T. T. PARKER.

STEAM SUPERHEATER.

APPLICATION FILED APR. 23, 1918.

1,283,550.

Patented Nov. 5, 1918.

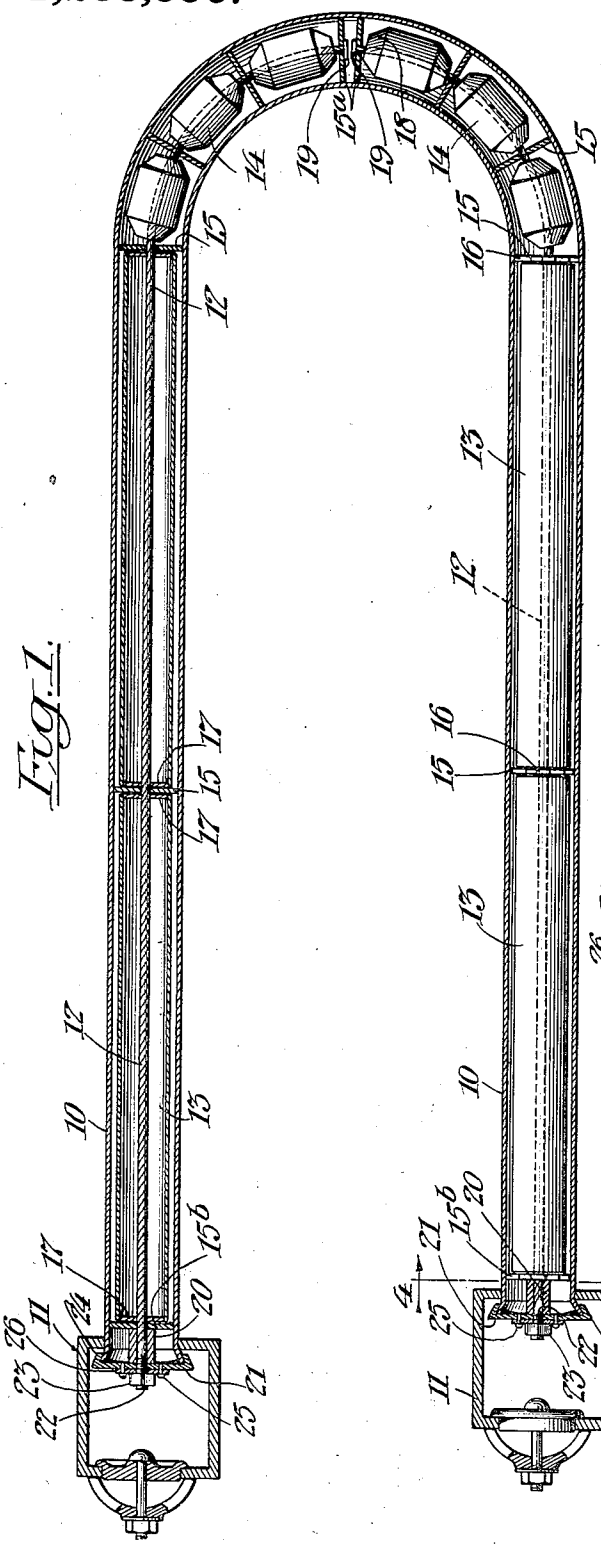


Fig. 1.

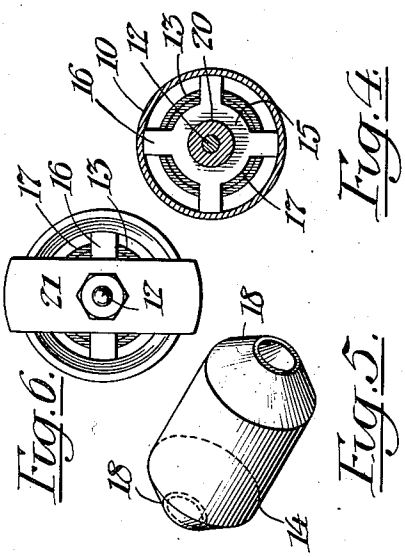


Fig. 4.

Fig. 5.

Fig. 6.

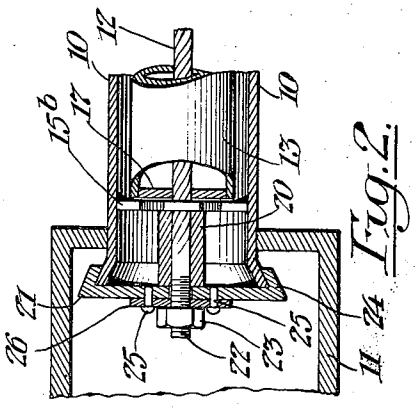


Fig. 2.

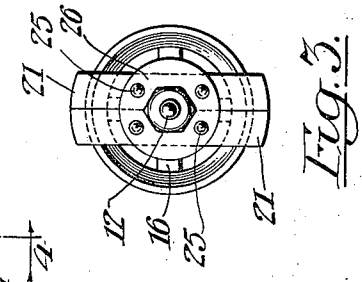


Fig. 3.

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STEAM-SUPERHEATER.

1,283,550. Specification of Letters Patent. Patented Nov. 5, 1918.

Application filed April 23, 1918. Serial No. 230,281.

To all whom it may concern:

Be it known that I, THOMAS T. PARKER, a citizen of the United States, and resident of the city of New York, borough of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Steam-Superheaters, of which the following is a specification.

This invention relates to that class of steam superheaters wherein curved or bent superheater tubes are employed; having reference more especially to a core structure whereby the inner capacity of the said tubes is reduced while maintaining the area of their inner surfaces.

Heretofore such core structures have been applicable solely to straight superheater tubes or to the straight legs only of curved superheater tubes; for the reason that such structures comprised rigid inflexible sections incapable of conforming to the curved or bent portions of the tubes, which portions, in many types of superheaters, are exposed to the furnace heat of highest temperature.

The object of my invention is to provide for superheater tubes a flexible core structure of simple and efficient construction which can be readily applied to and throughout the entire length of the tubes including the curved or bent portions thereof.

My invention, generally stated, comprises a flexible supporting element, preferably a wire cable, a succession of separable core sections strung longitudinally thereon, and separable spacing members interposed between adjacent sections and adapted to contact with the walls of the tube and thus maintain the said supporting element and its core sections centrally of the tube.

The invention also comprises means whereby the flexible core structure is removably attached to the superheater tube.

The invention also comprises novel features of construction and combinations of elements which will be hereinafter described and claimed.

In the drawings—

Figure 1 is a longitudinal section of a steam superheater tube and its headers, showing my improved core structure partly in section and partly in elevation.

Fig. 2 is an enlarged section of one end of a superheater tube, the adjacent portion of the flexible core, and its end connections with the tube.

Fig. 3 is an end elevation of said tube and core connections.

Fig. 4 is a transverse section of the structure, as on the line 4—4 of Fig. 1.

Fig. 5 is a perspective view of one of the core sections for entry in the curved or bent portion of the tube.

Fig. 6 is a view similar to Fig. 3, showing a modified form of attachment for the core structure.

In the drawings I have illustrated my invention as applied to a superheater tube, 10, of U-form, although it is to be understood that the invention is equally applicable to other types of superheater tubes. The ends of the tube are connected as usual with headers 11 having suitably-disposed hand holes whereby access can be had to the respective tube ends for the purpose of applying the flexible core structure to or withdrawing it from the tube. In the present instance two counterpart core structures are employed; the same extending through the length of the respective legs of the tube and meeting within the curved end portion of the latter.

Each of these core structures comprises a flexible supporting element, preferably an ordinary wire cable 12, extending longitudinally of the tube; a succession of centrally-perforated core sections 13, 14 strung on the cable, and centrally-perforated spacing disks 15 also strung thereon between adjacent sections; said disks having peripheral projections 16 (similarly to a spider) which are adapted to contact with the inner wall of the tube and thus maintain the cable centrally of the latter, thereby supporting the core sections in spaced relation to the inner wall of the tube. The steam flowing through the annular space thus provided within the tube absorbs the maximum heat from the wall of the tube and attains a high degree of superheat, and at the same time such steam by its intimate contact with the tube wall serves to protect the latter from the destructive action of the furnace heat.

The sections 13 are preferably cylindrical tubes closed at their ends by heads 17, and the sections 14 are shorter tubes having contracted or reduced end portions 18 which permit the flexure of the series of shorter tubes. A spacing disk 15^a is secured to one end of the cable, preferably by spot welding the extremity of the latter to said disk, as indicated at 19. A series of short sections 14

alternating with disks 15 are then strung on the cable and moved toward the end disk; a series of the longer sections 13, with alternating spacing disks 15, are then strung on the cable and moved toward the shorter sections until a close assemblage of the units is effected. In the present instance two long sections 13 and three short sections 14 are employed; but of course the number of each may be varied to meet specific requirements.

Preferably a separate spacing disk 15^b is applied to the end of the cable adjacent the outer large section 13, and a bushing 20 is interposed between said disk and a bridge member 21 through which the end of the cable extends; the strands of such cable end being spot welded, or otherwise amalgamated, and screw threaded, as at 22, for the reception of a nut 23.

The member 21 is preferably made in two parts having beveled end flanges 24 which can be readily slid into interlocking engagement with the flared end of the superheater tube, said parts being held together by studs 25 projecting from a retaining washer 26 into suitably-disposed perforations in the respective parts of the member. When the flexible core structure is inserted into the superheater tube, the parts of the member 21 are manually positioned upon the flanged end of the tube; the studs on the washer are then entered into the perforations of such parts, and the nut is finally screwed up, thereby locking the structure to the end of the superheater tube and at the same time retracting the cable so as to take up the spaces between the articulated core units and secure them in close relation to each other within the tube. To remove the core structure the nut is released and the above described operation is reversed.

When the flexible core structure is applied to the superheater tube as above described, the succession of short sections 14 readily conform to the bend or curvature of the tube, such sections, together with the sections 13 in the straight portion of the tube being maintained in spaced relation to the tube wall by the centralizing action of the spacing disks as previously mentioned.

If desired a single core structure for the entire length of the superheater tube may be employed, in which case a single central cable of double length will be used, said cable being equipped throughout its length with short core sections or with suitably-disposed short and long sections, as desired, and the extremities of such cable being secured to the respective ends of the superheater tube.

When a single core structure is employed I prefer to use at each end of the superheater tube the modified form of end attachment shown in Fig. 6, wherein the bridge member 21 is composed of a single piece and the retaining washer is omitted. By manipulating the nuts at the respective ends of the cable the latter is drawn taut and the structure is thus securely held within and longitudinally of the tube.

It is to be understood that I do not limit my invention to the specific details of construction herein disclosed as the same may be modified within the principle of the invention and the scope of the appended claims.

I claim—

1. In a core structure for superheater tubes, a flexible supporting element, a series of cylindrical core sections centrally strung thereon, said sections being of less diameter than the interior of the tube, and spacing members strung on said element between adjacent sections, said members having peripheral portions adapted to bear against the inner wall of the tube and at intervals maintain the flexible supporting element centrally of the tube.

2. In combination with a superheater tube having a curved portion, a flexible core structure within said tube, and its curved portion, said structure comprising a flexible supporting element extending longitudinally of the tube, a series of cylindrical core sections centrally strung on said element, said sections being of less diameter than the interior of the tube, and spacing members strung on said element between adjacent sections, said members having peripheral portions bearing against the inner wall of the tube and at intervals maintaining the flexible supporting element centrally of the tube.

3. The combination with a superheater tube having a curved portion, of a flexible core structure within said tube, said structure comprising a flexible supporting element extending longitudinally of the tube, a series of separable core sections strung on said element, the sections within the curved portion of the tube having contracted ends, and separable spacing members interposed between adjacent sections.

4. The combination with a superheater tube having a curved portion, of a flexible core structure within said tube, said structure comprising a flexible supporting element extending longitudinally of the tube, a series of straight core sections strung on said element, a series of sections having contracted ends also strung on said element, and separable spacing members interposed between adjacent sections.

5. The combination with a superheater tube, of a supporting element therein extending longitudinally thereof, a series of separable core sections strung on said element, separable spacing members interposed between adjacent sections, an additional spacing member adjacent the open end of the

tube, a bridge member on said open end through which one end of the said supporting element extends, a bushing on said element interposed between said bridge member and said additional spacing member, and a lock device on the extremity of the supporting element.

6. The combination with a superheater tube, of a supporting element therein extending longitudinally thereof, a series of separable core sections strung on said element, separable spacing members interposed between adjacent sections, an additional spacing member adjacent the open end of the tube, a two-part bridge member on said open end through which one end of the said supporting element extends, a bushing on said element interposed between said bridge member and said additional spacing member, retaining means for the parts of the bridge member, and a lock device on the extremity of the supporting element.

7. The combination with a superheater tube, of a flexible supporting element therein extending longitudinally thereof, separable core sections strung on said element, separable spacing members strung on said element in alternation with said sections, said members having peripheral projections which bear against the inner wall of the tube and maintain the said element centrally of the tube, and means for longitudinally adjusting said element and securing an extremity thereof at an end of the superheater tube.

8. In a core structure for superheater tubes, a flexible supporting element, a spacing member secured to one end of said element, a series of relatively short core sections strung on said element, one of said sections being in contact with said spacing member, and other spacing members strung on said element in alternation with said sections.

9. In a core structure for superheater tubes, a flexible supporting element, a spacing member secured to one end of said element, a series of relatively short core sections strung on said element, longer core sections strung on said element, and separable spacing members strung on said element in alternation with the core sections.

10. In a core structure for superheater tubes, a flexible supporting element, long and short core sections strung on said element, and separable spacing elements strung on said element between adjacent sections.

Signed at the city of New York, in the county and State of New York this 19th day of April A. D. 1918.

THOMAS T. PARKER.