

UNITED STATES PATENT OFFICE.

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SMOKE-TUBE BOILER.

1,011,658.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JOHANNES STOLLERZ, of Osterode-in-the-Harz, Germany, a citizen of the German Empire, have invented certain new and useful Improvements in Smoke-Tube Boilers, of which the following is a specification.

The subject-matter of my invention is a device in vertical or horizontal smoke tube or multitubular boilers for obtaining a quiet combustion process on the grate, whereby not only is the carrying away of unconsumed particles of coal from the surface of the grate into the smoke box and into the open air diminished or entirely obviated, but a better utilization of the heating surface is obtained. I attain these ends by equalizing the various strengths of draft in the individual smoke tubes by building into the smoke box a cage of wire netting, the width of whose meshes at those places, which are located at the tubes otherwise having a great strength of draft, is smaller than at those places, which are located at the tubes otherwise having a small strength of draft. Instead of the wire netting there may be employed an iron plate with perforations of analogously different width. This iron plate is preferably undulated. As the smoke issues in the direction of the smoke tubes in vertical boilers and transversely of this direction in horizontal boilers, it follows that the position and arrangement of the inserted cage of netting or perforated plate having meshes of various width will vary in each instance. In vertical boilers the cage composed of wire netting or perforated plate will be rectilinear or slightly arched and of the shape of the section of the smoke box and will possess in the middle, *i. e.* under the smoke stack as the draft is strongest there, small meshes which become larger continuously or stepwise toward its edges. In horizontal boilers, particularly locomotive and portable-engine boilers, the cage of wire netting or perforated plate when seen from the front will have the form of a sickle shaped roof surrounding the ends of the tubes.

One illustrative embodiment of the invention as applied to the smoke box of a horizontal boiler is represented by way of example in the accompanying drawing, wherein:

Figure 1 represents a longitudinal section on line 1—1 of Fig. 2 of a locomotive boiler

and smoke box embodying one form of this invention. Fig. 2 represents a transverse section of the smoke box on line 2—2 of Fig. 1. Fig. 3 represents a transverse section of a smoke box embodying another form of this invention.

The same reference characters are used in all the figures in the designation of the same parts.

Referring to the drawing, *a* designates the fitting consisting of an approximately cylindrical cage of wire netting mounted in a suitable manner on a stiffening iron frame or stays in the smoke box *b*, or of an undulated perforated iron plate; as Figs. 2 and 3 show, the cage rests at the rear end against the tube shaft or flue head of the boiler and surrounds the ends of the smoke tubes *c* in such manner that the flue gases issuing from them have no free path to the smoke stack *d*. The fitting *a* has smaller meshes or perforations at the top, or at the places where the draft is strongest, than at the sides. If the draft is nevertheless too strong at the top, I place a nonperforated plate thereon, that is to say I entirely cover over some of the meshes or perforations.

The lower edges *e* of the wire fitting are connected to non-perforated plates *f* extending to the bottom of the smoke box. In the case of a perforated iron plate forming the fitting this plate is bent to form the plates *f*.

The front end of the cage or fitting is preferably provided with straight or vertical edges *h* in its upper part and with slanting edges *h'* in its lower part, these slanting edges sloping downward and backward from the door *k* and the vertical edges abutting against said door. Plates *g* extend at both sides from the front edges *h'* of the cage to the wall *i* of the smoke box. This arrangement is for causing a stronger draft at the lower and lateral smoke tubes relatively to the weaker draft caused at the middle and upper smoke tubes, when the need therefor occurs. The upper horizontal part *l* of the fitting *a* is preferably formed as a damper plate, while the side walls of the fitting are cut longitudinally and provided at the edges with hinges *m* in order to be able to turn their lower parts inwardly upward, for the purpose of removing the coal dust lying behind them.

In all cases the area of the wire netting and the number and size of its meshes or of the perforations of the iron plate replacing

the netting are such that the total area of the apertures is at least equal to the total sectional area of the smoke tubes.

In order to prevent the netting being warped or twisted by heat or its own weight, it is made weaker from below upward and is consequently lighter in itself toward the top.

I claim:—

- 10 1. The combination of a steam boiler, a smoke box provided with a smoke outlet, a flue sheet separating the boiler and smoke box, flue tubes disposed in said boiler and having tube ends opening into said smoke box through said flue sheet, and a screen cage disposed in said smoke box against said flue sheet and surrounding said tube ends, the area of the openings in said screen cage being smaller near said smoke outlet.
- 20 2. The combination of a horizontal steam boiler, a smoke box disposed in front thereof and provided with a smoke outlet and with a door in the shell thereof, a flue sheet separating said boiler and said smoke box, flues disposed in said boiler and having tube ends opening into said smoke box through said flue sheet, and an incomplete cylindrical cage disposed in said smoke box against said flue sheet and surrounding said tube ends, said cage being provided in its lower front portions with edges which slant downward toward the rear, with plates extending

from said edges to the shell of the smoke box and with plates extending from its lower edges to the bottom of the smoke box. 35

3. The combination of a steam boiler, a smoke box provided with a smoke outlet, a flue sheet separating the boiler and smoke box, flue tubes disposed in said boiler and having tube ends opening into said smoke box through said flue sheet, and a cage of wire netting mounted between said outlet and the ends of said tubes and surrounding said ends and provided with a solid upper portion. 40

4. The combination of a steam boiler, a smoke box provided with a smoke outlet, a flue sheet separating the boiler and smoke box, flue tubes disposed in said boiler and having tube ends opening into said smoke box through said flue sheet, and a cage of wire netting mounted between said outlet and the ends of said tubes, the netting being weaker and lighter and the meshes thereof smaller from below upward, and provided with a solid upper portion. 45 50

In testimony, that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

JOHANNES STOLLERZ.

Witnesses:

DIETRICH SUSEMIHL,
AUGUST JANNASTH.