To all whom it may concern:

Be it known that I, Einar A. Winholt, a citizen of the United States, residing at Moline, in the county of Rock Island and State of Illinois, have invented certain new and useful Improvements in Baffle Walls for Boilers, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to baffles for boilers, particularly boilers of the water tube type, and pertains to the means installed between the tubes to form the baffle or baffles. As is well known, water tube boilers are provided with a considerable number of tubes arranged for water to circulate through, the tubes being situated for the passage therearound of the hot gases generated in the combustion chamber of the boiler. While these tubes are positioned in staggered relation to each other, with respect to vertical planes, to present a maximum circumferential tube surface to the hot gases flowing through the boiler, it has been found that more of the heat can be extracted from the gases and the efficiency of the boiler materially increased by providing... The usual practice is to build lattice-like walls to retain the plastic material by inserting wooden strips between the tubes and interlacing them, but such forms are insecure, bulge under the weight and pressure of the plastic material, molding a baffle that is of uneven thickness, using an excess of the heat resisting material, and where bulges occur the baffle is unduly thick and more of the length of some of the tubes are covered than is desirable. Such a form also leaves a rough imprint on the faces of the baffle, which acts to retard the proper flow of the gases and, furthermore, as such forms cannot be built tight and to closely fit around the tubes, the plastic material leaks through openings in the forms and causes gaps in the baffle through which the hot gases afterward leak and lessen the efficiency of the baffle.

My invention comprises peculiarly shaped blocks that can readily be installed between the tubes at the time the tubes are built into the boiler, the shape of the blocks being such that they not only fit closely around the tubes to form a substantially imperforate wall in a plane that intersects the longitudinal axes of the tubes, but are sustained in position by their contact with each other and their engagement with the tubes. The blocks may be made of heat resisting material and installed to form the permanent baffle, or if a poured baffle is preferred the blocks may be made of a combustible material and installed to serve as forms to hold a plastic heat resisting material until the latter becomes dry, the forms burning away when the boiler is fired.

My invention has for its object the provision of means to be employed in connection with the construction of a baffle for water tube boilers, and with which means a baffle may be formed that will fit the tubes closely; that will be of uniform thickness; that will have smooth faces and that can be economically installed.

Referring to the accompanying drawings in which like numbers indicate similar parts:

Figure 1 is a vertical longitudinal section of a conventional water tube boiler, provided with baffles;
Figure 2 is an enlarged detail of a transverse section of a portion of one of the baffles illustrating one application of my invention;

Figure 3 is an elevation of Figure 2; and Figures 4 and 5 are perspective views of blocks exemplifying my invention.

Referring to Fig. 1, 10 indicates the side walls, 11 the front wall, 12 the rear wall, 13—14 transverse partition walls, all of masonry and comprising the usual setting for boilers of the water tube type. The side walls are provided with suitable clean-out openings 15, and the front wall with the usual fuel opening 16 leading into the combustion chamber 17, formed between the side walls, the end wall 11, and the partition wall 13, and above the fire grate 18.

The usual water and steam drum 19 is suspended by hangers 20—20 from steel beams 21—21 which are supported by suitable uprights (not shown) that are built into the masonry setting described. Depending from the drum 19 are pipes 22—22 which support the tube headers 23—23, into which are secured the ends of the water tubes 24, of which there are a considerable number, the latter being positioned over the combustion chamber 17 and inclined longitudinally relative to the horizontal, the arrangement being such that a circuit is established for the circulation of water through the tubes, headers, connections and drum, in a manner that is well understood.

Water is supplied to the boiler through a suitable fixture 25 and steam is taken off through a fixture 26. The blow off fixture is indicated at 25° and the safety valve at 26°.

As best seen in Figure 3, the tubes 24 are arranged in staggered tiers, the object in so arranging them being to present as much tube surface as possible to the passage of the hot gases rising from the combustion chamber, but as previously mentioned the tubes will absorb more of the temperature from the gases resulting from combustion, and the efficiency of the boiler be accordingly increased, if baffles are provided to cause the gases to travel a serpentine path and cross the tubes more than once while flowing through the boiler.

Figure 1 presents an example of how baffles may be employed to cause a triple pass of the gases across the tubes, the baffles being indicated by the numerals 27—27. It will of course be understood that the point in the boiler at which a baffle is located, its dimensions, and the position it occupies, will be governed by the ideas of the engineer designing the boiler who will take into account the size of the boiler, its particular design, etc., in determining these matters.

With certain governing factors known, namely, the diameter of the tubes, the distance between tube centers, and the pitch or angle at which a baffle is to stand relative to planes perpendicular to the walls of the tubes, my invention may be put into practice.

To practice my invention blocks 28 are employed. In height these blocks equal the distance between a plane passing through the centers of the tubes of one tier and a plane passing through the centers of the tubes of the next adjacent tier, and in width they equal the distance from the center of one tube of a tier to the center of the next tube of the same tier, both dimensions being determined by measurements taken in a plane to be occupied by the face of the baffle.

The blocks 28 have recesses 29 formed in their sides to a depth equal to the radius of the tubes 24, and the walls 30 of these recesses are shaped to have surfaces that conform to the surface of the cylindrical tubes along the line of contact therewith of said blocks in order that the walls 30 of the recesses in the blocks will fit snugly against the exterior surface of the cylindrical tubes throughout the whole thickness of the blocks. It will be understood that as the baffle is usually built so that it occupies an inclined position with relation to the longitudinal axes of the tubes, as clearly shown in Fig. 1, it is necessary that the surfaces of the walls 30 be inclined so that they will lie parallel with the tubes and fit closely against them throughout the full thickness of the body member. By this construction the blocks have broad contact with the tubes, thereby giving a stable support and besides the wall as a whole is made more nearly impervious to the passage of the gases, and, when the blocks are used in constructing a form or mold for making a poured baffle wall leakage of the plastic material from between the form is prevented. The top and bottom edges of the blocks 28 are provided with interlocking surfaces, such for example as the tongue 31 and groove 32 best seen in Figure 4; and if desired the abutment portions of the side edges of the blocks may also be provided with similar interlocking surfaces as indicated in Figure 5.

As the tubes 24 are built into place in the boiler, the blocks 28 are installed therebetween and as best seen in Figure 3 it will be noted the side edges of the blocks of one course are aligned with the centers of the blocks of adjoining courses, thus breaking the vertical joints between the blocks installed between the series of tiers of tubes. When the blocks 28 are installed in the manner mentioned, they form a continuous interlocking self-sustaining wall in a plane that intersects the longitudinal axes of the tubes and that fits the tubes closely and maintains its desired position.

The baffle formed by the blocks 28 is usu-
ally positioned in the boiler to engage with a partition wall, as indicated in Figure 1, and the ends of the baffle usually fit against the side walls of the boiler setting, but the precise location of the baffle in the boiler and its relation to the boiler setting, are details governed by the design of the particular boiler in which a baffle is to be installed.

If the permanent baffle wall is to be composed of the blocks 28 themselves, I make the blocks of a heat resisting material, such as fire clay, and in such cases I preferably make the blocks relatively thick as shown in Figure 5; but if a poured baffle wall is desired I make the blocks relatively thin, as indicated in Figures 2 and 4, and of a combustible material, for instance wood, and install two sets of blocks between the tubes, building walls that are spaced apart a distance corresponding to the thickness desired for the baffle, (see Figure 2,) these walls serving as a form or mold to hold the plastic heat resisting material that is employed to make the permanent baffle, the form burning away when the boiler is fired.

It will be understood that when a form or mold is installed for an inverted baffle like that shown in connection with the partition wall 14, the space between the walls at the bottom of the form is boarded over or closed in any suitable manner to retain the plastic material within the walls of the form. The term “baffle wall” as used herein is intended to comprehend a wall constructed of the blocks described either as a permanent baffle wall, or one used in making a form for the construction of a permanent baffle wall by pouring, as hereinbefore described.

What I claim is:
1. In a water tube boiler, the combination with the boiler tubes, of blocks adapted to be inserted between the tubes, the sides of said blocks recessed to receive one-half the circumference of the tubes, said recesses shaped to closely fit the tubes throughout the thickness of the blocks, the top and bottom edges of contiguous blocks provided with engaging means adapted to hold the blocks in position.
2. A baffle block adapted to be inserted between the tubes of a boiler, comprising in combination, the body member, recesses in the sides of the body member, said recesses shaped to receive one-half the circumference of adjacent boiler tubes, the top and bottom edges of the body member provided with holding means.
3. A baffle block adapted to be inserted between the tubes of a boiler, comprising in combination, the body member, the sides of the body member recessed to receive one-half the circumference of adjacent boiler tubes, said recesses shaped to fit the tubes the full thickness of the body member, the top and bottom edges of the body member provided with holding means adapted to engage with the top and bottom edges of contiguous blocks.

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