No. 731,194. PATENTED JUNE 16, 1903.

L. D. LOVEKIN.

RETARDING DEVICE FOR BOILER TUBES.

APPLICATION FILED SEPT. 18, 1902.

NO MODEL.

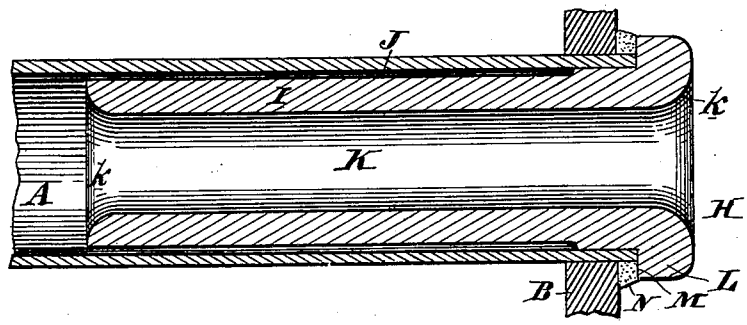


Fig. 1

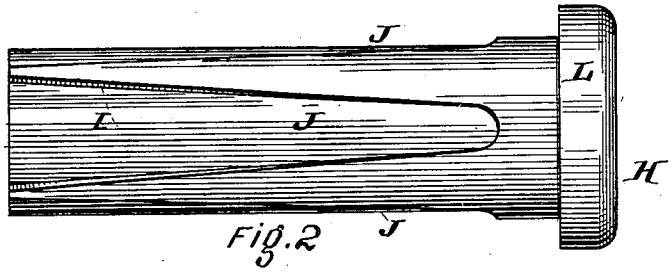


Fig. 2

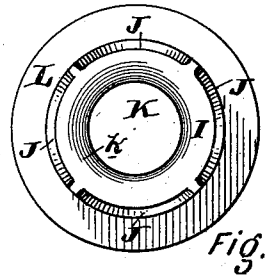


Fig. 3

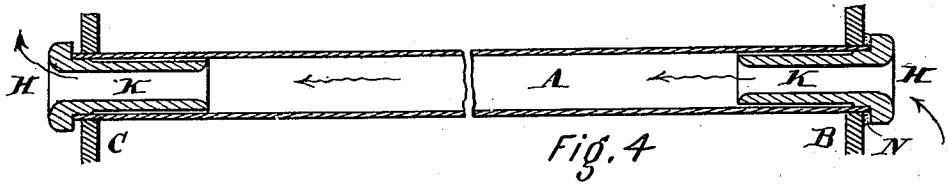


Fig. 4

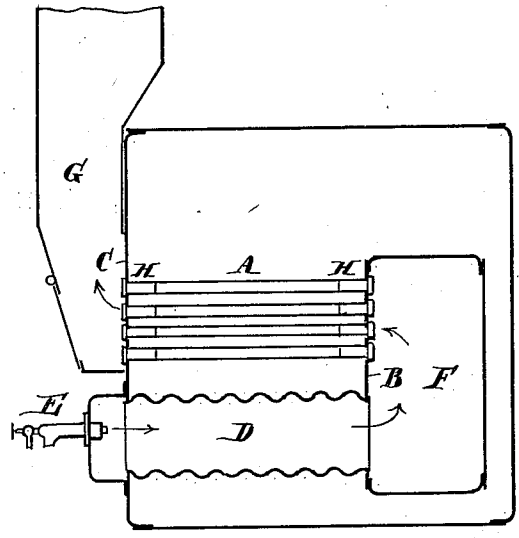


Fig. 5

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No. 731,194. Patented June 16, 1903.

UNITED STATES PATENT OFFICE.

LUTHER D. LOVEKIN, OF ARDMORE, PENNSYLVANIA.

RETARDING DEVICE FOR BOILER-TUBES.

SPECIFICATION forming part of Letters Patent No. 731,194, dated June 16, 1903.

Application filed September 18, 1902. Serial No. 123,826. (No model.)

To all whom it may concern:

Be it known that I, LUTHER D. LOVEKIN, of Ardmore, Montgomery county, State of Pennsylvania, have invented an Improvement in Retarding Devices for Boiler-Tubes, of which the following is a specification.

My invention has reference to retarding devices for boiler-tubes; and it consists of certain improvements, which are fully set forth in the following specification and shown in the accompanying drawings, which form a part thereof.

I have found that in burning oil as fuel in the furnaces of steam-boilers there is great tendency for the hot products of combustion to pass too freely through the tubes of the boiler and escape into the smoke box and stack, the result of which is loss of caloric and the failure of absorption by the water of the heat units rendered available from the oil vaporized in the furnace. This difficulty is especially apparent in the use of boilers originally designed for using coal as fuel and which have been converted so as to have their furnaces heated by oil fuel, and the cause is largely to be found in the fact that the tubes, which are invariably made sufficiently large to allow a considerable accumulation of soot without obstructing the draft to an objectionable degree, and thereby obviating the necessity of cleaning of the said tubes frequently, are of too great a sectional area. In the case of oil fuel there is practically no soot to collect, and hence the tube area remains so great as to permit the hot gases to rush through them under the impetus given to them by the pressure of the burner, the expansion of the gases themselves, and the strong draft produced by the stack. As it is inconvenient and practically impossible to reduce the pressure of the burner and the draft of the stack, it is the object of my invention to retard the passage of the gases through the boiler-tubes by introducing into them a retarding device of refractory nature. Another difficulty which often arises in boilers fitted with oil-burners is that when the fire has been accidentally extinguished by water occasionally getting into the oil an objectionable quantity of explosive gas will be generated in the fire-box, combustion-chamber, and tubes, and this explodes upon starting up the fires, sometimes resulting in serious injury to the firemen. By my invention the refractory nature of the bushings causes them to retain their incandescence for some time after the fuel has been shut off, and this insures automatic and immediate ignition the instant the cause of putting out the flame is removed, the said cause being only momentary.

In carrying out my invention I provide either or both ends of the tubes of the boiler with retarding-bushings, of fire-brick or other refractory material, said bushings fitting the ends of the tubes and extending for a considerable distance therein as a means of support. I prefer to form the outer end of the refractory bushings with heads or flanges, which extend over the ends of the boiler-tubes to shield them, and said tube ends may be further protected by a fire-clay cement packed in between the boiler-head and inner surface of the flange of the bushing.

My invention also comprehends details of construction, which, together with the above features, will be better understood by reference to the drawings, in which—

Figure 1 is a longitudinal sectional elevation through a portion of a boiler-tube and end plate with my improved retarding-bushing in place. Fig. 2 is a side elevation of the retarder-bushing. Fig. 3 is an end elevation of same. Fig. 4 is a sectional elevation showing a retarding-bushing at each end of a boiler-tube; and Fig. 5 is a sectional elevation of a marine boiler, showing my retarding-bushings applied thereto.

A represents boiler-tubes open at one end through the head C into the smoke-box G, leading to the stack, and at the other end through the head or sheet B, forming the forward wall of the combustion-chamber F.

D is the furnace-chamber, and E is the oil-burner, through which oil and air, together with some steam, if desired, are forced under pressure. Either or both ends of the tubes A are fitted with retarding-bushings H, of refractory material, such as fire-brick. These bushings are made to snugly fit the tube and formed with a flange or head L on the outer end, which projects laterally over and shields the ends of the tube against excessive heat. In projecting beyond the tube an annular groove or channel M is formed, which may,

if desired, be packed with fire-clay or other refractory cement N. Such fire-clay packing would only be necessary upon the ends of the tubes which extend into the combustion-chamber F and not at the smoke-box end G.

The outer surface of the body I of the retarding-bushing is grooved or channeled, as at J, to reduce to a minimum the surface of contact with the tube, especially upon the inner end of the bushing. These grooves J are tapered, so that at the inner end of the bushing there are only small projecting portions of the bushing, and hence very little of the boiler-tube is obstructed against the action of the heat. The shape of the bushings and grooves prevents localization of any strains from expansion and contraction. The bushing has a hole K of considerably smaller sectional area than the sectional area of the boiler-tube A, and the ends of the aperture are preferably rounded to form flaring ends *k* to offer the least obstruction to the passage of gases into the retarding-bushings. If desired, the grooves J may be omitted. These retarding-bushings being refractory material become white-hot in the combustion-chamber and create a radiant heat, which, together with that of conduction, increases the evaporating capacity of the tube and boiler plate or head B, through which the tubes pass. By having the air-spaces formed by the grooves J there is less variation in the expansion and contraction of the tube than would result if the bushing rested against the tubes closely throughout their length. When these retarding-bushings H are used at the combustion-chamber end, the draft within the tubes A is diminished, and where they are also used at the smoke-box end the retarding influence upon the draft is still more effective. It is evident that, if desired, the retarding-bushings at either ends of the tubes may be omitted. The effect of these retarding-bushings is to concentrate the heat in the fire-box, the combustion-chamber, and the tubes, so that the heat units absorbed by the water and evaporation duty of the boiler may be a maximum for the fuel consumed.

As before stated, the incandescing property of the bushing prevents explosions of gases if from any cause the fire at the burners is blown or put out accidentally.

In place of being made of fire-brick the retarding-bushings may be made of annealed porcelain or other refractory material. These retarding-bushings may be used on locomotives or any stationary or other boiler to which oil fuel is adapted, as well as on marine boilers.

While I prefer the construction shown, the details may be varied without departing from the spirit of the invention.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A retarding-bushing for boiler-tubes consisting of a long tubular body of refractory material such as fire-brick having a flange or head at one end of greater diameter than the body and having the outer surface grooved or recessed and of greater cross-section near the flange than at the end which is extended into the boiler-tube.

2. A retarding-bushing for boiler-tubes consisting of a long tubular body of refractory material such as fire-brick having a flange at one end of greater diameter than the body and having its outer surface extending to the other end, grooved or recessed longitudinally, the areas of said grooves longitudinally considered being irregular.

3. A retarding-bushing for boiler-tubes consisting of a long tubular body of refractory material such as fire-brick having a flange or head at one end of greater diameter than the body and having its outer surface extending to the other end grooved or recessed longitudinally by flaring recessed portions arranged about the body and within the larger parts arranged at the end thereof.

4. A boiler-tube and head or end plate, combined with a cylindrical retarding-bushing of refractory material such as fire-brick having one end of a diameter to snugly fit the tube and its middle body and other end grooved or recessed upon its outer part to form air-spaces between the tube and bushing.

5. The combination of a boiler-tube and head or end plate with a retarding-bushing of refractory material extending to a considerable depth within the tube and having its outer end flanged so as to extend beyond and shield the ends of the boiler-tubes and form an annular channel opening outward to the periphery of the flange, and a packing of refractory material such as fire-clay around the boiler-tube end and between the flange of the bushing and end plate.

6. The combination of a boiler having a boiler-tube opening at one end into the combustion-chamber and at the other end into the smoke-box, with removable retarding-bushings of refractory material arranged at each end of the tube and extending some distance within the same so as to form an enlarged gas-space extending substantially throughout the length of the tube.

In testimony of which invention I have hereunto set my hand.

LUTHER D. LOVEKIN.

Witnesses:
R. M. KELLY,
M. J. EYRE.