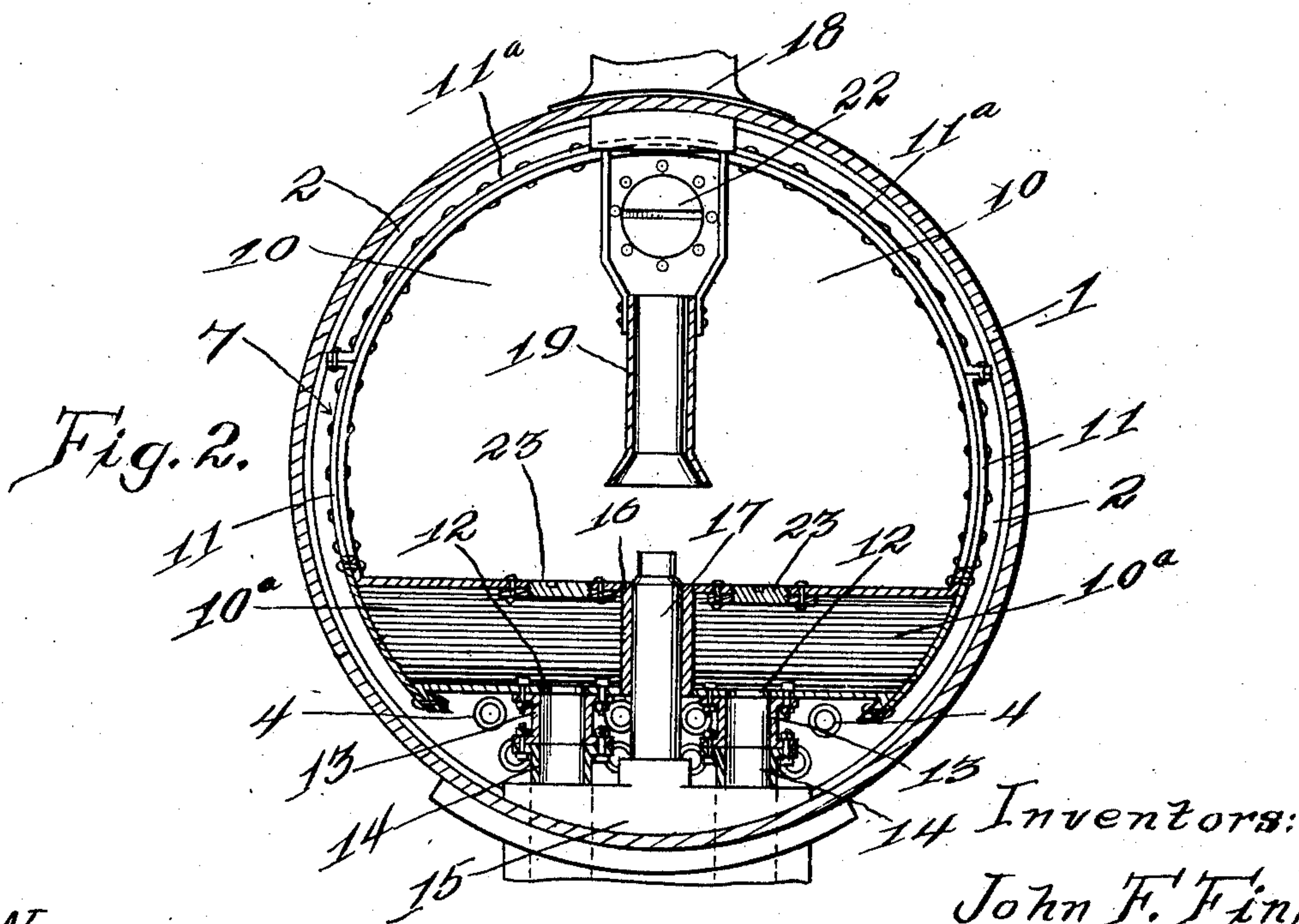
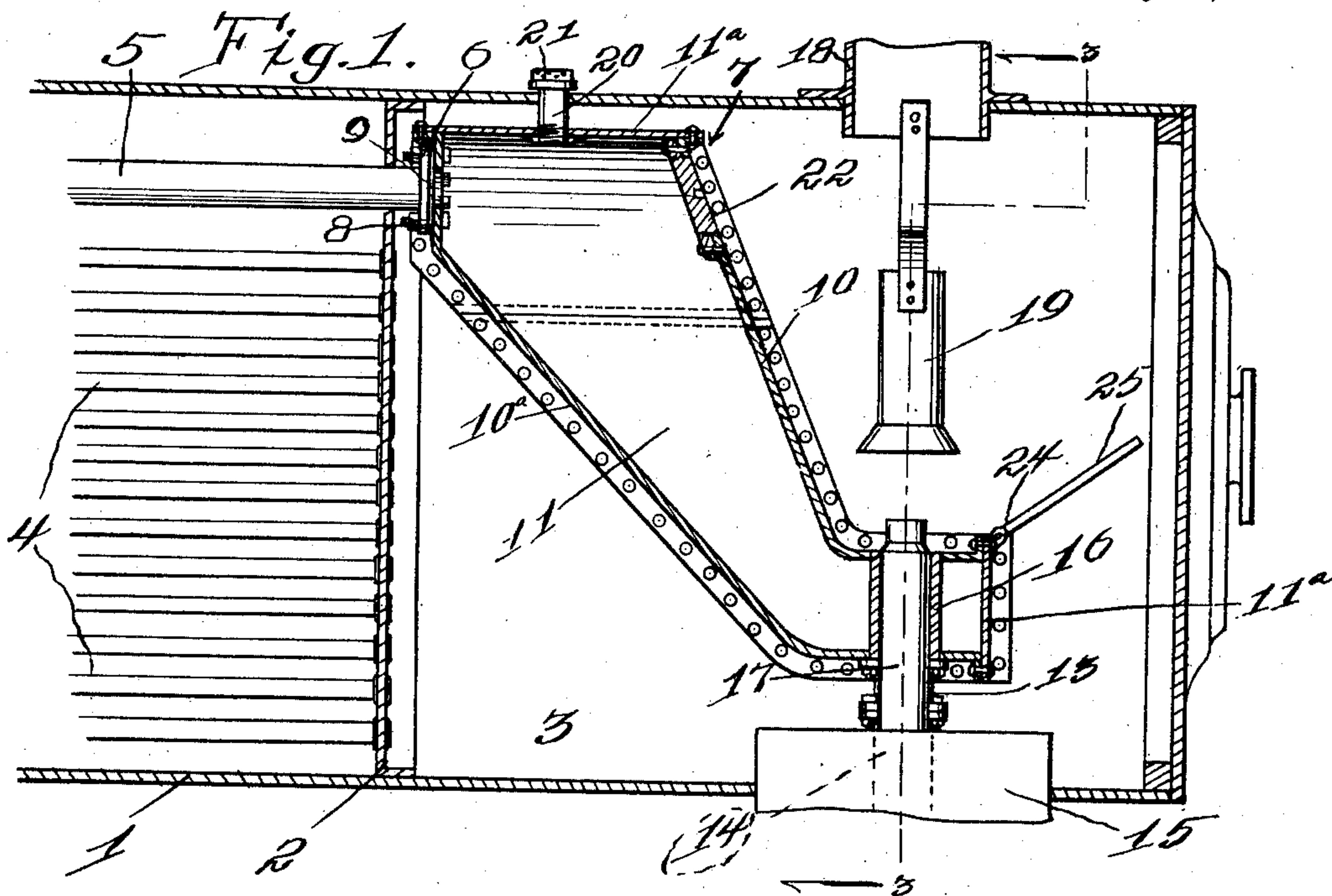


J. F. FINK & S. T. HILL.  
SUPERHEATER.

APPLICATION FILED JAN. 15, 1910.

998,489.

Patented July 18, 1911.



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# UNITED STATES PATENT OFFICE.

JOHN F. FINK AND STEPHEN T. HILL, OF CHICAGO, ILLINOIS.

## SUPERHEATER.

998,489.

Specification of Letters Patent.

Patented July 18, 1911.

Application filed January 15, 1910. Serial No. 538,261.

*To all whom it may concern:*

Be it known that we, JOHN F. FINK and STEPHEN T. HILL, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Superheaters, of which the following is a specification.

Our invention relates to a superheater designed particularly for use in connection with locomotive boilers, for the purpose of superheating the steam generated thereby, but may also be used in connection with any type of steam generator.

The principal object of our invention comprehends the production of a device of the above character, so constructed that it will serve as a baffle to retard the heat before it passes out through the smoke-stack.

A further object of our invention resides in providing the superheater with a vacuum-valve which is adapted to open inwardly, when the throttle valve is closed, to admit the outside atmosphere to the superheater and the steam cylinders. This is particularly true when the engine is coasting, when the atmosphere will be drawn through the superheater and steam supply pipes into the cylinders by the action of the pistons, which not only serves to cool the superheater and supply pipes, to prevent them from burning out, but also aids the lubricating oil to spread over the walls of the cylinders.

A still further object of our invention is to provide a superheater in the form of a single chamber, connected directly to the dry-pipe of a locomotive boiler and having a greater area or capacity than that of the steam cylinders, whereby the steam will remain a longer time within the superheater and consequently be superheated to a higher degree than if the area of the superheater and that of the cylinders were the same.

In the accompanying drawing, which illustrates our invention as applied to a locomotive boiler,—Figure 1 is a longitudinal vertical sectional view taken through the smoke box and a portion of the front end of the boiler. Fig. 2 is a vertical transverse sectional view taken on the line 3—3 of Fig. 1, looking in the direction indicated by the arrows.

Reference being had to the drawings and the numerals indicated thereon, 1 indicates the shell of the boiler, which extends forwardly beyond the boiler head or flue sheet

2 a suitable distance to form the smoke box 3. Fastened in the flue sheet 2 are the ends of the usual fire tubes 4. Passing through the flue sheet 2, above the fire tubes 4, is the dry-pipe 5, the outer end of which is provided with a flange 6 to which the superheater 7 is connected by means of bolts 8. A gasket 9 is interposed between the flange 6 and the superheater to provide a steam tight connection.

The superheater 7 is in the form of a single chamber composed of a front and a rear plate 10 and 10<sup>a</sup>, respectively, side plates 11, and end plates 11<sup>a</sup>, all formed of boiler-iron and securely riveted together, and braced by a suitable number of stay bolts. As most clearly shown in Fig. 1, the upper ends of the front and rear plates, 10 and 10<sup>a</sup> respectively, are a considerable distance apart, and taper inwardly toward their lower ends. This is to provide a large space for the saturated steam to enter the superheater, and also to enable the superheater to be made so that it will have a greater area than that of the steam cylinders, without making it too long. The front and rear plates 10, and 10<sup>a</sup> respectively, extend downwardly and forwardly within the smoke box 3 to within a short distance from the bottom thereon, the distance being sufficient to allow a large enough draft space; and then forwardly a suitable distance in parallel relation to each other. By referring to Fig. 2, it will be seen that the superheater extends almost entirely across in front of the flue sheet 2, so as to present a large area to the action of the heat and gases in the smoke box 3.

Formed in the rear plate 10<sup>a</sup> of the forwardly extended portion of the superheater is a pair of outlet openings 12, one adjacent each of the edges of said plate 10<sup>a</sup>. Bolted to the under side of said plate, at each of the openings 12, is a short pipe 13, to the lower ends of which are connected the cylinder supply pipes 14, which enter the cylinder saddle 15 in the usual manner and convey the superheated steam from the superheater to the cylinder chests.

The front and rear plates 10, and 10<sup>a</sup> respectively, between the outlet openings 12, are each provided with an opening in which is fitted a ring or pipe 16, through which is passed the upper end of the exhaust nozzle 17, above which, and in alinement with the smoke stack 18, is the usual petticoat pipe 19.



Fastened to the upper end plate 11<sup>a</sup> of the superheater is a pipe 20 which extends upwardly through the boiler shell 1 and has fastened thereto a vacuum-valve 21. This valve 21 is kept closed by the pressure within the superheater when the throttle valve is open, but opens to the pressure of the outside atmosphere when the throttle valve is closed. It will thus be seen that when the throttle valve is closed, and the engine is coasting, the action of the pistons will cause the air to be drawn in through the valve 21, and its passage through the superheater, and supply pipes 14, as well as the cylinders, serves not only to cool these parts, but aids the lubricating oil in spreading over the walls of the cylinders.

The front plate 10 of the superheater, directly opposite the mouth of the dry-pipe 5, is provided with a hand-hole 22, through which a suitable tool may be inserted to tighten the clamping bolts 8. These bolts, together with those used to attach the pipes 13 to the underside of the rear plate 10<sup>a</sup>, are introduced from the inside of the superheater so as to prevent any liability of their taps becoming loose and falling into the supply pipes 14. To provide for the removal of any nuts, or the like, which may fall into the superheater while it is being mounted in position, we provide the front plate 10 with a pair of small hand-holes 23, one above each of the outlet openings 12.

Formed integral with the front end plate 11<sup>a</sup> are lugs 24, to which is pivoted a damper 25 to regulate the draft, and which may be operated by any suitable means from the engine cab.

For use in connection with compound engines having high and low pressure cylinders, a high and a low pressure superheater are to be used, identical in construction, and arranged one in front of the other, and the exhaust from the high pressure cylinders connected to the low pressure superheater. By this arrangement the steam exhausting from the high pressure cylinders will pass into the low pressure superheater and be reheated before passing into the low pressure cylinders.

While we have shown and described our invention as used in connection with a locomotive boiler, it will be understood that it

may be equally as well used in connection with any other type of boiler, and no limitation is implied by reason of the particular structure shown. When used in connection with other boilers, however, the ring or pipe 16 for the reception of the exhaust nozzle 17 may be omitted as unnecessary, and the superheater connected direct to the boiler head or flue sheet to the steam space.

We claim:

1. A superheater for steam generators, comprising a single chamber located in front of the generator head, and having direct connection with the steam space of the generator, said chamber extending downwardly and forwardly, and provided at its lower end with a forwardly extending portion also open to the steam, said forwardly extending portion being provided on its lower side with outlets for the steam.

2. A superheater for steam generators, comprising a single chamber located in front of the generator head, and having direct connection with the steam space of the generator, said chamber extending downwardly and forwardly, and provided at its lower end with a forwardly extending portion also open to the steam, and provided with an intermediate opening and a tube secured through said opening, and short rigid steam-outlet connections extending from the underside of said forwardly extending portion.

3. In combination with a locomotive boiler, a smoke box, a superheater comprising a tapering chamber arranged in front of the boiler head, its large end having a direct connection with the dry-pipe of the boiler, and its small end provided with outlet pipes, supply pipes connected to said outlet pipes for conveying the superheated steam from the chamber to the steam cylinders, and a vacuum-valve connected to the upper end of the chamber for establishing communication between the chamber and the outside atmosphere when the locomotive is drifting.

In testimony whereof we affix our signatures in presence of two witnesses.

JOHN F. FINK.  
STEPHEN T. HILL.

Witnesses:

ARTHUR WESLEY,  
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