same position in the fire box that is occupied by the two water bars which are used to support the deflecting arch interposed between the fire and the flues, with which so many locomotives are provided at the present day. In fact, and this is a material advantage accruing from my invention, I can use the same water bars which in locomotives are now used for supporting the deflecting arch to support my improved grating, removing the deflecting arch, and putting in lieu thereof the grating, which I find by practical experience not only serves to supply air to, and to thoroughly disseminate it through, the products of combustion, but also acts as a deflecting arch as well, shielding the flues, and constituting in effect a screen to prevent them from being clogged, and to prevent sparking, &c. Upon these two water bars, I place loosely transverse fire clay or other refractory supports, these supports resting upon the water bars without having a rigid connection with the latter; and upon the transverse supports, I place the perforated fire clay air conduits, the conduits and their supports being so formed that each interlocks with and is held in place by the other, while at the same time the joints between them are flexible or sufficiently loose to permit expansion and contraction of material without injury.

To enable those skilled in the art to make and use my invention, I will now proceed to describe more particularly and in detail the manner in which it is or may be carried into effect by reference to the accompanying drawings in which—

Figure 1 is a longitudinal, vertical, central section through so much of a locomotive containing my improvement as needed to illus-

trate the invention. The remaining figures illustrate on a larger scale the structural details of the apparatus. Fig. 2 is a perspective view of the grating-proper comprising the perforated air conduits and their transverse supports. Fig. 3 is a longitudinal vertical central section, of one of the air conduit sections. Fig. 4 is an elevation of the left hand end of the same. Fig. 5 is a section on x—x Fig. 3. Fig. 6 is a vertical longitudinal central section of one of the transverse supports, with the water bars beneath in cross section. Fig. 7 is a sectional plan, showing the arrangement (one of many which can be used) for supplying the air conduits with air.

The water bars A, of which (as seen in Fig. 6) there are two, are placed one near each side wall of the fire box X, extending from a point slightly below the flues to a point above the fire door x. They are placed one on each side of the fire door; in a fire box thirty-four inches wide, each bar may stand say seven inches from the adjoining side of the fire box, the bars or pipes being usually from two to two and one half inches in diameter. They open into and communicate with the water space of the boiler at each end. Upon these water bars are placed the fire clay supports B, which extend crosswise of the bars by which they are upheld. These supports have on top, recesses b to receive the conduits, and ribs b' to keep the latter separated from each other by proper intervals. And underneath they have near each end a slight concavity b^2, to enable them to fit and take a proper bearing on the water bars A in which their ends rest. I prefer, in order to obtain greater strength, as well as to insure against accidental breaking or fracturing of the transverse supports B under the load which they carry, to make them tubular as seen at b^3, and to introduce into their bore a round metallic filling rod. This rod under the intense heat may burn out more or less frequently but the manner in which the parts are constructed and put together permits it to be readily renewed whenever an occasion demands.

The fire clay air conduits are made up each of several sections C, which are preferably of the form and dimensions illustrated. Each section is tubular and has perforations c in its opposite sides for the discharge of air; on the one end it has a tenon c', and on the opposite end a socket c^2, and the sections are put together end to end to form a conduit, the tenon on the end of one fitting into the socket in the adjoining end of the next; it also has at each end a shoulder c^3. The conduit sections preferably are six inches wide by eighteen inches long.

The cross supports B are placed at the ends of the conduits and at the intermediate points where the sections which make up the several conduits meet, the supports being broad enough to receive and support both of the two abutting ends of the joining sections of each conduit. The recesses b on the top of these supports B are just of a size (say in the case above supposed about six inches wide) to permit the conduits C to enter them; and the shoulders c^3 of each section enter between adjoining supports B, and extend down upon the interior opposite faces of the latter, in this way spacing and holding the supports B at proper intervals apart. The ribs b' on top of the supports B are in turn spacing ribs which hold the conduits apart. In order to secure the best results adjoining conduits should be separated from each other by a space say about two and a half inches wide.

In putting the grating in place, the supports B at the flue end of the fire box, are placed on the water bars A resting against the flue head. In this way a fixed starting point is obtained for the structure. The grating is then built up of the sections C and cross supports B in the manner hereinbefore indicated, the two interlocking with one another so that each serves to hold the other in place, while at the same time the joints and connections between them are so loose as to permit the free expansion and contraction of material.

The conduits at the end next to the fire door or front of the fire box should be closed by plugs of fire clay or the like. Air is supplied to them by any suitable means. The preferred arrangement is to take the air in from the front of the locomotive through say two funnels D, each leading through the front of the smoke box of the locomotive to the interior thereof where it connects to a Y or branch pipe d, from whose branches lead pipes d' across the smoke box to communicate with four selected boiler flues. I take for this purpose four of the lowermost flues which are as nearly as possible in the same horizontal plane, and on a level with the open ends of the conduits C which adjoin the flue head. These flues should project beyond the flue heads about an inch at each end, the one projecting end entering the adjoining end of the appropriate conduit C, and the other joining its supply pipe d at front. In this way I can use the boiler flues themselves as air passages. Under this arrangement by which air is taken in through funnels at front, the supply of air is occasioned by and dependent upon the movement of the locomotive. But manifestly if desired a special air pump operated from some moving part of the engine can be used; or by introducing into the funnel a jet of steam or a jet of air from the brake reservoir, a requisite amount of air can be supplied continuously whether the locomotive is in motion or at rest.

So far as concerns the interlocking sectional grating, composed of the iron supports B and the air conduit sections C, I remark that, in stationary boiler furnaces, the water bars A can be entirely dispensed with, and in lieu

thereof I can erect fire brick standards or columns to support the cross supports B at such points as may be deemed necessary.

Having described my invention and the best way known to me of carrying the same into effect, what I claim herein as new and of my own invention is—

1. The combination with the flues and fire box of a boiler furnace, of a series of air conduits formed each of tubular laterally perforated sections put together end to end, and a series of fire clay supports for said conduits placed below and extending cross wise of the latter, said supports and sections being provided respectively with recesses and engaging shoulders, whereby they are interlocked, the one serving to hold the other properly spaced and in place without any rigid connection or joint between the two, substantially as hereinbefore set forth.

2. The combination with the flues and fire box of a boiler furnace, of the water bars A, the transverse fire clay supports B, and the perforated air conduit sections C, these parts being constructed, fitted together and adapted to operate substantially in the manner and for the purpose hereinbefore set forth.

In testimony whereof I have hereunto set my hand, this 1st day of August, 1893, in the presence of two subscribing witnesses.

ALBERT F. KINGSLEY.

Witnesses:
EWELL A. DICK,
ROBT. W. COX.