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DEVICE FOR INCREASING BOILER EFFICIENCY.

APPLICATION FILED SEPT. 11, 1919.

1,399,236. Patented Dec. 6, 1921.

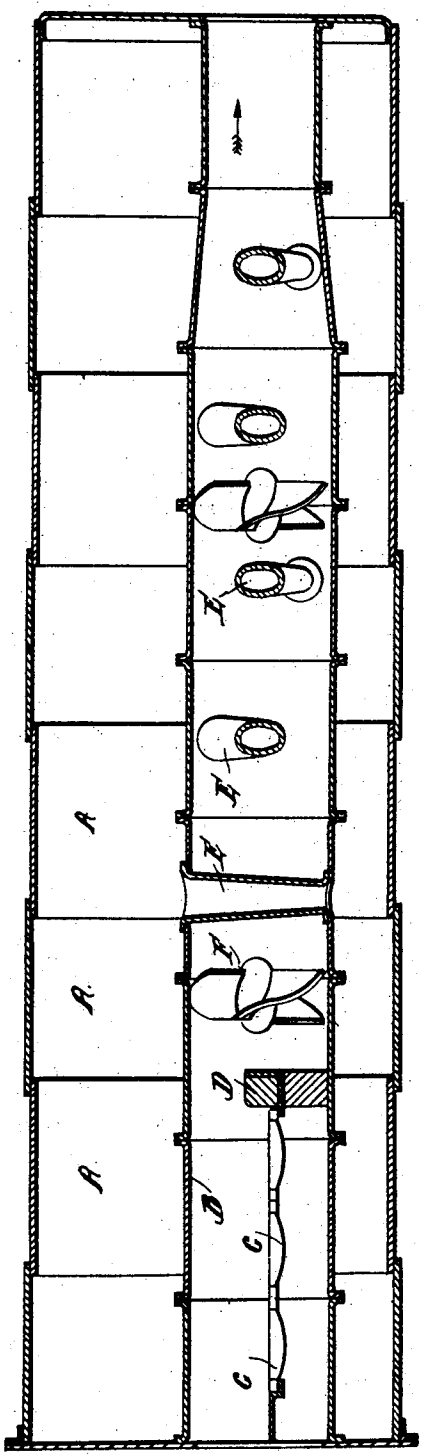


Fig. 1.

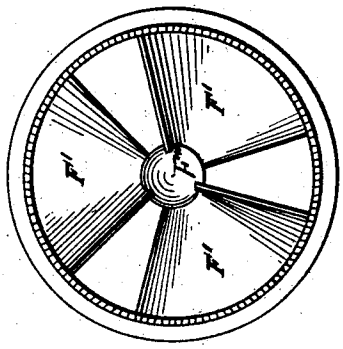


Fig. 3.

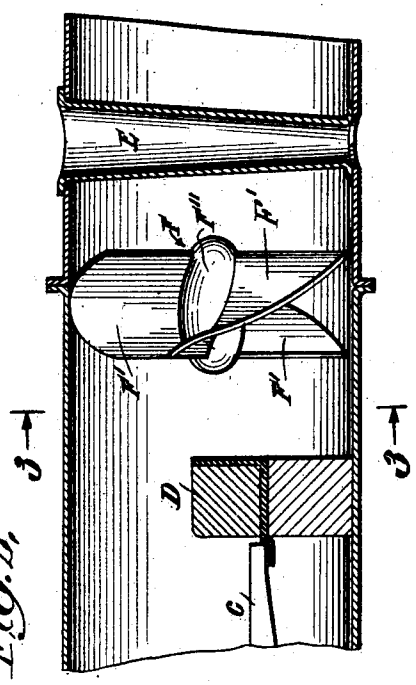


Fig. 2.

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DEVICE FOR INCREASING BOILER EFFICIENCY.

1,399,236. Specification of Letters Patent. Patented Dec. 6, 1921.

Application filed September 11, 1919. Serial No. 323,198.

To all whom it may concern:

Be it known that I, OKIYE YAMASHITA, a subject of the Emperor of Japan, residing at No. 3 Nishimachi, Nihonyenoki, Shiba, Tokyo, Japan, have invented certain new and useful Improvements in Devices for Increasing Boiler Efficiency, of which the following is a specification.

My invention relates to the provision of fire bricks having the configuration of propeller shape and loosely placed inside of furnace tubes of cylindrical boilers or the like such as Lancashire or Cornish type boilers.

The object of the invention is to give a vortex motion to the flue gas while passing through the furnace tubes so that the efficiency of the boiler is increased.

With the foregoing object outlined and with other objects in view, the invention consists in the novel features hereinafter described in detail, reference being had to the accompanying drawings in which I have shown one form of embodiment of the invention selected for the purpose of illustration and the said invention is more fully disclosed in the following description and claims.

Referring to the drawings:

Figure 1 is a longitudinal sectional view of Lancashire type boiler fitted with my device.

Fig. 2 is an enlarged view of the same, partly broken away.

Fig. 3 is a transverse sectional view of the same on the line 3—3 of Fig. 2.

In the drawings, A and B are boiler shell and furnace tube respectively and propeller shaped fire bricks, designated by F show my device which is composed of blades F′ and boss F″ and simply placed at rear of fire bridge D as shown in Fig. 2, but in case of a large boiler with long flues, especially where there are many conical circulating tubes such as Galloway tubes, this device may be followed by another set, spaced apart at a certain distance.

The hot gas generated by combustion of fuel upon fire grate C will pass over fire bridge D and come into contact with present device F, and passing along its screw shape blades F′, a vortex motion is imparted thereto.

It will be noted that in boilers without this special device, the hot gas will, broadly speaking, pass along the top portion of the furnace tube, leaving comparatively cool gas behind at the lower portion of the same so that the hot gas will pass through the furnace tubes quicker than the gas at the lower temperature.

Consequently, the heating effect is localized and the lower portion of furnace tube is at comparatively low temperature and has very little value for heat transmission, thereby the boiler efficiency being low.

On the other hand by my device, a vortex motion is imparted to the flue gas as hereinbefore mentioned, so that the lower portion of the furnace tubes will considerably increase its heating capacity.

By experiments it has been proved that fuel consumption is about 15% less than that of a boiler without this device to develop the same horse power under the same condition.

The parts of my device, namely, the blades and boss are so constructed that they are loosely put together so that they can be easily assembled in the boiler.

Special attention has been paid in the present design not to disturb the stream of the flowing gas, while giving the vortex motion thereto, for the purpose of minimizing the resistance to the draft. As shown in the drawings the boss is rounded at both ends and the front and rear peripheral edges of the blades, that is, the edges lying in vertical planes perpendicular to the axis of boiler at the front and rear ends of the blades are rounded while faces of blades being each in uniform thickness throughout.

The spiral blades are arranged radially and symmetrically around the boss and the whole device stands freely in the furnace tube supported by the peripheral edges of its two lower blades which are in intimate contact with the wall of the furnace tube at their full length, as shown in Fig. 3; therefore the said two blades serve as the supports of the whole device so as to make the device positioned steadily by its own weight. The length of the present device is comparatively short, for instance about 1 ft. 3 in. in total length for 5 ft. pitch of spiral blades and 3 ft. flue diameter and being only sufficient in the length to impart the desired vortex motion to the stream of the flowing gas while the vortex motion thus imparted being maintained by the momentum of the gas throughout the remaining portion of the flue. The above design will perform the function of imparting the vortex motion to the flowing

gas without substantially increasing the resistance to the draft of the gas. The material used for this device is not necessarily of fire bricks but it may be of any material so far as it resists the intense heat of the flowing gas.

What I claim and desire to secure by Letters-Patent is:—

1. A device for use in a furnace tube of a cylindrical furnace, comprising a boss and a plurality of spiral propeller shaped blades mounted on said boss, said boss and each blade being structurally separate to permit the same to be inserted into the furnace tube and being adapted to be assembled within the furnace tube.

2. A device for use in a furnace tube of a cylindrical furnace, comprising a boss and a plurality of spiral propelling blades mounted on said boss, said boss being rounded at both ends and said blades each having its edge perpendicular to the axis of the tube thin to be relatively non-obstructing to the passage of gas through the tube.

3. A device for use in a furnace tube of a cylindrical furnace, comprising a boss and a plurality of spiral propelling blades mounted on said boss, said boss being rounded at both ends and said blades being thin to be relatively non-obstructing to the passage of gas through said tube.

4. A device for use in a furnace tube of a cylindrical furnace, comprising a boss and a plurality of spiral propeller shaped blades mounted on said boss, said blades and boss being self-supporting by the engagement of the peripheral surfaces of the blades with the inner surface of the furnace tube, said boss and blade being structurally separate to permit the same to be inserted into the furnace tube and being adapted to be assembled within the furnace tube.

In testimony whereof I affix my signature in presence of two witnesses.

OKIYE YAMASHITA.

Witnesses:

HOGIRO WATANAHO.

K. KATO.