

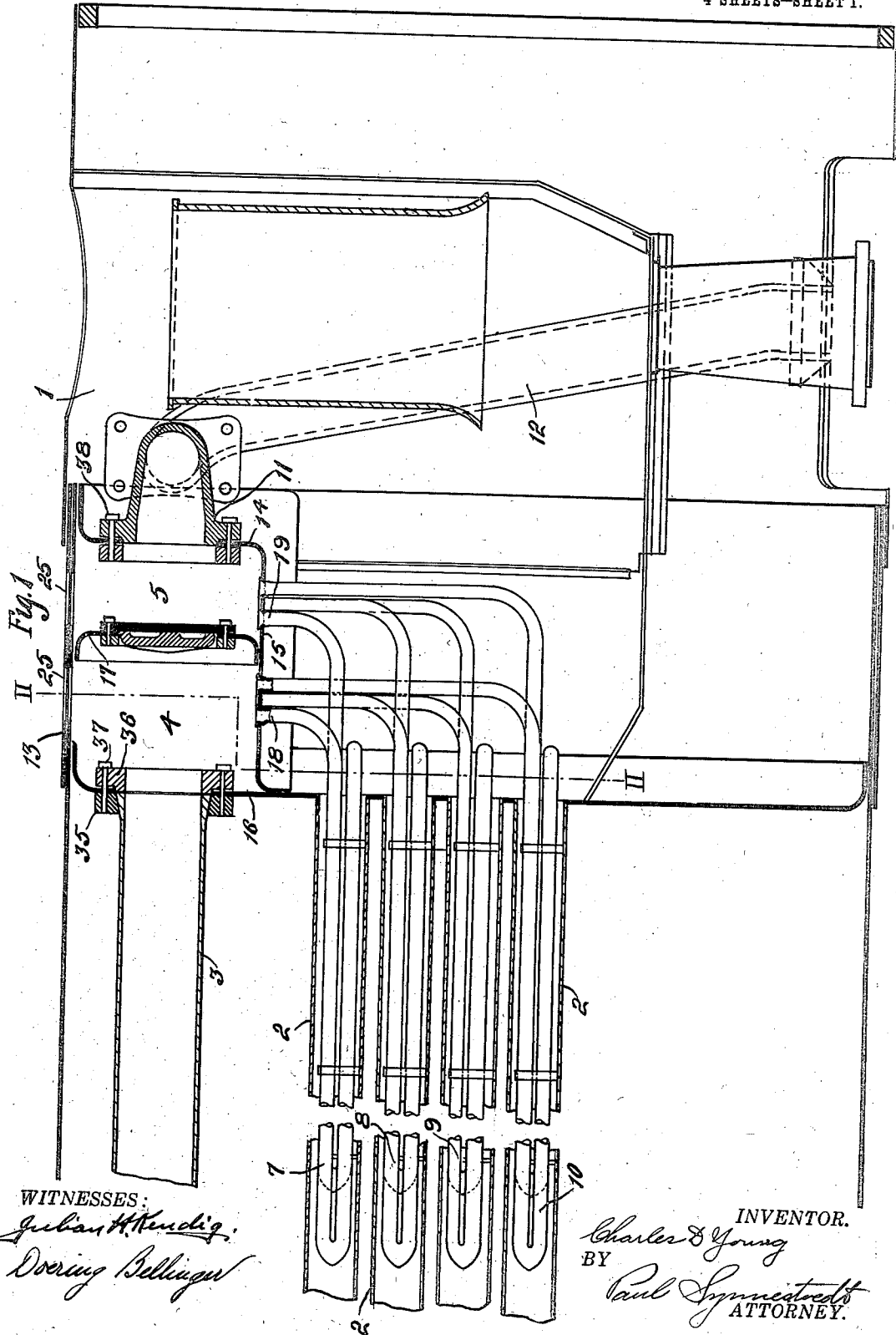
C. D. YOUNG.
SUPERHEATER.

APPLICATION FILED DEC. 5, 1911.

1,073,204.

Patented Sept. 16, 1913.

4 SHEETS—SHEET 1.

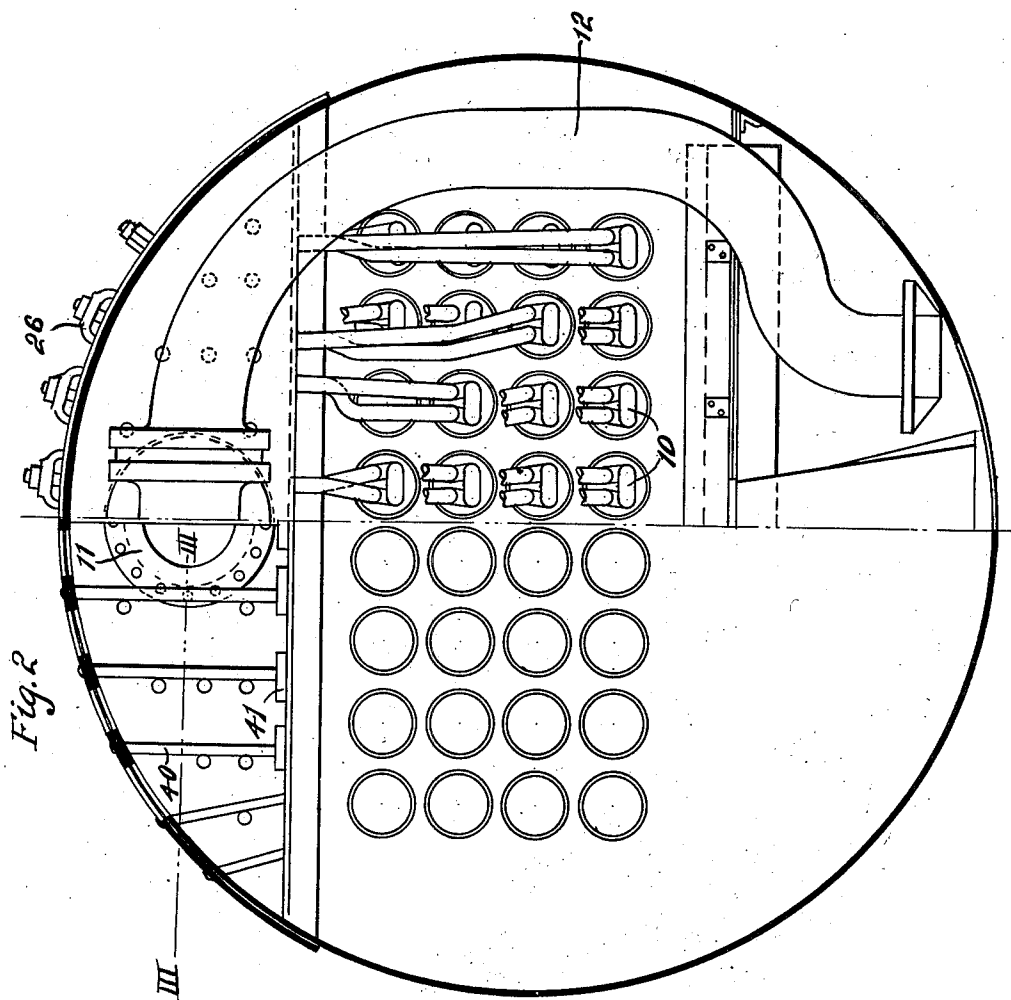


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4 SHEETS—SHEET 2.



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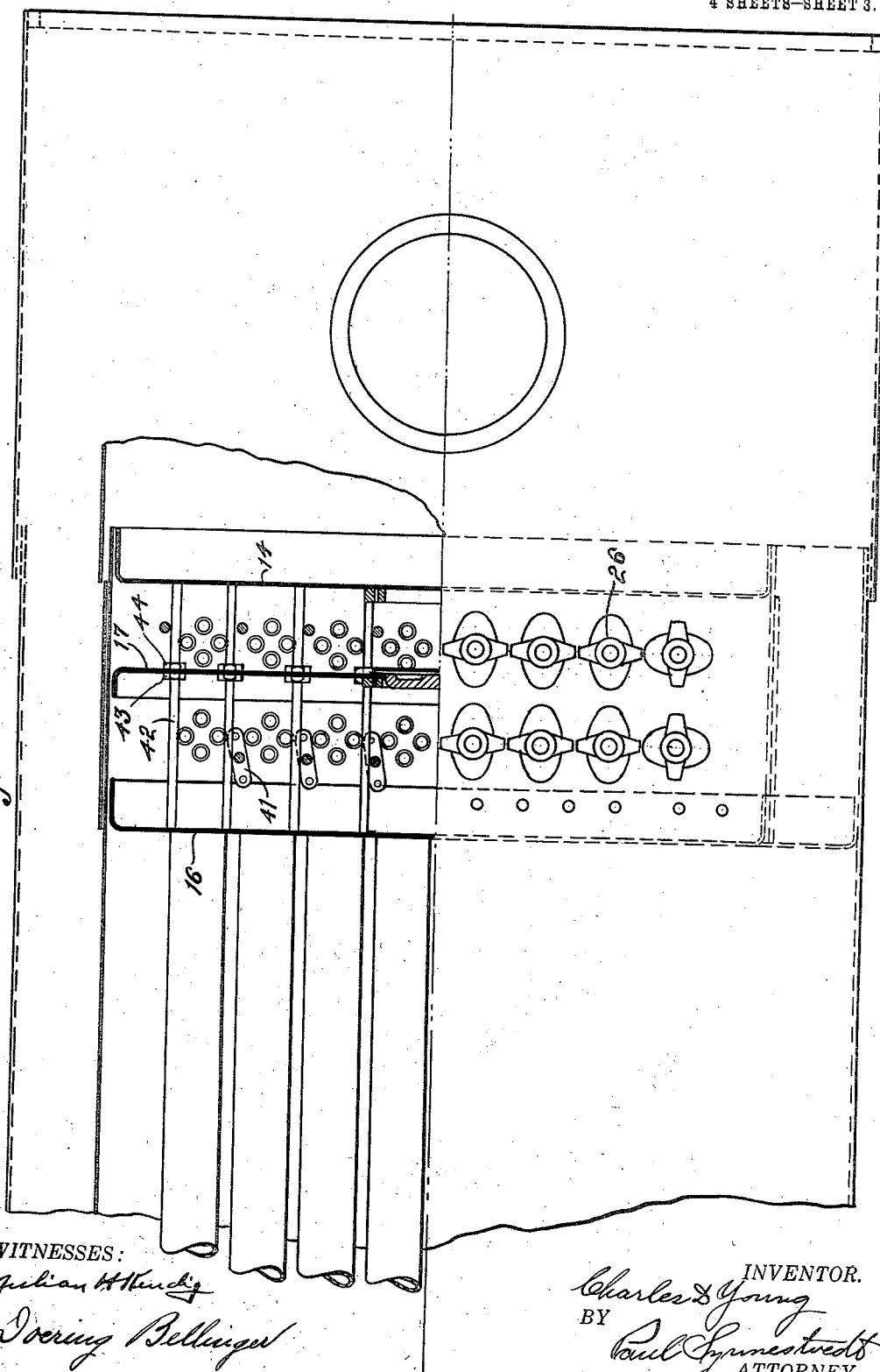
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4 SHEETS—SHEET 3.

Fig. 3



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Fig. 5

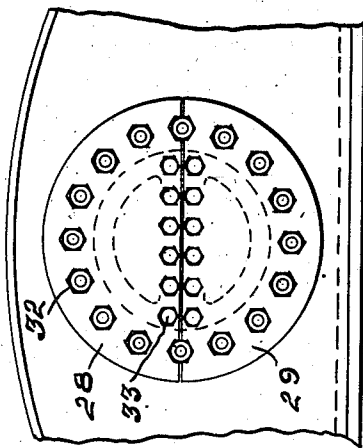


Fig. 7

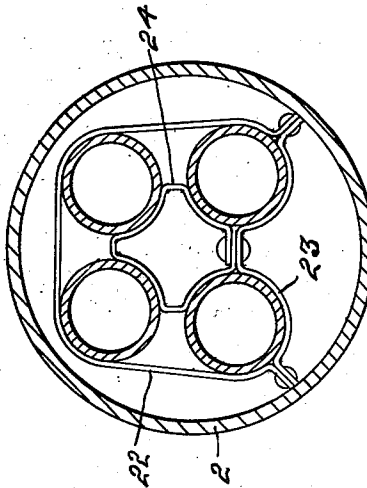


Fig. 6

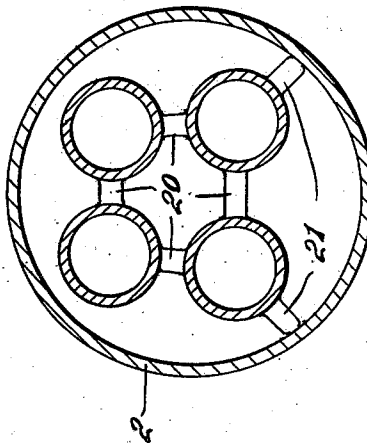
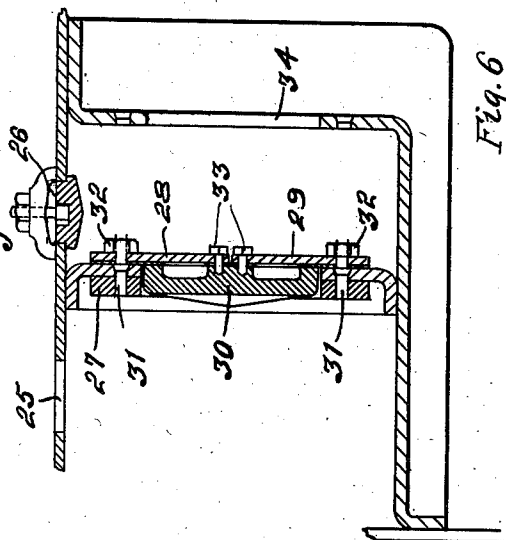


Fig. 4



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UNITED STATES PATENT OFFICE.

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SUPERHEATER.

1,073,204.

Specification of Letters Patent. Patented Sept. 16, 1913.

Application filed December 5, 1911. Serial No. 664,061.

To all whom it may concern:

Be it known that I, CHARLES D. YOUNG, a citizen of the United States, residing at Altoona, Pennsylvania, have invented certain new and useful Improvements in Superheaters, of which the following is a specification.

The invention relates to superheaters, and in the particular embodiment illustrated to superheaters for locomotive boilers.

It has for its primary objects the provision of a superheater which can be more cheaply applied and having tighter and better joints between the tubes and headers than in the superheaters of the general type heretofore used; the provision of a superheater having an improved arrangement permitting the ready removal of the dry pipe therethrough; the provision of a superheater wherein the tubes are supported in the fire tubes in an improved and superior manner; and in general to simplify, cheapen and improve locomotive superheater constructions.

Certain forms of the invention are illustrated in the accompanying drawings, wherein:—

Figure 1 is a longitudinal vertical section through the front end of a locomotive boiler provided with the improved superheater; Fig. 2 is a two-part view at the front end of the smoke box of the locomotive looking to the rear, the right hand portion of the figure being a section taken on the line II—II of Fig. 1, with the superheater tubes removed from the fire tubes, and the left hand portion of the figure being a section through the smoke box in front of the superheater, certain portions of the superheater tubes being broken away to more clearly disclose the arrangement to the rear thereof; Fig. 3 is a two-part view looking downward, the upper half of the view being a horizontal section along the line III—III of Fig. 2, and the lower half of the view being a plan view; Figs. 4 and 5 are enlarged detail views showing in section and front elevation respectively the closure means in the partition wall of the superheater; and Figs. 6 and 7 are enlarged detail sectional views showing the means for maintaining the lengths of the superheater tubes in their proper relative positions, and for supporting them in the fire tubes with their walls spaced away from the wall of the fire tube.

Referring first to the general arrangement of parts as shown in Figs. 1, 2 and 3; 1 is the smoke box of the locomotive; 2 are the fire tubes opening into such smoke box; 3 is the dry or outlet pipe leading from the steam dome of the locomotive and lying in the steam space above the fire tubes; 4 is the inlet header of the superheater; 5 is the outlet header of the superheater; 7, 8, 9 and 10 are coils of superheater tubes, each one of which has one of its front ends communicating with the header 4, and the other of its front ends communicating with the header 5; 11 is the outlet casting; and 12 is the outlet pipe secured at one end to the said outlet casting 11 and communicating at its other end with the steam chests of the locomotive.

As indicated in Figs. 1 and 2, the headers 4 and 5 are formed of sheet metal, the upper wall 13 being in effect an extension of the outer sheets of the boiler, and the ends and bottom walls 14 and 15 serving to close in the space below the wall 13 and to the front of the tube sheet 16. The space thus provided is divided into the compartments 4 and 5 by means of the partition wall 17.

Each of the superheater coils is arranged in four lengths, one end 18 of each being expanded into the bottom sheet 15 of the headers to the rear of the partition wall 17, and the other end 19 being expanded into the said sheet to the front of the partition wall 17. By this arrangement the steam supplied through the dry pipe 3 to the rear header 4, passes through the coils 7, 8, 9 and 10, and into the front header 5, from which header it is supplied to the cylinders of the locomotive by means of the pipe 12.

In order to maintain the lengths of the superheater coils in their proper relative position, the spacing and supporting means indicated in Figs. 6 and 7 are employed, the means shown in Fig. 6 being employed adjacent the front end of the coils, while the means shown in Fig. 7 are employed at other points along the lengths of the coils. As indicated in Fig. 6, the spacing means consists of blocks 20, which are welded to the tubes, thus maintaining them at the proper distance apart. Other blocks 21 welded to the lower lengths of the coil serve to support the coil from the wall of the fire tube. The same function is accomplished in the arrangement shown in Fig. 7 by the use of the pieces of strap iron 22, 23 and 24.

In order to permit of the expanding of the ends of the superheater tubes into the lower wall 15 of the headers, the hand holes 25 are provided in the upper wall 13 of the headers. These hand holes are so arranged as to permit ready access of the tools necessary for expanding the ends of the tubes into the lower wall of the headers. These hand holes are closed by means of the closure members 26 (Figs. 4 and 3), which closure members may be of any approved type.

In order to provide access to the dry pipe the removable T 11 is arranged in alignment with the end of the pipe 3, and an opening is cut in the partition wall 17 intermediate the end of the dry pipe 3 and the T 11, such opening being normally closed by the closure means shown in detail in Figs. 4 and 5. This closure means consists of a stiffening ring 27, the semi-circular half plates 28 and 29 and the stiffening plate 30. The ring 27 is secured in place by means of the rivets 31, which rivets have their right hand ends threaded to receive the nuts 32, by means of which the half plates 28 and 29 are secured in position, a gasket being interposed between the edges of such plates and the partition wall 17. The straight edges of the plates 28 and 29 are clamped rigidly to the stiffening plate 30 by means of the studs 33, a gasket also being interposed between the face of the plate 30 and the plates 28 and 29 in order to insure a tight closure. It will be seen that by making the larger plate in two pieces 28 and 29, with the stiffening plate 30 fitting inside the opening in the partition wall 17, each of such parts may be readily removed through the opening 34 without making such opening greater in diameter than the diameter of the opening in the partition wall 17.

A secure rigid joint between the end of the dry pipe 3 and the flue sheet 16 is secured by the use of the rings 35 and 36, which are rigidly secured in position by means of the bolts 37. The T casting 11 is secured in position by means of the bolts 38 extending through the flange of the T and into the stiffening ring 39 upon the inner side of the wall 14. The lower plate 15 of the headers is supported by means of stay-bolts 40 (Fig. 2) whose lower ends are provided with transverse integral heads 41 riveted to the sheet 15. The plates 14 and 17 are supported by means of the horizontal stay-bolts 42 shown in Fig. 3; such stay-bolts being threaded at their ends into the plates 14 and 16, and carrying the nuts 43 and 44 on opposite sides of the partition plate 17. In order to avoid confusion the stay-bolts 40 and 42 are omitted Figs. 1 and 4.

It will be seen from the foregoing that

the construction is one which can be cheaply applied to the ordinary type of locomotive, and that all of the tube connections with the headers may be made without difficulty by expanding the ends of the tubes into the headers in the ordinary way, thus avoiding the necessity of using the more expensive and less effective joints secured by the use of bolts and ball- or gasket joints. The ends of all the superheater tubes are accessible through the hand-holes 25, and the arrangement is such that any set of tubes may be readily removed for replacement or repair. The dry pipe 3 is also readily accessible for replacement or repair by reason of the use of the removable T 11 and the removable closure means in the plate 17. Other advantages incident to the construction will be apparent to those skilled in the art.

Having thus described my invention and illustrated its use, what I claim as new and desire to secure by Letters Patent is the following:—

1. The combination with a boiler provided with fire tubes and with a smoke box whose walls constitute an extension of the walls of the boiler; of a pair of superheater headers formed by a bottom sheet metal wall extending transversely of the smoke box above the said tubes, by an upright sheet metal wall closing the front of the space bounded by the said bottom sheet metal wall and the upper portion of the fire box wall, and by a dividing wall to the rear of the said upright wall; superheater tubes lying in the said fire tubes and having their front ends upturned and communicating with the said headers; an inlet to one header; and an outlet from the other header.

2. The combination with a boiler provided with fire tubes and with a smoke box whose walls constitute an extension of the walls of the boiler; of a pair of superheater headers formed by a bottom sheet metal wall extending transversely of the smoke box above the said tubes, by an upright sheet metal wall closing the front of the space bounded by the said bottom sheet metal wall and the upper portion of the fire box wall, and by a dividing wall to the rear of the said upright wall; superheater tubes lying in the said fire tubes and having their front ends upturned and expanded into the said bottom wall; an inlet to one header; and an outlet from the other; the wall of the smoke box constituting the upper walls of the headers being provided with hand holes and removable closures opposite the ends of the said superheater tubes.

3. The combination with a boiler provided with fire tubes and with a smoke box whose walls constitute an extension of the walls of the boiler; of a pair of superheater headers formed by a bottom sheet metal

5 wall extending transversely of the smoke box above the said tubes, by an upright sheet metal wall closing the front of the space bounded by the said bottom sheet metal wall and the upper portion of the fire box wall, and by a dividing wall to the rear of the said upright wall having an opening provided with a removable closure means; superheater tubes lying in the said fire tubes and having their front ends upturned and communicating with the said headers; an inlet pipe in the steam space above the fire tubes and leading through the wall between the rear header and the said steam space with its end opposite the said opening in the dividing wall; and a removable outlet casting upon the said upright wall opposite the opening in the said dividing wall.

4. The combination with a boiler provided with fire tubes and with a smoke box whose walls constitute an extension of the walls of the boiler; of a pair of superheater headers formed by a bottom sheet metal wall extending transversely of the smoke box above the said tubes, by an upright sheet metal wall closing the front of the space bounded by the said bottom sheet metal wall and the upper portion of the fire box wall, and by a dividing wall to the rear of the said upright wall having an opening provided with a removable closure means; superheater tubes lying in the said fire tubes and having their front ends upturned and communicating with the said headers; an inlet pipe in the steam space above the fire tubes and leading through the wall between the rear header and the said steam space with its end opposite the said opening in the dividing wall and removable through such opening; and a removable outlet casting upon the said upright wall opposite the opening in the said dividing wall arranged to permit the passage of the said inlet pipe upon the removal of the said casting.

5. The combination with a boiler provided with fire tubes and with a smoke box whose walls constitute an extension of the walls of the boiler; of a pair of superheater headers formed by a bottom sheet metal wall extending transversely of the smoke box above the said tubes, by an upright sheet metal wall closing the front of the space bounded by the said bottom sheet metal wall and the upper portion of the fire box wall, and by a dividing wall to the rear of the said upright wall having an opening provided with a removable closure means; superheater tubes lying in the said fire tubes and having their front ends upturned and communicating with the said headers; an inlet pipe in the steam space above the fire tubes and leading through the wall between the rear header and the said steam space with its end opposite the said opening in

the dividing wall and removable through such opening; and a removable outlet casting upon the said upright wall opposite the opening in the said dividing wall arranged to permit the passage of the said closure means and inlet pipe upon the removal of the said casting.

6. In apparatus of the class described having a metal partition wall having an opening and an outer wall provided with an opening having a removable closure, means for closing the opening in the said partition wall comprising a pair of semi-circular plates fitting together along their straight sides and having their outer curved edges over-lapping the edges of the opening, a stiffening plate of less diameter than the opening lying in said opening, threaded members along the circular edges of the said semi-circular plates for securing such edges detachably to the edges of the opening, and threaded members along the straight edges of the said semi-circular plates for securing such edges detachably to the stiffening plate.

7. The combination with a boiler provided with fire tubes and with a smoke box whose walls constitute an extension of the walls of the boiler; of a superheater header formed by a segment of the wall of the smoke box, an end sheet and an inner sheet extending from the flue sheet to the said end sheet; and superheater tubes lying in the said fire tubes and each having one end communicating with the said header through one of said sheets.

8. The combination with a boiler provided with fire tubes and with a smoke box whose walls constitute an extension of the walls of the boiler; of a pair of superheater headers formed by a segment of the wall of the smoke box; an end sheet; a dividing wall substantially parallel thereto and an inner sheet extending from the flue sheet of the boiler to the said end sheet; superheater tubes lying in the said fire tubes and having their ends communicating with the said headers; an inlet to one header; and an outlet from the other header.

9. In a steam boiler provided with fire tubes, a superheater comprising a pair of headers one of which employs a part of the front tube sheet as part of its wall, superheater elements held within some of the fire tubes and having their ends connected with the two headers, and steam connections between the headers and the steam supply and engine cylinders respectively.

10. In a steam boiler provided with fire tubes, a superheater comprising a pair of sheet metal headers one of which employs a part of the front tube sheet as part of its wall, superheater elements held within some of the fire tubes and having their ends con-

ected with the two headers, and steam connections between the headers and the steam supply and engine cylinders respectively.

11. In a steam boiler provided with fire tubes, a superheater comprising a pair of contiguous headers one of which employs a part of the front tube sheet as part of its wall, superheater elements held within some of the fire tubes and having their ends connected with the two headers, and steam con-

nections between the headers and the steam supply and engine cylinders respectively.

In testimony whereof I have hereunto signed my name in the presence of the two subscribed witnesses.

CHARLES D. YOUNG.

Witnesses:

H. A. LEADER,

W. J. McFARLAND.