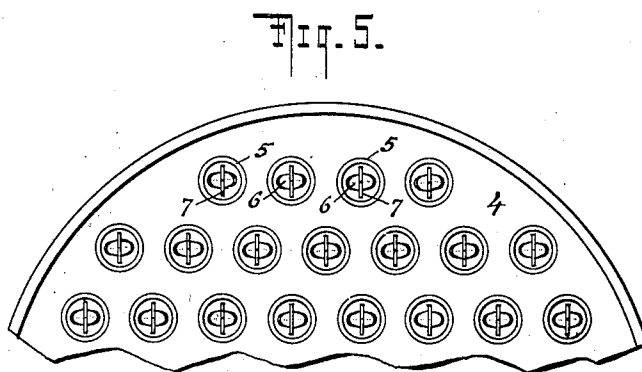
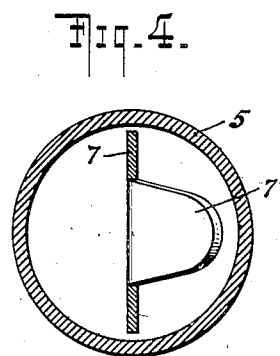
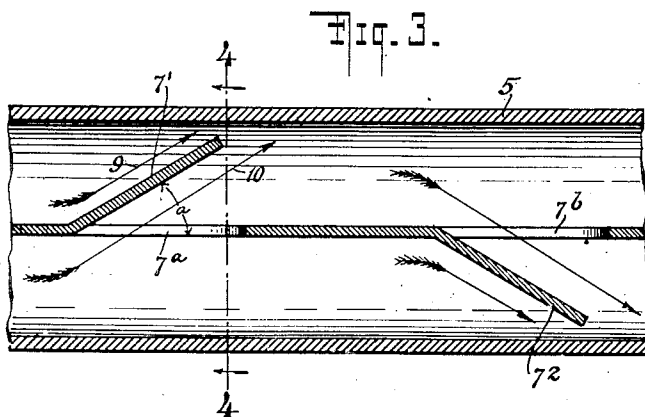
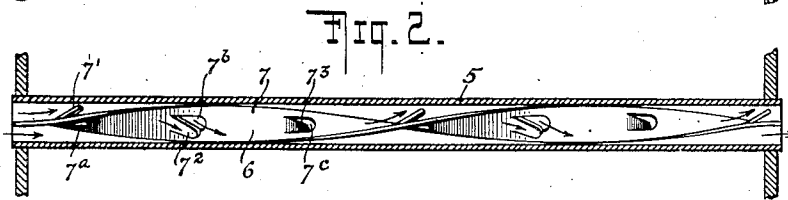
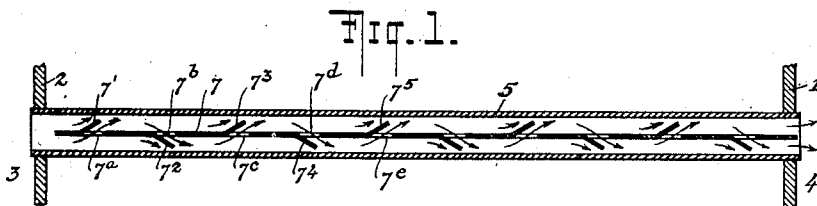


H. SEGELKEN.
RETARDER FOR FLUE TUBES.
APPLICATION FILED OCT. 26, 1912.

1,056,373.

Patented Mar. 18, 1913.



WITNESSES

G. V. Rasmussen
George Du Bon

INVENTOR

Henrich Segelken
BY
Biesen & Knauth
ATTORNEYS

UNITED STATES PATENT OFFICE.

HEINRICH SEGELKEN, OF BREMERHAVEN, GERMANY, ASSIGNOR OF ONE-THIRD TO FRANZ KÜWNICK, OF HOBOKEN, NEW JERSEY, AND ONE-THIRD TO HERMANN BEYERSDORFF, OF BREMERHAVEN, GERMANY.

RETARDER FOR FLUE-TUBES.

1,056,373.

Specification of Letters Patent.

Patented Mar. 18, 1913.

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To all whom it may concern:

Be it known that I, HEINRICH SEGELKEN, a subject of the German Emperor, and a resident of Bremerhaven, Germany, have invented a new and useful Improvement in Retarders for Flue-Tubes in Steam-Boilers, of which the following is a specification.

My invention relates to retarders for the flues or smoke tubes of steam boilers *i. e.*, to devices to be introduced into said flue tubes for the purpose of retarding or slowing the progress of the combustion gases through said tubes in such a manner as to cause said gases to yield up their heat units more completely to the flue tube walls and to the water in contact therewith than would be the case were the retarder not used.

The preferred form of retarder constitutes a sort of screw within the flue tube and comprises a strip of sheet metal twisted about its axis and inserted in the flue tubes. It thus converts the straight flue channel into two semi-circularly sectioned channels spirally twisted upon one another and each having a length substantially greater than that of the flue tube itself. Retarders of this description do not, however, fully meet the requirements of maximum efficiency and to that end are constructed as hereinafter more particularly described.

The object of my invention is to provide a retarder which shall not only slow the combustion gases in their progress through the tube so as to secure the greater absorption of heat units due to an extended time-contact of the hot gases with the walls of the tube, but also to provide a means of mixing the gases together during their progress through the tube so as to secure a better "after burning" of the gases, or, in other words, a better and more complete combustion of the gases as they pass through the tube. More particularly, my invention has for its object to bring about such mixing by means of the construction of the twisted strip retarder above referred to.

A further object of my invention is to provide a retarder in which both the retarding function and the mixing function may be adjusted at will to suit different types of boilers or different conditions of running for the same boiler.

My invention will be better understood by referring to the accompanying drawings in which—

Figure 1 shows a horizontal central longitudinal section through a single flue tube of a steam boiler, the retarder being shown as a flat strip to illustrate the course of the gases through the tube; Fig. 2 represents a plan view of my retarder, the strip being shown in its twisted form; Fig. 3 represents an axial horizontal section through a flue tube as shown in Fig. 1, on a greatly enlarged scale; Fig. 4 represents a transverse section taken along the line 4—4 of Fig. 3; and Fig. 5 represents, in elevation, part of the end of the boiler taken from the smoke box end and showing flue tubes provided with my retarder.

Referring to the drawings, 1 is the front tube sheet and 2 the rear tube sheet of a flue tube boiler; 3 the fire box end and 4 the smoke box end; 5 a flue tube running from front to rear tube sheet and connecting the fire box and smoke box; and 6 a preferred form of my improved retarder within the flue tube.

The retarder 6 is of metal, preferably sheet iron, and comprises a straight strip of length (after twisting) substantially that of the flue tube and width substantially equal to the internal diameter of said tube and so dimensioned that it can be readily inserted and withdrawn. Spaced centrally along the strip are ears 7', 7², 7³ etc. alternately pressed toward opposite sides of the strip so as to make a suitable angle *a* with said strip. These ears are punched out from the strip so that each ear leaves an opening 7^a, 7^b, 7^c etc. in said strip. The exact dimensions and configuration of these ears relative to the strip and to the flue tube may be varied to suit conditions, but I find that ears of the general relative dimensions and of the shape shown are satisfactory.

The ears 7', 7², 7³ etc. may be punched from the strip in any usual way after which the strip is given a suitable uniform twist about its central longitudinal axis. It is cut off to have a length substantially equal to the flue tube and inserted within said tube.

To secure the best results the edge of the retarder end at the smoke box end should

be vertical as seen in Figs. 2 and 5; the gases from the two spiral channels of the flue tube will thus emerge from the tube and ascend in the smoke box with equal ease. Preferably the edge of the retarder end at the fire box end should also be vertical to split the gases vertically and not horizontally whereby they are divided into two approximately equal currents.

The operation of my invention is as follows: The gases entering the flue tube from the fire box are divided by the strip 7 and pass through the tube, part on one side of said strip and part on the other. The gases on the one side (Fig. 3) travel parallel to the axis of the tube save for the twist due to the twist of strip 7 until they reach the first ear 7' when they are deflected toward the wall of the tube, as indicated by the arrow 9; the gases are crowded over the end and around the edges of the gear 7' but retarded, while on the other side of said ear there will be established, according to well known principles, a region of relative rarefaction or lowered pressure. The gases entering the flue tube on the other side of the strip 7 when they reach the first opening 7^a will, owing to the low pressure region or suction adjacent to the ear 7', in part flow through said opening as indicated by arrow 10 to mingle with the gases which have passed over the first ear 7', on the first named side of the strip; and in part continue on to the second ear 7² where they will, in turn, be deflected toward the wall of the flue tube and be joined by and mixed with gases passing through the second opening 7^b from the first named side of the strip. And as the gases continue to flow through the flue tube, this alternate to and fro movement of the gases across the strip through the openings and consequent repeated mixing of the divided streams will also continue until they emerge into the smoke box. This constant mixing of the gases tends to effect their more perfect combustion as they pass through the tube. The deflecting ears, also, bring the gases more perfectly in contact with the walls of the flue tubes so that the heat units are more completely absorbed thereby. The retardation of the gases due to the ears as well as that due to the twist also tends to a more complete yielding up of the heat units in the gases to the flue tube walls. To secure the best results, the angle α between ears and strip should be suitably adjusted by bending the ears away from or toward the strip. Should too much steam be generated, the angle should be increased, and should too little steam be generated, the angle should be decreased. Similarly, the amount of twist per unit length of retarder may be altered, if desired.

Preferably, all the flue tubes should be provided with retarders if the maximum ef-

iciency is to be obtained. In practice, in first adjusting the retarders to a given boiler, however, I find it well to omit retarders from one or two lower rows of flue tubes until a good adjustment of the retarders has been effected, whereupon all the tubes are filled with such adjusted retarders. When running under forced draft, the retarders may be removed from the lower rows, but restored when forced draft is no longer used. These retarders are particularly adapted for marine boilers but can be profitably employed in any boiler of the flue tube type.

In practical use, I have secured by the use of these retarders a reduction, in the case of an Atlantic liner of about 60 tons of coal per 24 hours, for the same or rather an increased production of steam as compared with the coal consumed using a retarder without the ears and openings. The heat at the smoke box was simultaneously reduced by about 75° C.

I claim:

1. In a boiler, a flue tube provided with a central wall to form a pair of passages for the fire gases, retarding means projecting from said wall for the gases in each passage, and means for causing some of the gases in each passage to pass through the walls thereof behind the retarding means so as to mix with gases of the other passage.

2. In a boiler, the combination of a flue tube, and a strip inclosed by said tube, said strip being provided with a plurality of spaced projecting ears and also with openings adjacent to and partially overlapped by said ears for the purpose described.

3. In a boiler, the combination of a flue tube, and a strip inclosed by said tube, said strip being provided with a plurality of spaced ears alternately projecting toward opposite sides and being also provided with a plurality of openings located immediately behind said ears.

4. In a boiler, the combination of a flue tube and a spiral strip inclosed by said flue tube, said strip being provided with a plurality of spaced openings and ears adjacent thereto projecting toward opposite sides and adjustably united with said strip.

5. In a boiler, the combination of a flue tube and a spiral strip inclosed by said flue tube, said strip being provided with a plurality of spaced openings and ears adjacent thereto, projecting toward opposite sides in the same general direction as defined by the passage of the gases through the tube.

6. In a boiler, the combination of a flue tube and a spiral strip inclosed by said flue tube, said strip being provided with a plurality of spaced openings and ears adjacent thereto, projecting toward opposite sides in the same general direction as defined by the

passage of the gases through the tube, the end edges of the strip standing vertically in the tube.

7. As an article of manufacture a re-
5 tarder comprising a metallic strip provided with ears disposed along said strip projecting alternately from opposite sides thereof the base of said ears rising from an imperforate part of said strip and the free end of
10 said ears terminating within the confines of an imaginary circle of which the width of the strip is a diameter and a series of perforations, one for each ear, said perforations

lying on corresponding sides of said ears relatively to the length of the strip, the arrangement being such that the ears are located between an imperforate and a perforated part of the strip. 15

In testimony whereof I have hereunto set my hand in the presence of two subscribing 20 witnesses.

HEINRICH SEGELKEN.

Witnesses:

JOS. F. BUCK,

HEINRICH SCHMEDEN.