H. S. VINCENT.

BOILER FOR ARTICULATED LOCOMOTIVES.

APPLICATION FILED JAN. 29, 1910.

955,927. **Patented Apr. 26, 1910.**

3 SHEETS—SHEET 1.

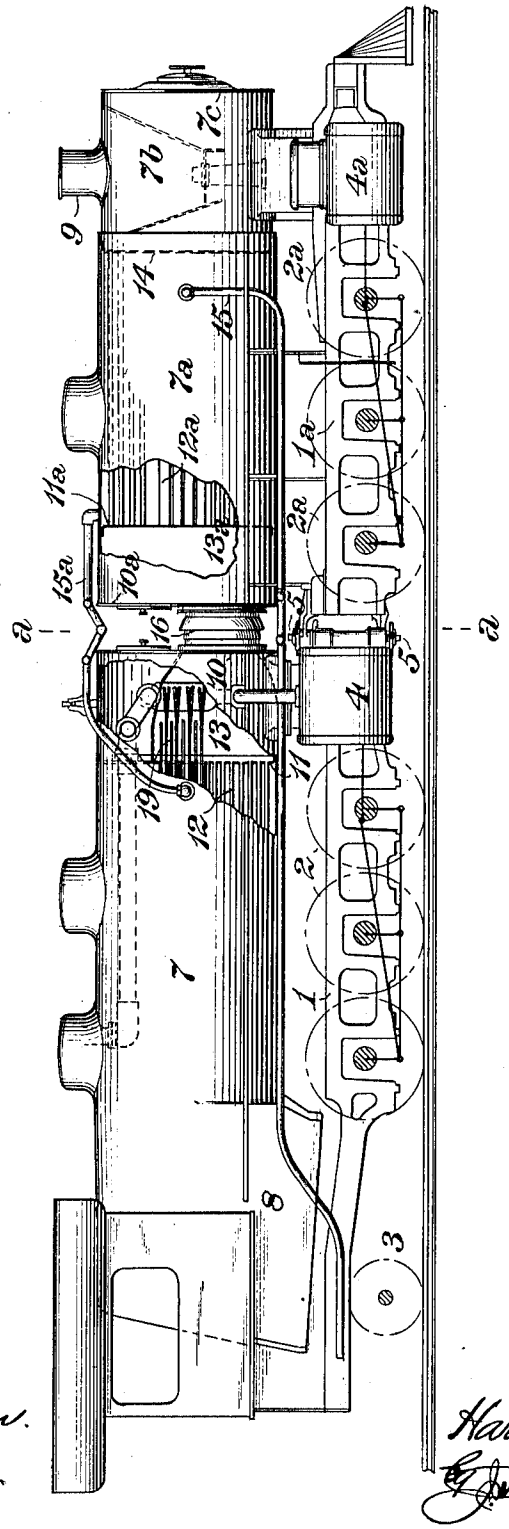

FIG. I.

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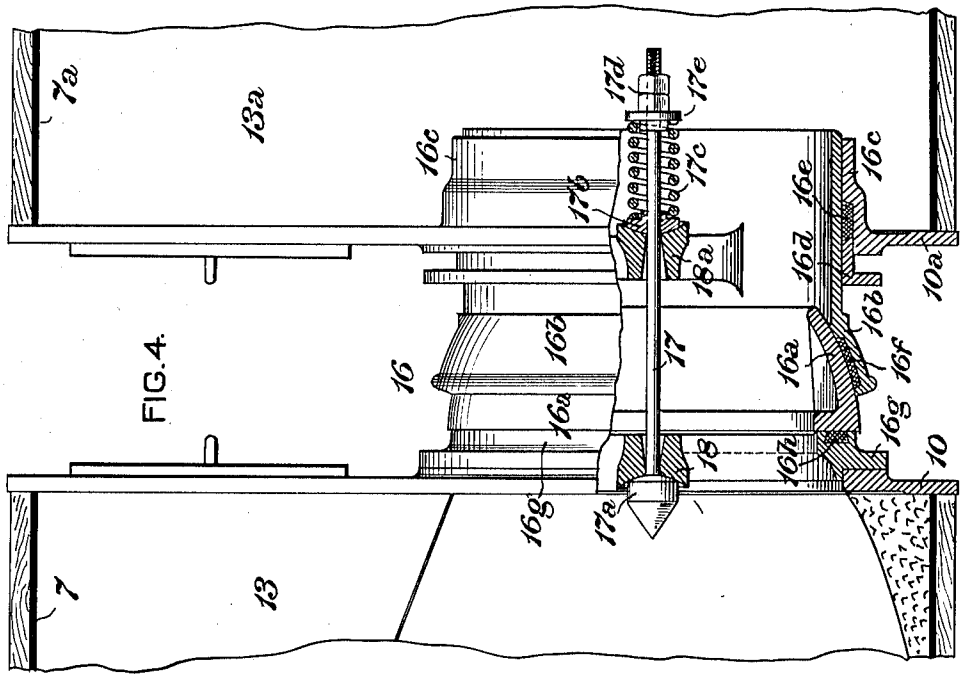

FIG. 4.

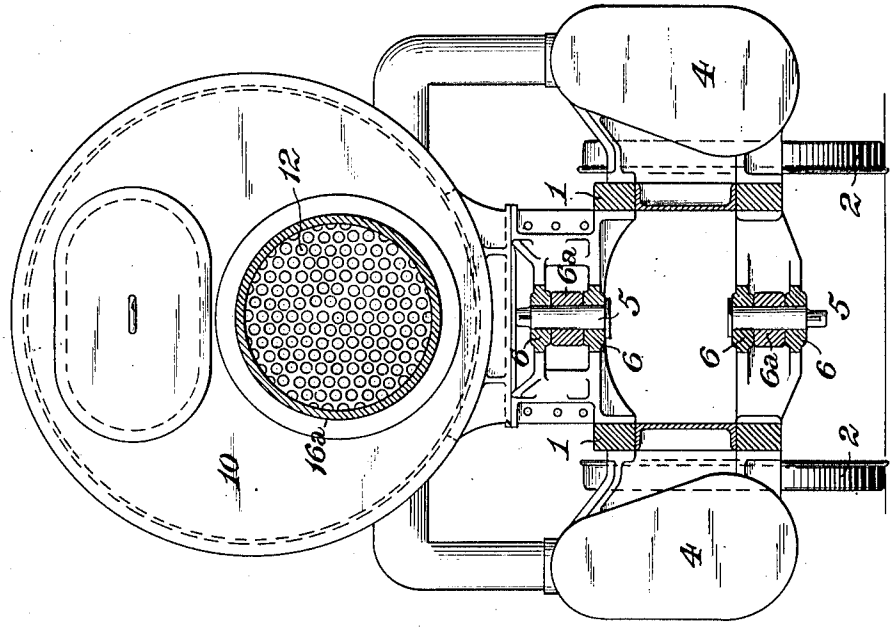

FIG. 2.

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3 SHEETS—SHEET 3.

FIG. 3.

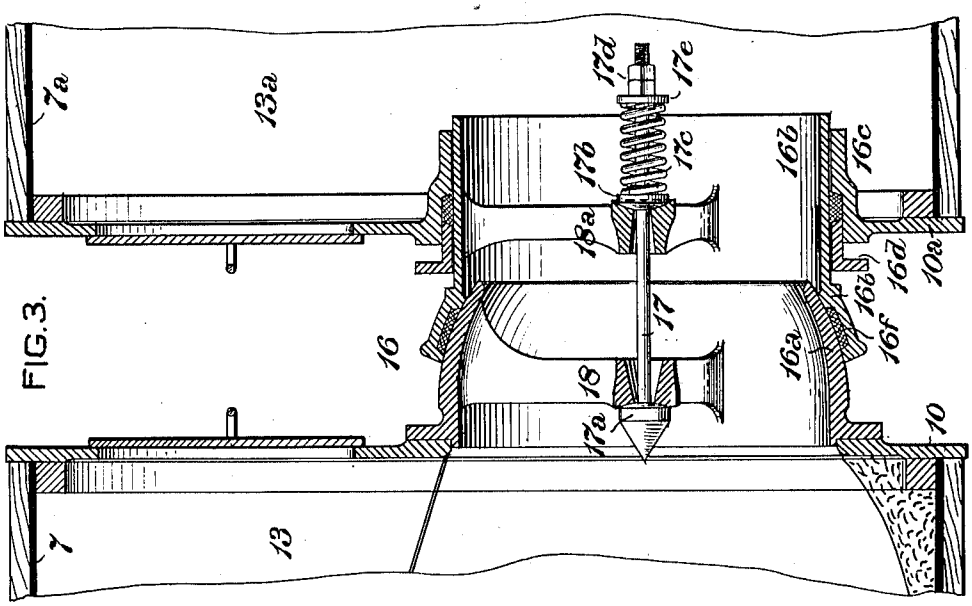
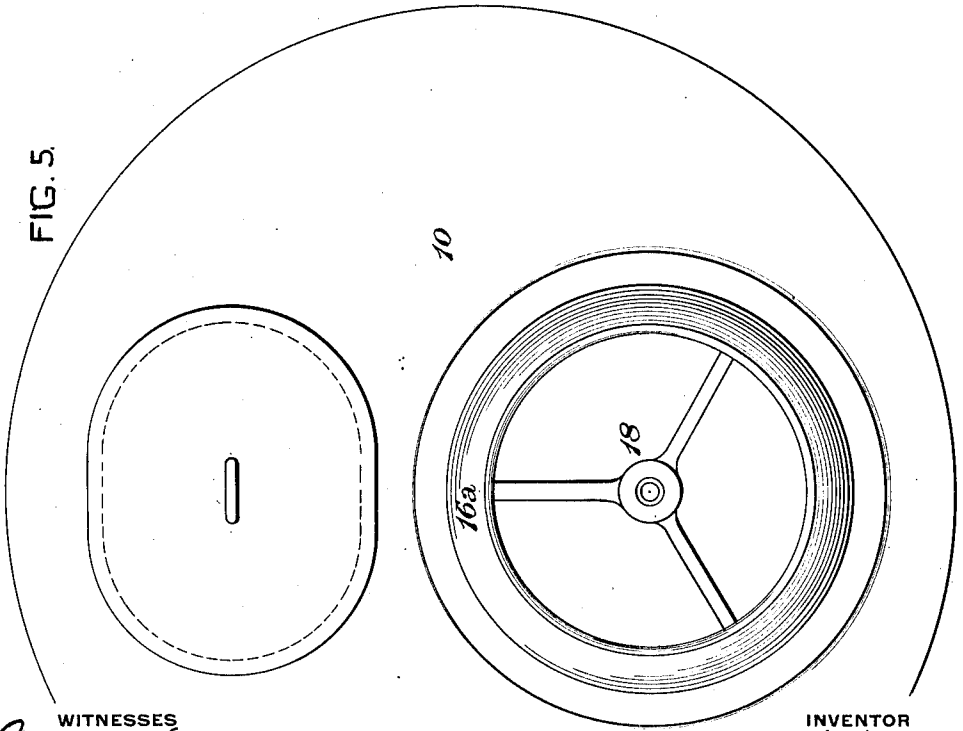


FIG. 5.



WITNESSES

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UNITED STATES PATENT OFFICE.

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BOILER FOR ARTICULATED LOCOMOTIVES.

955,927. Specification of Letters Patent. Patented Apr. 26, 1910.

Application filed January 29, 1910. Serial No. 540,748.

To all whom it may concern:

Be it known that I, HARRY S. VINCENT, of Ridgewood, in the county of Bergen and State of New Jersey, have invented a certain new and useful Improvement in Boilers for Articulated Locomotives, of which improvement the following is a specification.

My invention relates to boilers for locomotives of the so-called "articulated" type, *i. e.*, that in which two frames, each carrying independent sets of driving mechanism, are coupled together by a pivot, so that while the locomotive has a long wheel base, it is of sufficient flexibility to readily pass curves in the track. In locomotives of this type, as heretofore constructed, it has been the practice to attach the boiler rigidly to one of the frames only, permitting it to overhang the other frame, upon which it is carried by sliding supports.

The primary object of my invention is to provide a boiler for articulated locomotives, comprising two independent sections, each of which may be rigidly secured to one of the two coupled frames and move therewith independently of the other frame and boiler section, said boiler sections being articulated one to the other, that is to say, attached through the intermediation of a movable joint in such manner as to be readily uncoupled when desired to facilitate replacement of boiler tubes or permit access to the interior of the sections for other purposes.

A further object of my invention is to provide independent chambers in the sections of the boiler for the reception of a superheater and a reheater respectively, said chambers communicating by an articulated flue connection through which the products of combustion pass from a firebox on the rear boiler section to a stack on the forward section.

The improvement claimed is hereinafter fully set forth.

In the accompanying drawings: Figure 1 is a side view, partly in section, of an articulated locomotive, illustrating an application of my invention; Fig. 2, a transverse section, on an enlarged scale, through the same, on the line *a a* of Fig. 1; Fig. 3, a partial longitudinal section, on a further enlarged scale, showing the articulated flue connection of the boiler section; Fig. 4, a similar section, showing a structural modification; and, Fig. 5, a front view, in elevation of the rear section of the boiler.

My invention is herein exemplified as applied in connection with an articulated compound locomotive, comprising a rear frame, 1, supported on a plurality of driving wheels, 2, and a pair of rear trailing wheels, 3, and a front frame, 1^a, supported on a plurality of driving wheels, 2^a. The driving wheels of the rear frame are rotated, through the ordinary connections, by steam pressure in high pressure cylinders, 4, fixed to the rear frame, and the driving wheels of the front frame are similarly rotated by steam pressure in low pressure cylinders, 4^a, fixed to the front frame. The front and rear frames are coupled, in the longitudinal central plane of the locomotive, by pivots, 5, passing through hinges, 6^a and 6, secured to the front and rear frames, respectively.

In the practice of my invention, I provide a boiler of the fire tube locomotive type, which comprises a rear section, 7, having a firebox, 8, at its rear end, and which is secured rigidly to the rear frame, 1, and an independent forward section, 7^a, having a smoke box, 7^b, and stack, 9, at its forward end, and which is secured rigidly to the front frame, 1. Except in the particular features of my invention hereinafter described, the boiler accords substantially, in structural and operative principle, with fire tube locomotive boilers of present standard construction.

The forward end of the rear section, 7, of the boiler is closed by a head, 10, between which and the front flue sheet, 11, of the rear boiler section, to which a plurality of fire tubes, 12, extend from the firebox, in the ordinary manner, there is located a chamber 13, which I term descriptively a preliminary smoke box, and in which a superheater, 19, is shown as located. The rear end of the forward boiler section, 7^a, is similarly closed by a head, 10^a, between which and the rear flue sheet, 11^a, of the front boiler section, there is located a chamber, 13^a, which I term an intermediate smoke box, and in which a reheater of any suitable form may be located. Fire tubes, 12^a, extend

from the rear flue sheet, 11^a, of the forward boiler section to the front flue sheet, 14, thereof, the space between which and the smoke box front, 7^c, forms the ordinary smoke box, 7^b, to which the stack, 9, is connected, and which, I term a final smoke box.

In the instance shown, the rear boiler section, 7, performs the function of a steam generator and steam receptacle, and the forward boiler section serves as a feed water heater, its fire tubes, 12^a, being greater in number than those of the rear section, and their upper rows being located nearly as high as its top, so that no steam space is provided above them. Feed water is supplied to the forward section through feed pipes 15, leading from the injectors, and thence passes to the rear boiler section through a suitably articulated pipe or pipes, 15^a. It will, however, be obvious that, if preferred, a lesser number of fire tubes may be used in the forward boiler section, so as to provide steam space therein and enable it to act as a steam generator and steam receptacle, similarly to the rear section.

The rear and forward boiler sections, 7 and 7^a, are attached one to the other, preferably near their bottoms, by an articulated draft passage or flue, indicated on the drawings, as an entirety, by the reference symbol, 16, through which passage the products of combustion pass from the rear to the front section, in their traverse to the stack, 9. The articulation of the draft passage, 16, is in the form of an air tight ball or spherical joint, which is made between a draft passage section, 16^a, which is in the form of a section of a sphere, secured at its rear end to the front head, 10, of the rear boiler section, and a draft passage section, 16^b, which is spherically formed interiorly, at its outer end, to receive the section, 16^a, and is fitted, with a limited degree of longitudinal traverse, in the rear head, 10^a, of the front boiler section. Suitable packing, 16^f, is fitted in a recess in the spherical portion of the section, 16^b. The center of the ball joint is preferably in the same vertical plane as the common axis of the pivots, 5, by which the front and rear frames are connected. The cylindrical portion of the draft passage section, 16^b, fits in a corresponding socket, 16^c, formed on the head, 10^a, and is made air tight therein by a packing gland, 16^d, which fits in a recess in the socket, 16^c, forming a stuffing box, which is filled with a suitable lubricating heat resisting packing, 16^e. In order to insure and maintain proper contact between the spherical surfaces of the draft passage sections, 16^a and 16^b, they are connected by a rod, 17, having a spherical faced head, 17^a, which bears on a corresponding seat formed centrally in a frame or spider, 18, extending across the section, 16^a, and carries a spherical faced washer or wearing plate, 17^b, which is pressed by a spring, 17^c, against a corresponding seat on the inner side of a frame or spider, 18^a, extending across the section, 16^b. The adjacent end of the rod, 17, is threaded to receive adjusting nuts, 17^d, which, through a washer, 17^e, bear on the spring, 17^c, and enable its tension to be adjusted as desired. As the section, 16^b, slides easily in the socket, 16^c, it will be seen that a comparatively light tension in the spring, 17^c, will suffice to keep the spherical surfaces in contact.

The engine frames, 1 and 1^a, being rigidly connected to the boiler sections, 7 and 7^a, and the pivots, 5, and hinges, 6 and 6^a, admitting of relative movement only in a horizontal plane, it may be found advisable in practice to provide for relative transverse and vertical movements of the boiler sections. To this end, I provide a structural modification of the draft passage joint, in which, as shown in Fig. 4, in addition to the spherical bearing above described, the draft passage section, 16^a, has a sliding bearing on the head, 10, of the rear boiler section, instead of being rigidly connected thereto. The rear face of the section, 16^a, is finished to a flat surface, and abuts against a corresponding bearing face on a supplemental section ring, 16^g, which is secured to the boiler head, 10. The frame or spider, 18, in this case, extends across the supplemental section ring, 16^g, and a suitable lubricating heat resisting packing, 16^h, is fitted in a recess in the face of the latter. The draft passage sections are connected by a rod, 17, under spring tension, as in the instance first described.

It will be seen that my invention provides a boiler comprising two independent sections, each rigidly secured to one of two articulated engine frames, and embodying, as a characteristic and novel structural feature, the attachment of the sections of the boiler one to the other by an articulated flue of comparatively small diameter, the joint of which is of such character as to be readily made and maintained, and to admit of the relative movement of the boiler sections and their attachment and detachment, as may from time to time be desired, with an extremely economical expenditure of time and labor. Its advantage, in avoiding the objections to the usual long boiler, which overhangs the forward frame of an articulated locomotive, and is moved into angular relation with the central plane thereof in passing curves, will be manifest to those familiar with locomotive practice, and it presents the further capability of providing independent smoke boxes adapted for the reception of a superheater and a reheater respectively, and which are less liable to accumulate a deposit

of unconsumed fuel, and better adapted for the removal of any deposit thereof that may be made, than a combustion chamber of comparatively large volume interposed between two sets of boiler tubes.

I am aware that a boiler comprising two sections, each provided with a set of tubes, and attached, one to the other by an intervening flexible section of substantially the same diameter as the shells of the sections, has been heretofore proposed, and I do not therefore broadly claim a boiler made in two sections, attached, with the capacity of relative movement one to the other.

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

1. A boiler made in two sections, one section being attached to the other, with the capacity of relative movement by an articulated flue of smaller diameter than the shells of the sections.

2. A boiler made in two sections, each having a smoke box at its end adjoining the other, said sections being attached one to the other by an articulated flue, opening at its ends into said smoke boxes and of smaller diameter than the same and providing capacity of relative movement of the boiler sections.

3. The combination, in a locomotive boiler, of two sections disposed one in advance of the other, and an articulated flue, of smaller diameter than said sections, attached at its opposite ends, thereto, and constituting the coupling members thereof.

4. The combination, in a locomotive boiler, of a rear section having a firebox at its rear end and a smoke box at its front end, and an intervening set of fire tubes, a forward section having a smoke box at each end and an intervening set of fire tubes, and an articulated flue, of smaller diameter than the sections and attaching the adjacent smoke boxes thereof, one to the other with the capacity of relative movement of the boiler sections.

5. The combination, in a locomotive boiler, of a rear section having a firebox at its rear end and a smoke box at its front end and an intervening set of fire tubes, a forward section having a smoke box at each end and an intervening set of fire tubes, a superheater located in the smoke box of the rear section, a reheater located in the rear smoke box of the forward section, and an articulated flue, of smaller diameter than the sections and attaching the adjacent smoke boxes thereof one to the other with the capacity of relative movement of the boiler sections.

6. The combination, in a locomotive boiler, of two sections, disposed one in advance of the other, and a ball and socket joint articulated flue, connected, at its opposite ends, to the boiler sections.

7. The combination, in a locomotive boiler, of a rear section, a forward section, heads closing the adjacent ends of said sections, an articulated flue comprising a ball section connected to the head of one boiler section and a socket section fitting movably in the head of the other boiler section, and means for imparting spring pressure to the abutting surfaces of the ball and socket sections.

8. The combination, in a locomotive boiler, of a rear section, a forward section, heads closing the adjacent ends of said sections, an articulated flue comprising a ball section connected to the head of one boiler section and a socket section fitting movably in the head of the other boiler section, means for imparting spring pressure to the abutting surfaces of the ball and socket section, and means for permitting movement of the ball section relatively to the head of the adjacent boiler section.

9. The combination, in a locomotive boiler, of a rear section, a forward section, heads closing the adjacent ends of said sections, an articulated flue ball section connected to the head of one boiler section, a socket and stuffing box on the head of the other boiler section, an articulated flue socket section fitting in said socket and stuffing box, and means for imparting spring pressure to the abutting surfaces of the ball and socket sections.

10. The combination, in a locomotive boiler, of a rear section, a forward section, heads closing the adjacent ends of said sections, an articulated flue ball section connected to the head of one boiler section, an articulated flue socket section fitting movably in the head of the other boiler section, a rod passing centrally through said ball and socket sections and abutting thereon by spherical faced bearings, a spring imposing pressure on the bearings of said rod, and an adjusting nut engaging said rod and bearing on said spring.

11. The combination, in a locomotive boiler, of a rear section, a forward section, heads closing the adjacent ends of said sections, an articulated flue ball section abutting against, and movable relatively to, a flat bearing connected to the head of one boiler section, an articulated flue socket section fitting movably in the head of the other boiler section, a rod passing centrally through said ball and socket sections and abutting thereon by spherical faced bearings, a spring imposing pressure on the bearings of said rod, and an adjusting nut engaging said rod and bearing on said spring.

12. A boiler made in two sections, one section being articulated to the other by a movable joint connection.

13. A boiler made in two sections, one section being articulated to the other by a two part movable joint flue.

14. A boiler made in two coupled sections,

the coupling member of the sections being articulated by a movable joint.

15. The combination, in a locomotive boiler, of two sections, one disposed in advance of the other on the same longitudinal line and spaced apart, and an intervening movable joint articulated section coupling the two boiler sections together, and forming a flue.

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Witnesses:
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