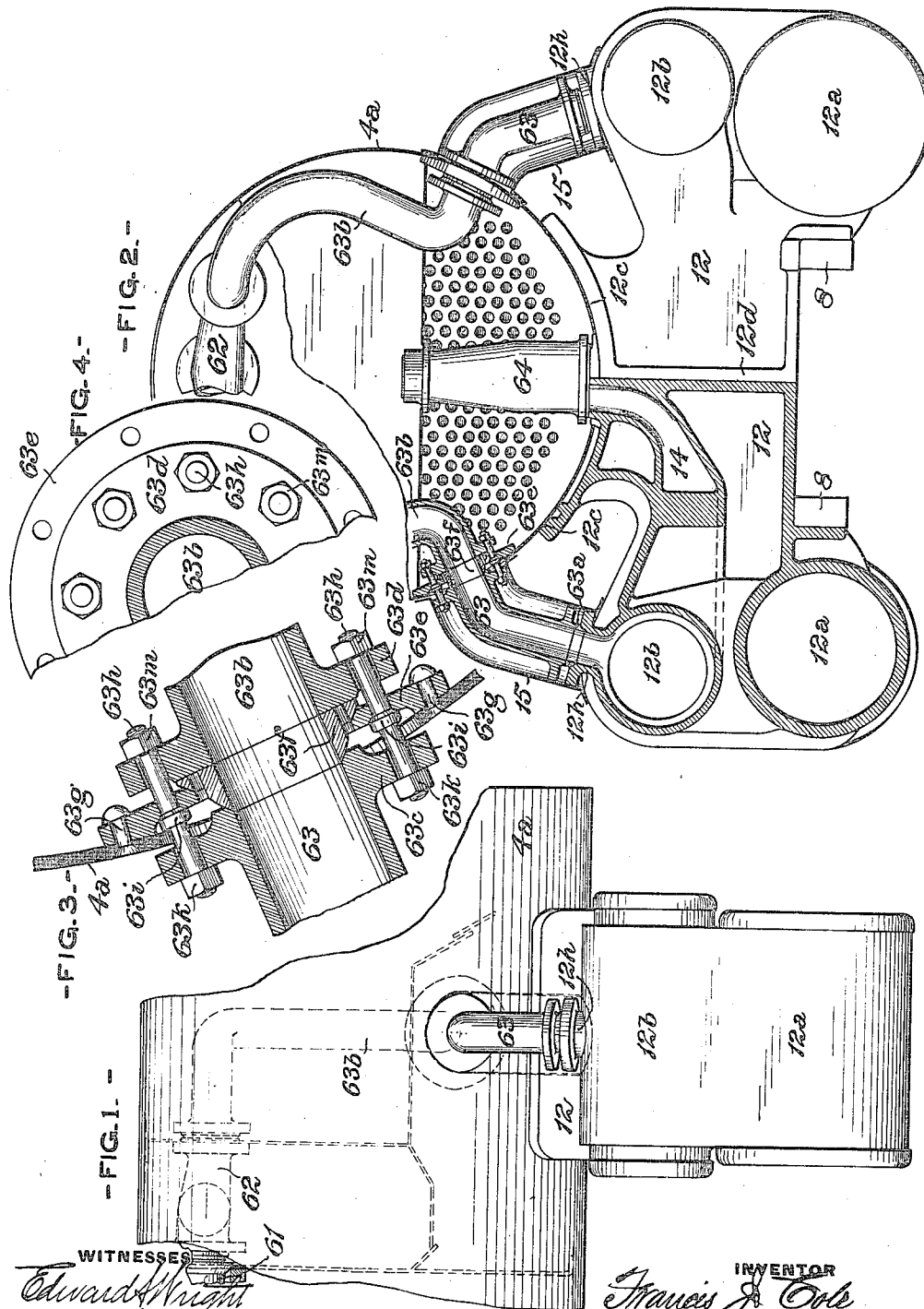


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APPLICATION FILED APR. 8, 1911.

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Patented July 25, 1911.

2 SHEETS—SHEET 1.

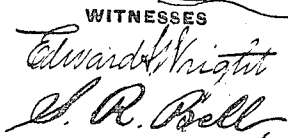


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2 SHEETS - SHEET 2.



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# UNITED STATES PATENT OFFICE.

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## STEAM-PIPE FOR LOCOMOTIVE-ENGINES.

998,872.

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Application filed April 8, 1911. Serial No. 619,650.

*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-Pipes for Locomotive-Engines, of which improvement the following is a specification.

The object of my invention is to provide novel and improved means for connecting the valve chests of a locomotive engine with the main steam supply pipe thereof, whereby a simplification of the construction of the cylinders will be rendered conveniently practicable; a substantial reduction of the obstruction of the smoke box and the impairment of draft, which are conditions of the ordinary steam pipe construction, shall be effected; and air and steam tight joints which can be readily made and effectually maintained, be provided.

The improvement claimed is hereinafter fully set forth.

In the accompanying drawings: Figure 1 is a side view, in elevation, of the right hand cylinder and valve chest, and the adjoining portion of the boiler, of a locomotive engine in which my invention is applied; Fig. 2, a view, half in front elevation, and half in central transverse section, of the cylinder saddles, and a partial transverse section through the smoke box; Fig. 3, a longitudinal section, on an enlarged scale, through the adjoining portions of the right hand steam pipes, showing the steam and air joints thereof; Fig. 4, a view, in elevation, of the joint members, as seen from the right hand side of Fig. 3; Fig. 5, a view of the same character as Fig. 1, but illustrating a structural modification; and, Fig. 6, a view of the same character as Fig. 2, showing said structural modification.

Referring first to Figs. 1 to 4 inclusive, in the practice of my invention, the smoke box, 4<sup>a</sup>, which constitutes the forward portion of the boiler of the locomotive, is supported upon, and connected to the frames, 8, by a pair of what are known as "half saddle cylinders," which are ordinarily, as indicated, counterparts, each comprising a saddle portion, 12, having a curved bed or seat, 12<sup>c</sup>, on its top at one side and a steam cylinder, 12<sup>a</sup>, and superposed distribution valve chest, 12<sup>b</sup>, on the opposite side. The two half saddle cylinders are, as in ordinary practice, finished on their meeting faces, and are secured together by bolts passing

through flanges, 12<sup>d</sup>, adjoining said faces. When so connected, the beds, 12<sup>c</sup>, form a segmental seat, upon which the smoke box, 4<sup>a</sup>, rests, and to which it is bolted. An exhaust steam passage, 14, (one or more) extends from each valve chest, 12<sup>b</sup>, to the top of the saddle portion, and an exhaust pipe, 64, is bolted to the saddle portions, above the upper openings of the exhaust passages. The live steam passages which are ordinarily cored in half saddle cylinder castings are wholly dispensed with, and in lieu thereof, the communication of the valve chests with the main steam supply pipe or dry pipe, 61, is effected by the following construction. The main steam pipe or dry pipe, 61, of the boiler, through which steam is supplied to the cylinders, 12<sup>a</sup>, is connected, at its forward end, to a T head, 62, in the usual manner. Branch steam supply pipes, 63<sup>b</sup>, which convey steam from the main steam pipe to the cylinders, are connected to the opposite sides of the T head, and lead therefrom, through the smoke box, 4<sup>a</sup>, following, substantially, its curvature, to a plane in the lower portion thereof, in which they are connected to the upper ends of outside steam pipes, 63, the lower ends of which are, in turn, connected to necks or short live steam passages, 12<sup>b</sup>, projecting from the tops of the valve chests, 12<sup>b</sup>, ball joint rings, 63<sup>a</sup>, being interposed, to form tight joints with the capacity of a limited degree of relative movement of the outside steam pipes and the valve chests. In order to protect the outside steam pipes from the cooling action of the atmosphere, they are inclosed in sheet metal casings, 15, which extend from the half saddle castings to the outside of the smoke box, and may be provided with lagging of any suitable and preferred material which is a nonconductor of heat. Under this construction, a considerable percentage of the cross sectional area of the smoke box below the spark arresting appliances, which, under the ordinary construction, is obstructed by the lower portions of the branch steam pipes, is now left entirely free and open, thereby correspondingly promoting the free passage of the products of combustion to the stack, improving the draft, and rendering access to the parts within the smoke box more ready and convenient.

It will be obvious that it is of material practical importance to effectually prevent leakage of air into the smoke box, around

the joints of the inside and outside steam pipes, and leakage of steam at the junctions of said pipes, and at the same time provide for the ready connection and disconnection of the inside and outside steam pipes, as may, from time to time, be required. To this end, as shown on an enlarged scale in Fig. 3, a flange, 63<sup>c</sup>, is formed on the upper end of each of the outside steam pipes, 63, and a flange, 63<sup>d</sup>, of corresponding diameter, is formed on the lower end of each of the inside steam pipes, 63<sup>b</sup>. Between these flanges are interposed an air joint plate or ring, 63<sup>e</sup>, which is fitted truly against the inside of the smoke box shell around the opening therein through which the outside steam pipe, 63, projects, and a steam joint ring, 63<sup>f</sup>, which fits, by spherical faces, within and against the air joint ring and the outer steam pipe, 63, and fits, by a flat face, against the inside steam pipe, 63<sup>b</sup>. The air joint ring, 63<sup>e</sup>, is secured to the smoke box by rivets or bolts, 63<sup>g</sup>, and the inside and outside steam pipes are connected and drawn up to proper bearing on the interposed steam joint ring, 63<sup>f</sup>, by bolts, 63<sup>h</sup>, having collars, 63<sup>i</sup>, which bear on the air joint ring, 63<sup>e</sup>, and nuts, 63<sup>k</sup> and 63<sup>m</sup>, on their ends, which bear on the flanges, 63<sup>c</sup> and 63<sup>d</sup>, of the outer and inner steam pipes respectively. It will be seen that by this construction, tight air and steam joints are provided, a firm connection of the inner and outer steam pipes effected, and the capacity afforded of disconnecting either the outer or the inner steam pipes as desired, without disturbance of the other pipe of either pair.

Figs. 5 and 6 illustrate a structural modification embodying the essential features above described, in which each of the outside steam pipes, 63, is connected to the T head and main steam supply pipe through the intermediation of a superheater header, 70, which, in the establishment of communication between the steam supply pipe and the outside steam pipe, performs the same function as a steam conveying member, and serves as a mechanical equivalent for, the inside steam pipe, 63<sup>b</sup>, before described. In the instance exemplified, the superheater header, 70, is of the type set forth in Letters Patent of the United States No. 875,895, granted and issued to me under date of January 7, 1908, but it does not, in and of itself, form part of my present invention, and may be of any other known and preferred construction. The header, 70, is secured to a support, 71, which is bolted or riveted to the inside of the smoke box, against which it is fitted truly around the opening therein through which the outside steam pipe, 63, projects, thereby constituting an air joint plate and forming an air tight joint therewith, similarly to the air

joint plate or ring, 63<sup>e</sup>, before described. A ball joint ring, 63<sup>n</sup>, is interposed between the top of the outer steam pipe, 63, and the superheater header, 70, forming a steam tight joint between the two, similarly to the steam joint ring, 63<sup>f</sup>, and the outside steam pipe is, as before, provided with a flange, 63<sup>c</sup>, adjoining its upper end, which is secured to the superheater header by bolts, 63<sup>o</sup>. The outer steam pipes, 63, are inclosed in casings, 15, as in the instance first described.

The construction last above described embodies the same essential structural features and presents the same operative advantages as that first described, there being, in each case, an outside steam pipe, a steam conveying member in the inside of the smoke box connecting this pipe, either directly or indirectly, as the case may be, with the main steam supply pipe, air and steam tight joints between the inside steam conveying member and the smoke box, and between the inside and outside steam conveying members, respectively, and the capacity of detachment and attachment of the outside steam pipes without disturbance of the inside steam conveying members.

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

1. The combination, with a locomotive boiler, of a half saddle cylinder having a steam cylinder and a superposed communicating distribution valve chest, an outside steam supply pipe connected to the valve chest and leading therefrom, exterior to the half saddle cylinder, to the smoke box of the boiler, a steam conveying member located within the smoke box and communicating with the main steam supply pipe of the boiler and with the outside steam pipe, and means connecting the outside steam pipe and inside steam conveying member with the capacity of attachment and detachment of either without disturbance of the other.

2. The combination, with a locomotive boiler, of a half saddle cylinder having a steam cylinder and a superposed communicating distribution valve chest, an outside steam supply pipe connected to the valve chest, and leading therefrom, exterior to the half saddle cylinder, to the smoke box of the boiler, a steam conveying member located within the smoke box and communicating with the main steam supply pipe of the boiler and with the outside steam pipe, means connecting the outside steam pipe and inside steam conveying member with the capacity of attachment and detachment of either without disturbance of the other, and means, independent of, and interposed between, said pipe and said member, for preventing air leakage into the smoke box.

3. The combination, with a locomotive

boiler, of a half saddle cylinder having a steam cylinder and a superposed communicating distribution valve chest, an outside steam supply pipe connected to the valve chest and leading therefrom, exterior to the half saddle cylinder, to the smoke box of the boiler, a steam conveying member located within the smoke box and communicating with the main steam supply pipe of the boiler and with the outside steam pipe, an air joint plate interposed between the inside steam conveying member and the smoke box, and a steam joint ring interposed between said member and the outside steam pipe.

4. The combination, with a locomotive boiler, of a half saddle cylinder having a steam cylinder and a superposed communicating distribution valve chest, an outside steam supply pipe connected to the valve chest and leading therefrom, exterior to the half saddle cylinder, to the smoke box of the boiler, a steam conveying member located within the smoke box, and communicating with the main steam supply pipe of the boiler, an air joint plate fixed to the inside of the smoke box around the opening therein for the outside steam pipe, connections securing the outside steam pipe and inside steam conveying member detachably to said plate, and a steam joint ring interposed between said pipe and said member.

5. The combination, with a locomotive boiler, of a half saddle cylinder having a steam cylinder and a superposed communicating distribution valve chest, an outside steam supply pipe connected to the valve chest and leading therefrom, exterior to the half saddle cylinder, to the smoke box of the boiler, a steam conveying member located

within the smoke box and communicating with the main steam supply pipe of the boiler, an air joint plate secured to the inside of the smoke box around the opening therein for the outside steam pipe, connections securing the outside steam pipe and inside steam conveying member detachably to said plate, and a steam joint ring interposed between said member and said plate and between said plate and the outside steam pipe.

6. The combination, with a locomotive boiler, of a half saddle cylinder having a steam cylinder and a superposed communicating distribution valve chest, an outside steam supply pipe connected to the valve chest and leading therefrom, exterior to the half saddle cylinder, to the smoke box of the boiler, a steam conveying member located with the smoke box and communicating with the main steam supply pipe of the boiler, an air joint plate secured to the inside of the smoke box around the opening therein for the outside steam pipe, a steam joint ring fitting, by spherical faced joints, in said plate and in the outside steam pipe, and fitting against the inside steam conveying member, bolts passing through flanges on the outside steam pipe and inside steam conveying member and having collars bearing on the air joint plate, and nuts engaging threads on the ends of said bolts and bearing on the flanges of the outside steam pipe and the inside steam conveying member, respectively.

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