Sept. 1, 1931. B. B. WHITTAM 1,821,683

HEADER FOR WATER TUBE BOILERS

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Fig. 1

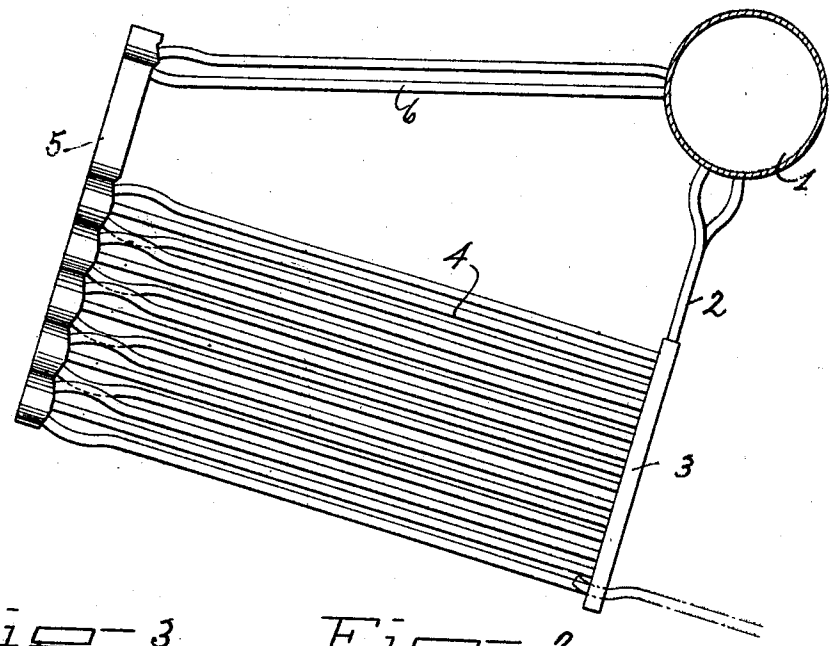
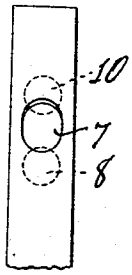


Fig. 3



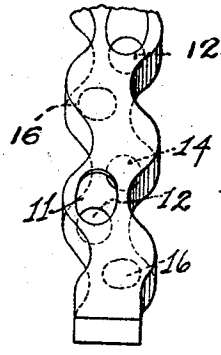
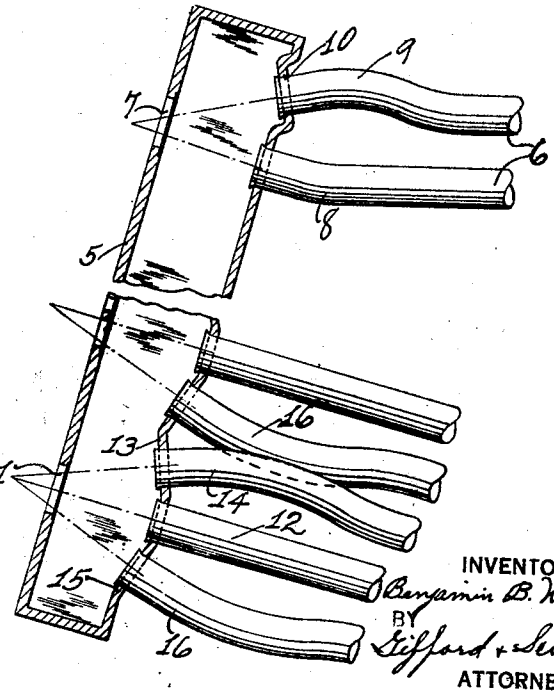


Fig. 2



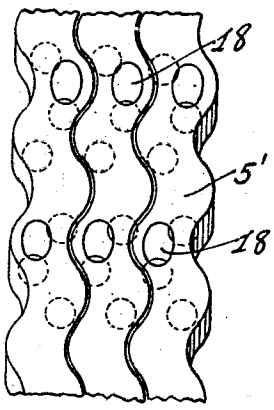
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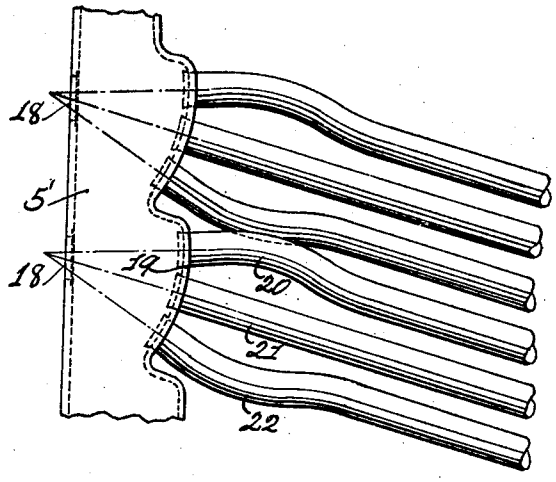
HEADER FOR WATER TUBE BOILERS

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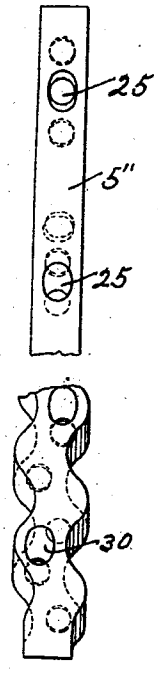
Fig—4



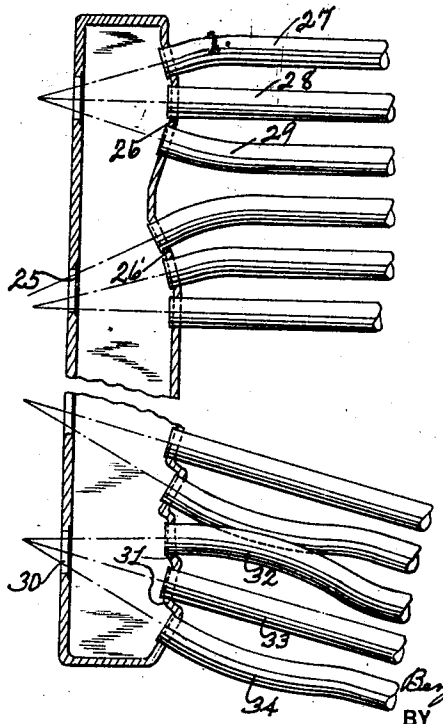
Fig—5



Fig—6



Fig—7



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UNITED STATES PATENT OFFICE

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HEADER FOR WATER TUBE BOILERS

Application filed December 10, 1927. Serial No. 239,059.

This invention relates to headers for water tube boilers in which the number of hand holes are greatly reduced below the number usually required in such headers. The invention will be understood from the description in connection with the accompanying drawings, in which Fig. 1 is a vertical section through an illustrative embodiment of the invention; Fig. 2 is a section on an enlarged scale through the header; Fig. 3 is a front view of the header; Fig. 4 is a front view of a modification; Fig. 5 is a side view corresponding to Fig. 4; Fig. 6 is a front view of another modification; and Fig. 7 is a section through the modification shown in Fig. 6.

In the drawings reference character 1 indicates the steam and water drum of a water tube boiler of a well known type. The water space of the steam and water drum 1 is connected by nipples 2 to downtake headers 3. A bank of inclined tubes 4 connects the downtake headers 3 to uptake headers 5 and rows of circulating tubes 6 connect the upper portions of the headers 5 to the steam space of the steam and water drum 1.

In the illustrative embodiment shown in Figs. 2 and 3 each one of the uptake headers 5 has a straight upper portion and a corrugated lower portion. The ends of the bank of tubes 4 are expanded into the corrugated portions of the headers 5. The uptake headers 5 are provided with a straight wall along the front side in which wall handholes are formed. The rear sides of the headers 5 are provided with stepped portions so that one handhole serves for a plurality of tubes for the purpose of inserting tube cleaners into the ends of the tube and also for the purpose of introducing expanders to expand the tubes in place in the wall of the header. The upper portion of each header 5 is provided with a single handhole 7 opposite the ends of the tubes 6. The ends of the tubes 6 are bent as shown at 8 and 9 so that the center line of the ends of these tubes will be directed toward the handhole 7 and pass through the same. The lower row of tubes 6 is so located with respect to the handhole 7 that a tube in this lower row can be expanded into its header without altering the position of that portion of the header wall. However, in order to permit the upper row of tubes 6 to enter the header wall perpendicular to the surface thereof the wall is stepped or bent as shown at 10 so that a line perpendicular to this portion 10 will pass through the handhole 7.

The lower or corrugated portion of each header 5 is provided with handholes 11, each one of which serves three tubes of the bank 4 of tubes. The middle tube 12 of each set of three tubes is straight and the center line thereof is in line with the corresponding handhole 11. The wall of the header opposite the handhole 11 is inclined as shown at 13 so that the bent upper end 14 of the upper tube of the set of three will enter the header at right angles to the wall and the projection of the center line of the end of this tube will be in line with the opening 11 as seen in Fig. 2. In a similar manner the portion 15 of the header 5 is bent or inclined in the opposite direction so that the bent end 16 of the lower tube of the set of three tubes will enter the header at right angles to the wall thereof and the projection of the center line of the end of this tube will also be in line with the opening 11 as seen in Fig. 2. This permits the three tubes to be expanded in place and be cleaned from a single handhole. The uppermost row of each set of three is offset with respect to the lowermost row of the next set so that the bent portions 14 and 16 of adjacent sets can overlap each other without interference, as most clearly shown in Fig. 2. Although the ends of the tubes are not exactly in line with the center of the openings 11, the projections of the center lines of the ends of the tubes if extended pass between the upper and lower edges of the openings 11 as shown in Fig. 2 and pierce an imaginary plane parallel to the wall of the header in which the holes 11 are located a short distance outside of the header between the transverse lines that are tangent to the upper and lower walls of the openings. The portions of the headers which connect the straight walls thereof with the walls into which the tubes are expanded are called the edges of the headers.

In the modification shown in Figs. 4 and 5 the handholes 18 in the corrugated portion

of the headers 5′ accommodate three tubes each. In this modification the opposite wall of the header is bent or formed as shown at 19 as a cylindrical surface formed on a cylinder whose axis lies a short distance outside of the holes 11. The middle tube 21 is straight and enters the cylindrical surface perpendicular thereto while the upper and lower tubes of headers 5′ are bent as shown at 20 and 22 to enter the cylindrical surface perpendicularly and with the center lines of the ends of all three tubes passing within the upper and lower limits of the handhole opening.

In the modification shown in Figs. 6 and 7 the straight portion of each one of the headers 5″ is provided with handholes 25 each one of which accommodates three tubes. The opposite wall of the header is bent or stepped as indicated at 26 so that the central tube 28 can be left straight and enter perpendicularly in line with the opening 25, while the ends of the adjacent tubes of the set are bent, as indicated at 27 and 29, to enter the wall perpendicularly and have their central lines directed toward the opening 25. The portion 26′ of the wall of the header 5″ is shaped slightly differently so that the lowermost tube can be straight, while the other two are bent, and all enter perpendicularly with their center lines passing through the opening 25.

The lower or corrugated portion of each header 5″ is provided with handholes 30, each one of which accommodates three tubes. The opposite wall of the header is stepped as indicated at 31 to provide surfaces into which the straight central tube 33 enters perpendicularly and the adjacent bent ends 32 and 34 of the other tubes also enter perpendicularly to the surface with the center lines of the ends of the tubes passing within the upper and lower limits of the corresponding opening 30.

By the present invention a large number of handholes are dispensed with in uptake headers, and the tubes can all be taken out through the handholes in the downtake headers, as illustrated in dotted lines in Fig. 1 for one of the tubes.

I claim:

1. A header, handholes provided in one side thereof, tubes entering the opposite side of said header spaced longitudinally along said header from each other, the ends of a plurality of longitudinally spaced tubes being bent in opposite directions and pointing towards each handhole.

2. A header, handholes provided in one side thereof, tubes entering the opposite side of said header spaced longitudinally along said header from each other, the ends of a plurality of longitudinally spaced tubes being bent in opposite directions and pointing towards each handhole and entering the side of said header perpendicularly.

3. A header, handholes provided in one side thereof, tubes entering the opposite side of said header spaced longitudinally along said header from each other, the center lines of the ends of a plurality of longitudinally spaced tubes crossing a plane parallel to said first named side near said handholes on a line at right angles to the edges of said header.

4. A header, handholes provided in one side thereof, the other side of said header being stepped to provide a plurality of surfaces facing each of said handholes, said surfaces being located along said header on opposite sides of lines perpendicular to the side in which said handholes are located and each of said surfaces being provided with a tube seat.

5. A header substantially rectangular in cross section, handholes provided in one side thereof, tubes entering the opposite side of said header spaced longitudinally along said header from each other, the ends of a plurality of longitudinally spaced tubes pointing towards each handhole.

6. A header having a flat straight side, handholes provided in said side, tubes entering the opposite side of said header spaced longitudinally along said header from each other, said tubes being divided into sets of longitudinally disposed tubes, each set having the ends of its tubes pointing towards a single handhole.

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