G. H. RUPP.

FLUE ATTACHMENT.

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1,014,097.

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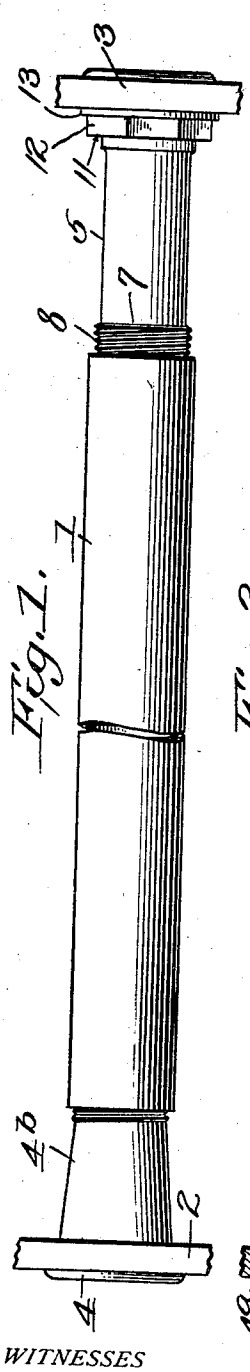

Fig. 1.

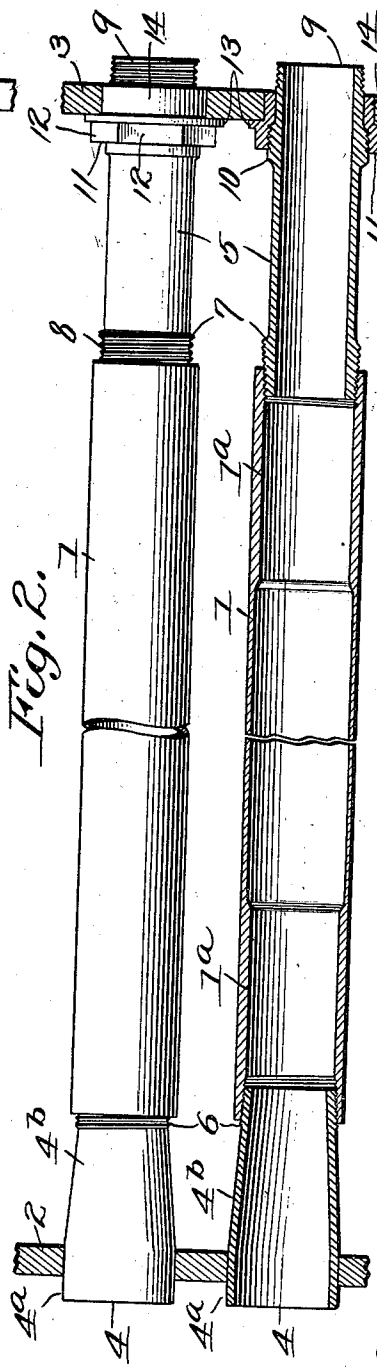

Fig. 2.

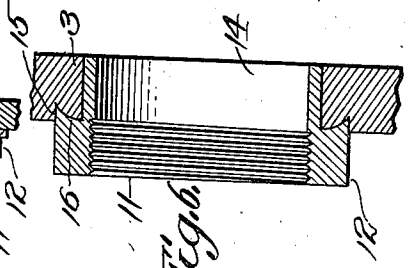

Fig. 6.

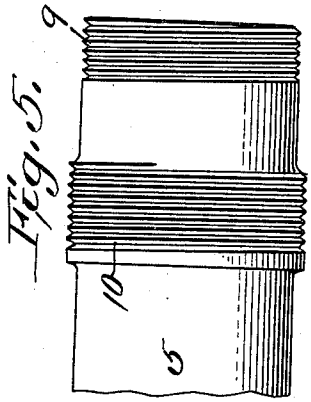

Fig. 5.

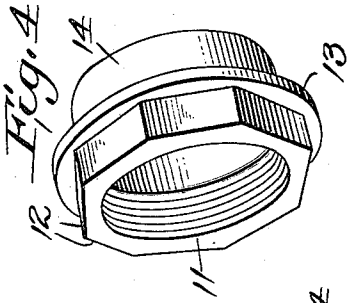

Fig. 4.

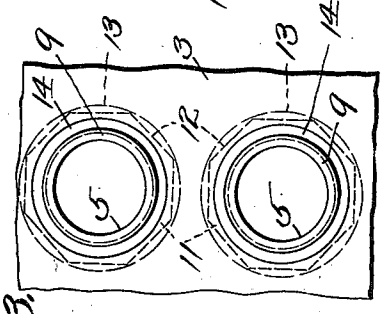

Fig. 3.

WITNESSES

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FLUE ATTACHMENT.

1,014,097. Specification of Letters Patent. Patented Jan. 9, 1912.

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To all whom it may concern:

Be it known that I, GEORGE H. RUPP, citizen of the United States, residing at Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Flue Attachments, of which the following is a specification.

The present invention relates in general to steam boilers, and more particularly to a novel and advantageous manner of attaching the flues to the flue sheets, the primary object of the invention being the provision of flue attaching means which embodies novel features of construction whereby a tight and rigid joint is obtained, and also whereby a maximum water space is provided adjacent the fire box flue sheet where the heat is the most intense.

A further object of the invention is the provision of flue attaching means which can be readily installed in locomotive and other steam boilers without necessitating any material changes in the construction thereof, which comprises few and durable parts, and which will effectively prevent the leakage of water and steam at the joints, this latter feature being of great importance in connection with locomotive boilers, since with the construction now employed it is usually necessary to take each locomotive to the shops for the purpose of having the flue joints tightened at the end of each long run.

With these and other objects in view, the invention consists in certain novel combinations and arrangements of the parts as will more fully appear as the description proceeds, the novel features thereof being pointed out in the appended claims.

For a full understanding of the invention, reference is to be had to the following description and accompanying drawing, in which:—

Figure 1 is a side elevation of a flue which is constructed and attached to the flue sheets in accordance with the present invention, the middle portion of the flue being broken away. Fig. 2 is a side elevation of a pair of flues mounted between the two flue sheets, one of the flues and the flue sheets being shown in section, and the flue attaching members being shown in the position assumed before the ends thereof are expanded. Fig. 3 is a face view of a portion of the fire box flue sheet. Fig. 4 is a detail perspective view on an enlarged scale of the collar. Fig. 5 is an enlarged side elevation of the outer end of the flue attaching member which is employed in connection with the fire box flue sheet, and Fig. 6 is a detail sectional view showing a modified form of the invention.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawing by the same reference characters.

Specifically describing the present embodiment of the invention, the numerals 1 designate the flues which are of the usual construction and extend between opposite flue sheets 2 and 3. In a locomotive the flue sheet 2 would form one of the walls of the smoke box while the flue sheet 3 would form one of the walls of the fire box, the products of combustion passing through the flues from the fire box to the smoke box. Each of the flues 1 is provided with end portions 1^a which may be welded thereto, and which are formed of thicker metal than the flues so as to provide a solid bearing for the respective flue attaching members 4 and 5 and prevent the ends of the flues from splitting or rupturing when the said flue attaching members are applied thereto. The flue attaching member 4 has an outer cylindrical portion 4^a which is received within the openings in the flue sheet 2, and an inner frusto conical or tapered portion 4^b the extremity of which is received within the end 1^a of the flue 1 and has a threaded connection therewith as indicated at 6. The opposite flue attaching member 5 has a tubular construction and is formed with an exterior diameter somewhat less than the exterior diameter of the flue. The inner end of this flue attaching member 5 is formed with a conical enlargement 7 which is received within the end 1^a of the flue and is threaded for engagement therewith. The opposite end of the member 5 extends through the opening in the flue sheet 3 and has the projecting portion thereof exteriorly threaded at 9. It will also be observed that the member 5 is formed at a point spaced from the outer end thereof with an exteriorly threaded shoulder 10, the space between the said shoulder and the threads 9 being smooth or unthreaded and having a length corresponding to the thickness of the flue sheet. A collar 11 is fitted upon the outer end of the flue attaching member 5, and has a threaded engagement with the exterior of the shoulder 10. This collar is formed with an octagonal portion

12 adapted to be engaged by a wrench or similar tool, and also with an outwardly projecting annular flange 13 adapted to abut against and engage the inner face of the flue sheet. The outer end 14 of the collar 11 is slightly contracted so as to fit over the smooth portion of the member 5 between the shoulder 10 and threads 9, the said outer end 14 of the collar having an exterior diameter substantially the same as that of the flue 1 and fitting accurately within the opening of the flue sheet 3.

When placing the flues within a boiler, the flues are first assembled, as indicated in Fig. 2, with the ends of the flue attaching members 4 and 5 projecting beyond the respective flue sheets 2 and 3. A wrench of some suitable construction is then applied to the threads 9 on the projecting end of the member 5 so as to draw the flange 13 of the collar 11 tightly against the inner face of the flue sheet and hold the flue in proper position. The projecting end of the flue attaching member 4 is then expanded in the usual manner within the opening in the flue sheet 2, and may then be flanged if desired as indicated in Fig. 1. The wrench is then removed from the threads 9 of the flue attaching member 5 and the projecting end of the said flue attaching member expanded within the opening of the sheet 3, and then flanged if desired as indicated in Fig. 1. The flue sheet 3 is thereby tightly clamped between the expanded end of the flue attaching member 5 and the flange 13 of the collar 10, and a firm water tight joint obtained between the members. Such a joint is very essential in locomotive boilers, since the continual jarring and jolting to which they are subjected when in use has a tendency to loosen an ordinary joint so as to cause the escape of water and steam into the fire box, which not only reduces the heating efficiency of the engine, but also renders it necessary to frequently inject a fresh supply of water into the boiler. Attention is further directed to the fact that the slightly reduced diameter of the flue attaching members 5 increases the water space adjacent the fire box flue sheet 3, so that a maximum amount of water is located at that point where the heat is most intense.

A slight modification is shown in Fig. 6, in which the inner face of the flue sheet 3 is provided with annular grooves 15 surrounding the openings therein, each of the collars 11 being provided with a corresponding annular bead 16 which is received within the grooves 15. This bead 16 and groove 15 will afford an additional safeguard against leakage, and may be employed in extreme cases where the straight shoulder previously described would not be sufficient. It will be observed that in the event the flue sheet 3 should expand and tend to pull away from the portion 14 of the collar 11, the bead 16 will be drawn into a closer engagement with the groove 15 so as to produce a tighter joint at this point and render leakage impossible. It will thus be obvious that with this construction there would be no danger of leakage due to the constant expansion and contraction of the flue sheet.

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

1. In a device of the character described, the combination of a flue sheet, a flue terminating short of the flue sheet, a tubular flue attaching member having an exterior diameter smaller than that of the flue so as to increase the water space adjacent the flue sheet, the inner end of the flue attaching member being formed with a conical enlargement which has a threaded engagement with the end of the flue, while the outer end of the flue attaching member engages the flue sheet.

2. In a device of the character described, the combination of a flue sheet, a flue terminating short of the flue sheet and having the end portion thereof thickened, and a tubular flue attaching member, the inner end of the said flue attaching member being formed with a conical enlargement which has a threaded engagement with the thickened end portion of the flue, while the outer end of the flue attaching member engages the flue sheet.

3. In a device of the character described, the combination of a flue sheet, a flue terminating short of the flue sheet, a tubular flue attaching member having the inner end thereof applied to the flue while the outer end thereof extends through the flue sheet and is expanded into engagement with the opening of the flue sheet, and an annular flange carried by the flue attaching member for engagement with the inner face of the flue sheet.

4. In a device of the character described, the combination of a flue sheet, a flue terminating short of the flue sheet, a tubular flue attaching member having the inner end thereof applied to the flue, while the outer end thereof extends through the flue sheet and is expanded into an engagement with the opening thereof, the said tubular flue attaching member being provided at a point spaced from the outer end thereof with a shoulder, and a collar fitted upon the flue attaching member and engaging the shoulder, the said collar being formed with a flange adapted to bear against the inner face of the flue sheet.

5. In a device of the character described, the combination of a flue sheet, a flue terminating short of the flue sheet, a tubular flue attaching member having the inner end thereof applied to the flue while the outer

end thereof extends through the flue sheet and is expanded into engagement with the opening thereof, the said flue attaching member being provided at a point spaced from the outer end thereof with an annular shoulder, and a collar fitted upon the tubular flue attaching member and having a threaded engagement with the before mentioned shoulder, the inner end of the collar having a polygonal formation and being provided with an annular flange engaging the inner face of the flue sheet, while the outer end of the collars is slightly contracted and fits around that portion of the flue attaching member received within the flue sheet.

6. In a device of the character described, the combination of a flue sheet having an opening therein, a flue terminating short of the flue sheet, a tubular flue attaching member having the inner end thereof applied to the flue while the outer end thereof projects through the opening in the flue sheet, the projecting portion thereof being threaded and an annular shoulder being provided upon the tubular flue attaching member at a point adjacent the inner face of the flue sheet, a collar applied to the flue attaching member so as to engage the shoulder thereon and formed with a flange adapted to bear against the inner face of the flue sheet, the threaded projecting end of the flue attaching member being adapted to be engaged by a wrench for drawing the before mentioned flange tightly against the flue sheet, and then expanded.

7. In a device of the character described, the combination of a flue sheet having an opening therein, a flue terminating short of the flue sheet and corresponding in size to the opening in the flue sheet, a tubular flue attaching member having a smaller exterior diameter than the flue so as to increase the water space adjacent the flue sheet, the inner end of the said tubular flue attaching member being formed with a conical enlargement having a threaded engagement with the end of the flue, while the outer end thereof projects through the opening in the flue sheet and is provided with an annular shoulder at a point adjacent the inner face of the flue sheet, the projecting end of the flue attaching member being threaded, and a collar fitted upon the tubular flue attaching member so as to engage the shoulder thereon, the said collar being formed with a flange adapted to engage the inner face of the flue sheet and having the outer end thereof slightly contracted so as to surround that portion of the flue attaching member within the opening of the flue sheet, the projecting end of the flue attaching member being adapted to be engaged by a wrench for drawing the before mentioned flange tightly against the flue sheet, and then expanded.

8. In a device of the character described, the combination of a pair of flue sheets, a flue arranged between the flue sheets and terminating short thereof, a tubular flue attaching member having a tapered inner end which engages the flue, the outer end of the said flue attaching member engaging the flue sheet, and a second flue attaching member having a diameter less than that of the flue, the inner end of the second flue attaching member being formed with a conical enlargement for engagement with the flue, while the outer end thereof engages the flue sheet.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE H. RUPP.

Witnesses:
HOWARD P. BANKARD,
HARRY B. PLOWMAN.