No. 782,489. PATENTED FEB. 14, 1905.

F. J. COLE.

STEAM BOILER SUPERHEATER.

APPLICATION FILED DEC. 2, 1904.

2 SHEETS—SHEET 1.

FIG. 1.

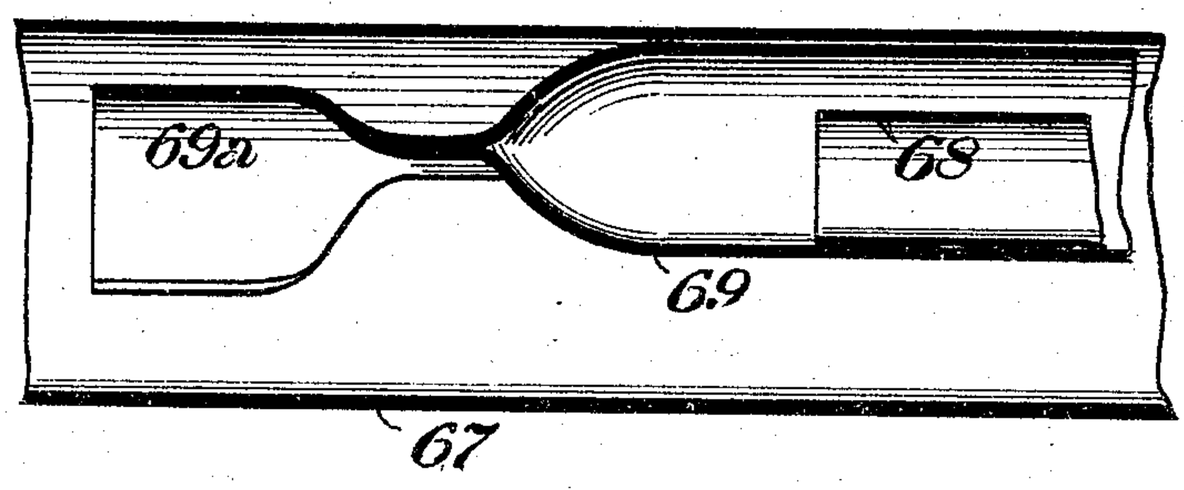


FIG. 2.

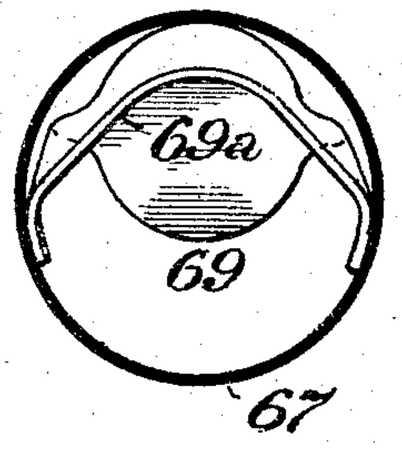


FIG. 3.

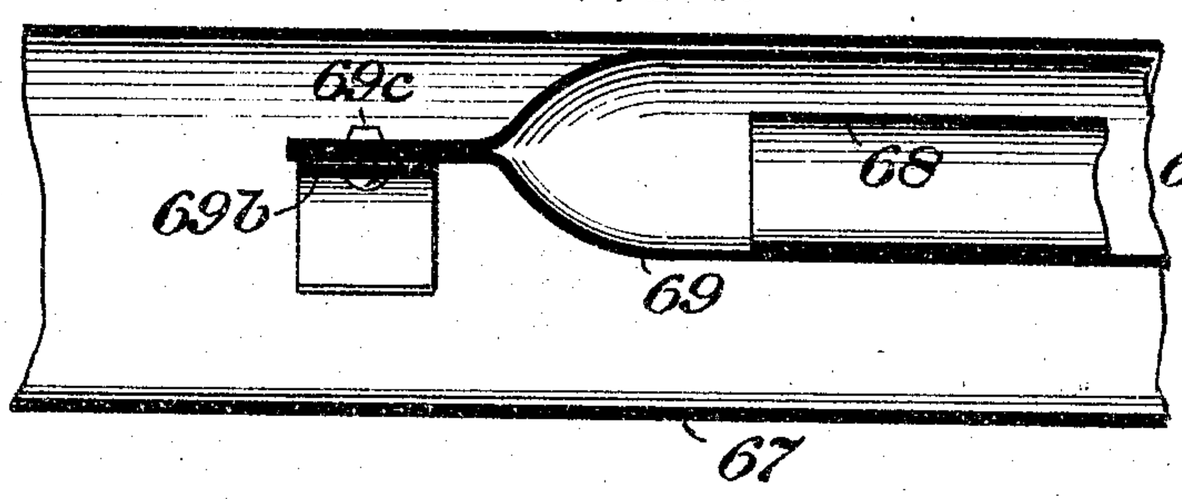


FIG. 4.

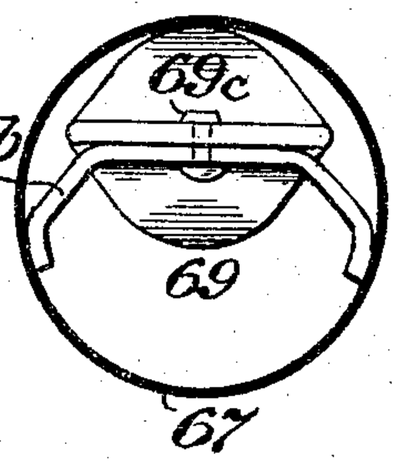


FIG. 6.

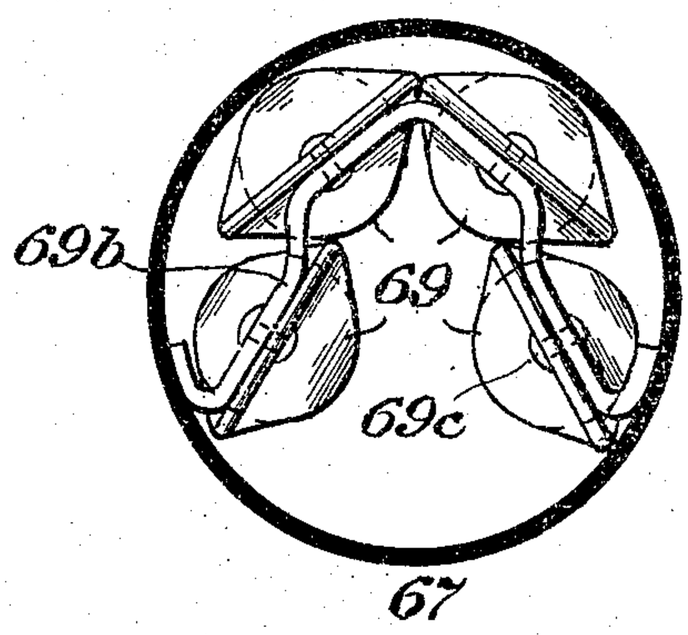
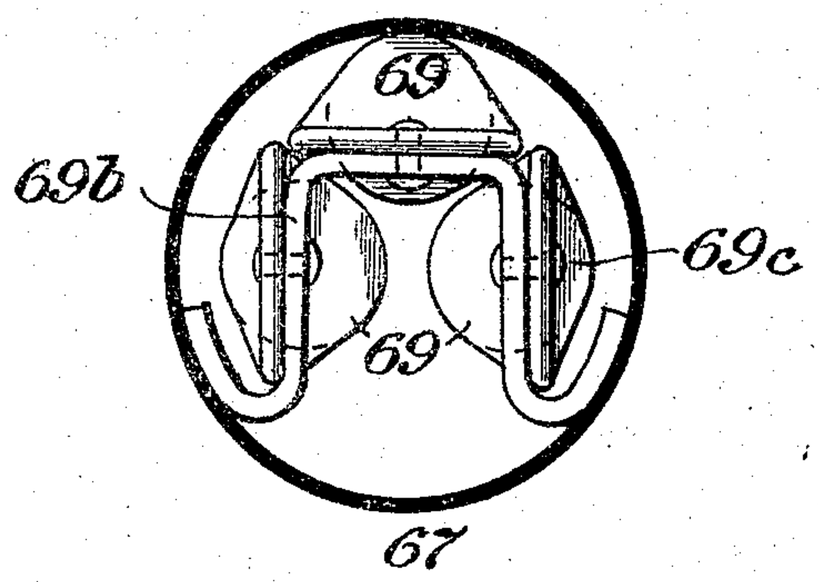


FIG. 5.



WITNESSES

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2 SHEETS—SHEET 2.

FIG. 7.

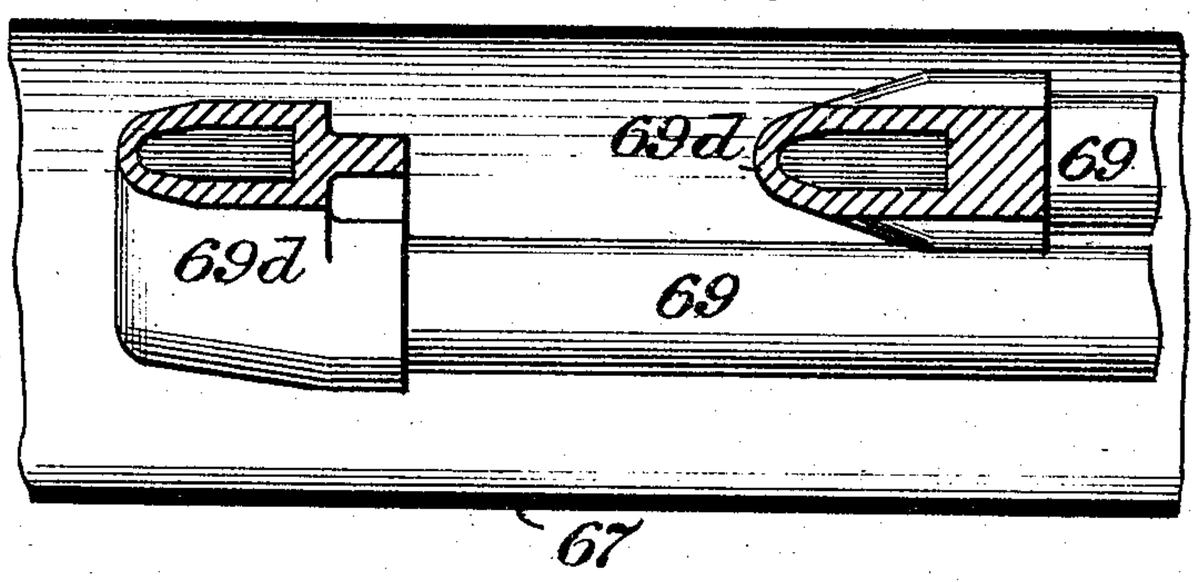


FIG. 8.

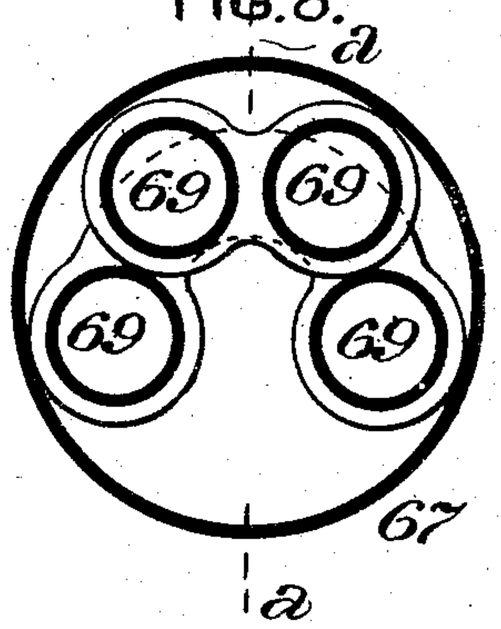


FIG. 9.

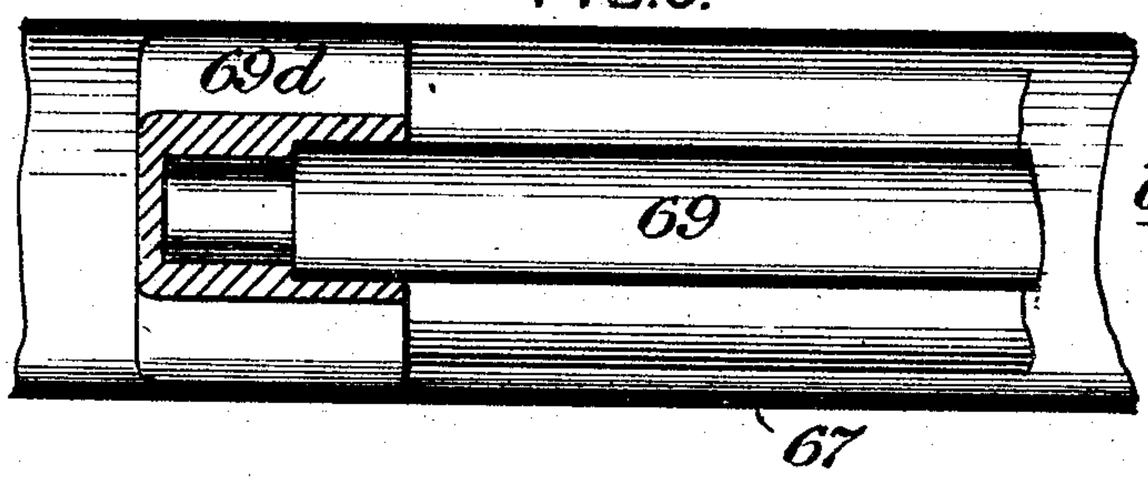


FIG. 10.

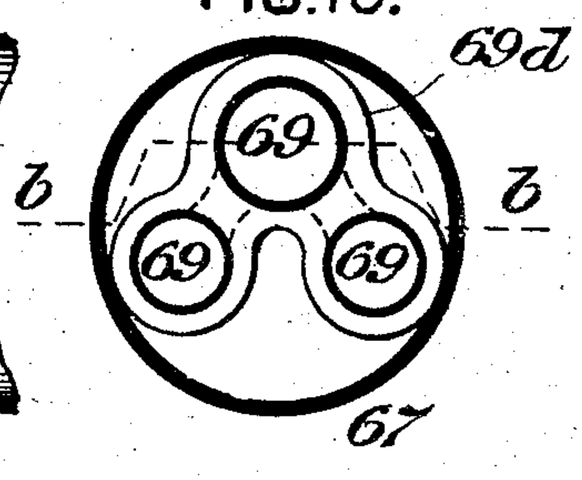


FIG. 11.

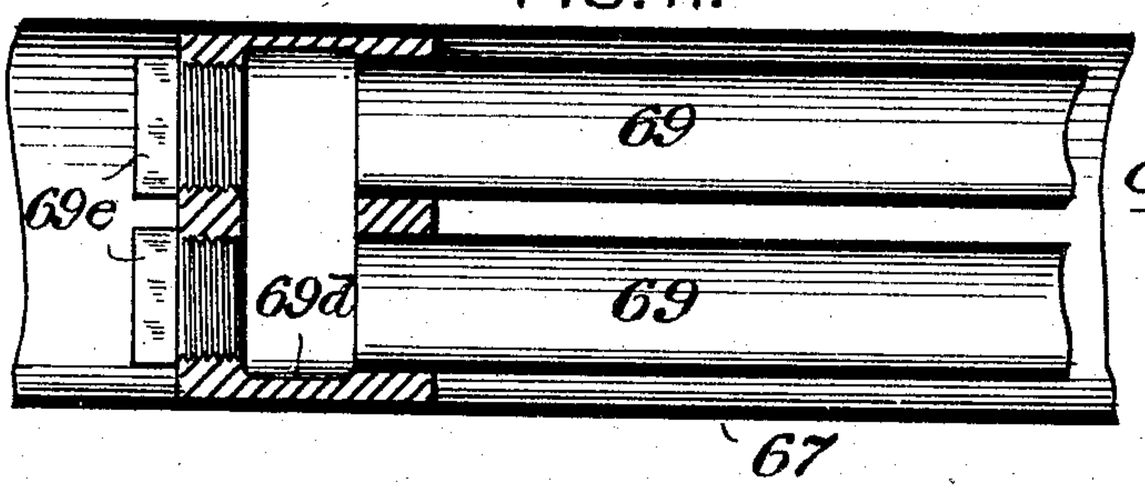
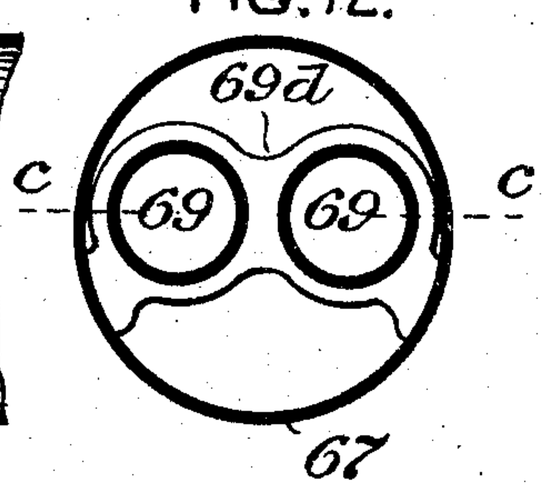


FIG. 12.



WITNESSES

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No. 782,489. Patented February 14, 1905.

UNITED STATES PATENT OFFICE.

FRANCIS J. COLE, OF SCHENECTADY, NEW YORK, ASSIGNOR TO AMERICAN LOCOMOTIVE COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

STEAM-BOILER SUPERHEATER.

SPECIFICATION forming part of Letters Patent No. 782,489, dated February 14, 1905.

Application filed December 2, 1904. Serial No. 235,179.

To all whom it may concern:

Be it known that I, FRANCIS J. COLE, of Schenectady, in the county of Schenectady and State of New York, have invented a certain new and useful Improvement in Steam-Boiler Superheaters, of which improvement the following is a specification.

My present invention relates to superheaters of the general class or type exemplified in Letters Patent of the United States No. 765,307, granted and issued to the American Locomotive Company as my assignee under date of July 19, 1904; and its object is to provide means whereby the rear ends of the superheater-pipes of appliances of such type may be supported within the superheating-tubes, so as to be held in normal position therein and to permit the traverse of the products of combustion from the fire-box to the smoke-box without obstruction of the lower portions of the tubes and consequent tendency to the clogging or filling up of the tubes with soot and cinders.

The improvement claimed is hereinafter fully set forth.

In the accompanying drawings, Figure 1 is a vertical longitudinal central section through a portion of one of the superheating-tubes of a locomotive-boiler and the rear ends of the superheater-pipes located therein, illustrating an application of my invention; Fig. 2, a transverse section through the superheating-tube, showing the outer superheater-pipe and its support in elevation; Fig. 3, a view similar to Fig. 1, illustrating a modification of structural detail; Fig. 4, a transverse section through the superheating-tube of Fig. 3, showing the outer superheater-pipe and its support in elevation; Figs. 5 and 6, transverse sections showing, respectively, three and four sets of superheater-pipes; Fig. 7, a vertical longitudinal section on the line *a a* of Fig. 8 through a portion of a superheating-tube containing four superheater-pipes; Fig. 8, a transverse section through the same; Fig. 9, a horizontal longitudinal section on the line *b b* of Fig. 10 through a portion of a superheating-tube containing three superheater-pipes; Fig. 10, a transverse section through the same; Fig. 11, a horizontal section on the line *c c* of Fig. 12 through a portion of a superheating-tube containing two superheater-pipes, and Fig. 12 a transverse section through the same.

Referring first to Figs. 1 to 6, inclusive, my invention is illustrated as applied in connection with an inner superheater-pipe 68 and an outer superheater-pipe 69, which are, as in Letters Patent No. 765,307 aforesaid, located and extend longitudinally in a superheating fire-tube 67, through which products of combustion pass from a steam boiler-furnace to an exit flue or stack, said outer and inner superheater-pipes being in the complete apparatus connected at their forward ends to a steam-supply pipe and to a steam-delivery pipe, respectively, in order that steam from the source of supply may traverse the superheater-pipes in opposite directions in passing to the delivery-pipe and in such traverse be superheated by the hot products of combustion which pass through the surrounding superheating-tube. The steam supply and delivery pipes do not in and of themselves constitute any part of my present invention, and therefore are not herein shown. The outer superheater-pipe 69 is closed at its rear end, or that nearer the fire-box, in any suitable manner, as shown in Figs. 1 and 3, by being welded together; but it will be obvious that, if preferred, its rear end may be closed by a plug. In order to avoid as far as possible tendency for the superheating-tube to be clogged by deposits of soot and cinders which may be entrained with the gaseous products of combustion which pass through it, it is desirable that as much free space as possible should be left in its lower portion and that the superheater-pipes should be so supported that the least practicable impediment shall be presented to the passage of the products of combustion through the superheating-tube. To this end I provide a bridge piece or support 69ª, which is fixed to the rear end of the outer superheater-pipe 69—that is to say, the end nearer the fire-box—and is curved on its opposite sides, so as to fit against the inner surface of the superheating-tube 67 on the side portions thereof

and entirely above an arc of the lower portion of its periphery extending for a substantial distance on each side of its vertical central plane, as, say, an arc of ninety degrees or more. The bridge-piece, through the contact of its side portions with the inside of the superheating-tube, supports the rear ends of the superheater-pipes at the normal distance above the bottom of the superheating-tube and leaves a substantial portion of the transverse sectional area thereof adjoining its bottom unobstructed. As shown in Figs. 1 and 2, the bridge-piece 69[a] is integral with the outer superheater-pipe 69, being formed by a suitably-curved prolongation of the welded-up end portion thereof. It may, however, if preferred, be a separate piece of metal 69[b], secured to the welded portion of the rear end of the tube by a rivet 69[c] or other suitable connection, as shown in Figs. 3 to 6, inclusive. The separate bridge-piece is bent into proper form to present a surface or surfaces for connection to the rear ends of one or more outer superheater-pipes 69, one of said pipes being shown in Figs. 3 and 4, three in Fig. 5, and four in Fig. 6, and it will be usually necessary to use it when the ends of the superheater-pipes are closed by plugs. In each case the bridge-piece is provided with curved side portions to fit against the inner surface of the superheating-tube, as first described.

Figs. 7 to 12, inclusive, illustrate a structural modification of my improvement as applied in connection with superheater-pipes having their rear ends connected by return-bends 69[d], which are made of such form as to act also as bridge pieces or supports for the superheater-pipes by fitting against the inner surface of the superheating-tube 67 above an arc of the lower portion of its periphery, as in the instance first described. Figs. 7 and 8 show a construction embodying two pairs of superheater-pipes 69, the upper pair being slightly shorter than the lower. The rear ends of the pipes of each pair are connected by a return-bend 69[d], that of the lower pair constituting the bridge-piece and supporting the lower pair at normal distance above the bottom of the superheating-tube by the contact of portions of the curved walls of the return-bend with the inner surface of the superheating-tube above an arc of the lower portion of the periphery of the latter extending for a substantial distance on each side of its vertical central plane. The return-bend of the upper pair of superheater-pipes rests upon the lower pair of pipes, and the upper pair are thus through said return-bend supported by the return-bend of the lower pair. Figs. 9 and 10 show the combined return-bend and support as connecting the rear ends of three superheater-pipes and Figs. 11 and 12 as connecting the rear ends of two superheater-pipes and as provided with curved lateral projections below its horizontal central plane, which projections fit against the inner surface of the superheating-tube, as in the several instances before specified.

It will be seen that my invention is readily applicable at inconsiderable cost in connection with superheater-pipes, which are disposed in any of a variety of ways in a surrounding superheating-tube and that the superheater-pipes will be properly supported without interfering with their removal and insertion, as required.

I claim as my invention and desire to secure by Letters Patent—

1. In a steam-boiler superheater, the combination of a superheating fire-tube, a steam superheater-pipe extending longitudinally therein, and a bridge piece or support fixed to the end of the superheater-pipe nearer the fire-box and having curved side portions fitting the inner surface of the superheating-tube entirely above an arc of the lower portion of its periphery extending for a substantial distance on each side of its vertical central plane.

2. In a steam-boiler superheater, the combination of a superheating fire-tube, a steam superheater-pipe extending longitudinally therein and having its end nearer the fire-box closed, a bridge piece or support having curved side portions fitting the inner surface of the superheating-tube entirely above an arc of the lower portion of its periphery extending for a substantial distance on each side of its vertical central plane, and a connection securing said support to the superheater-pipe.

3. In a steam-boiler superheater, the combination of a superheating fire-tube, a steam superheater-pipe extending longitudinally therein and having its end nearer the fire-box closed by being welded together, a bridge piece or support having curved side portions fitting the inner surface of the superheating-tube entirely above an arc of the lower portion of its periphery extending for a substantial distance on each side of its vertical central plane, and a connection securing said support to the welded end portion of the superheater-pipe.

4. A bridge piece or support for steam superheater-pipes consisting of a plate of metal bent into form presenting a surface adapted to be connected to the closed end of a superheater-pipe and curved side portions to fit against the inner surface of a surrounding superheating-tube.

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Witnesses:
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A. J. BRAMAN.