(Model.)

2 Sheets—Sheet 1.

R. G. BROOKE.

INJECTOR.

No. 534,194. Patented Feb. 12, 1895.

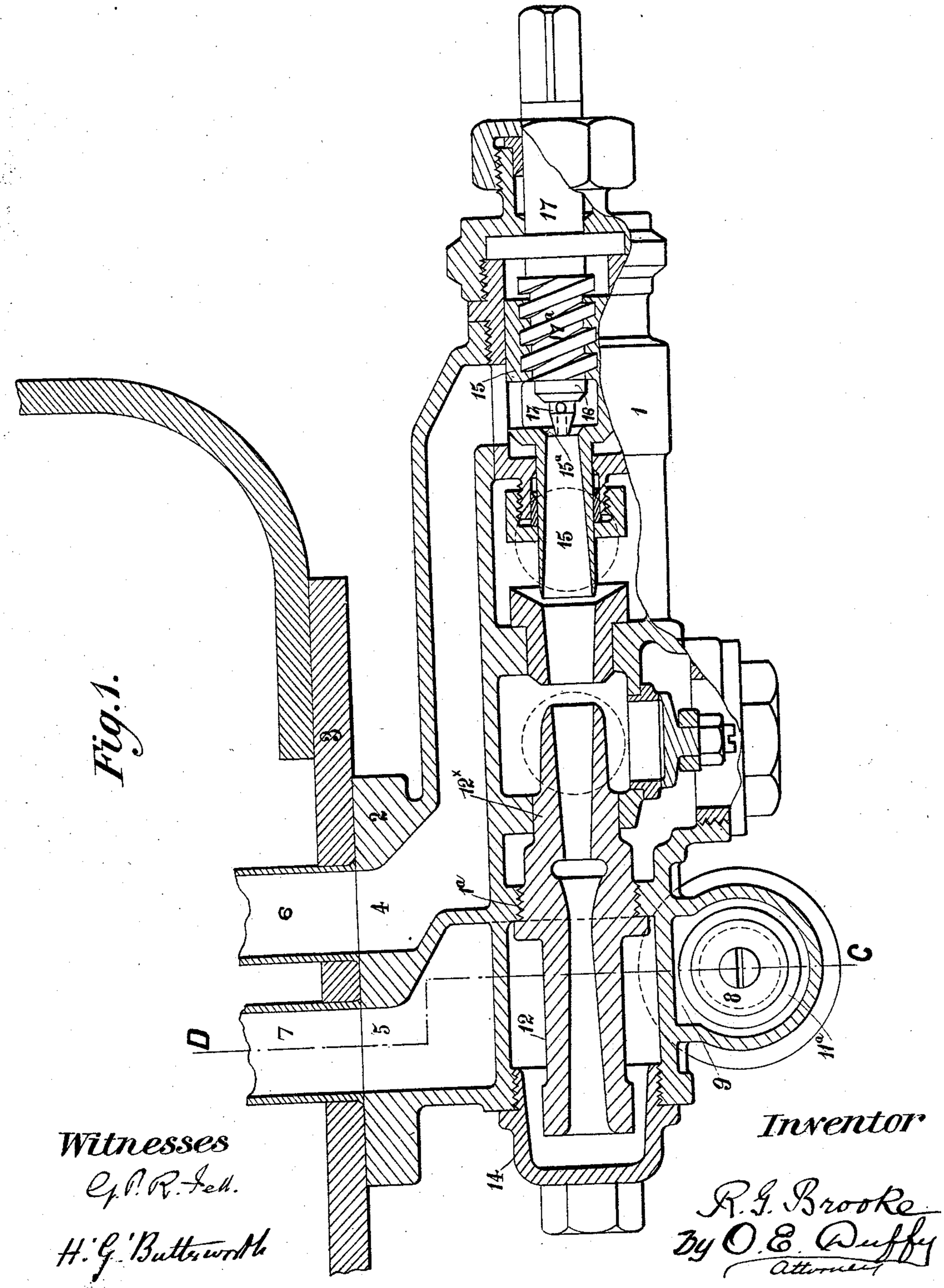

Fig. 1.

Witnesses
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(Model.)

2 Sheets—Sheet 2.

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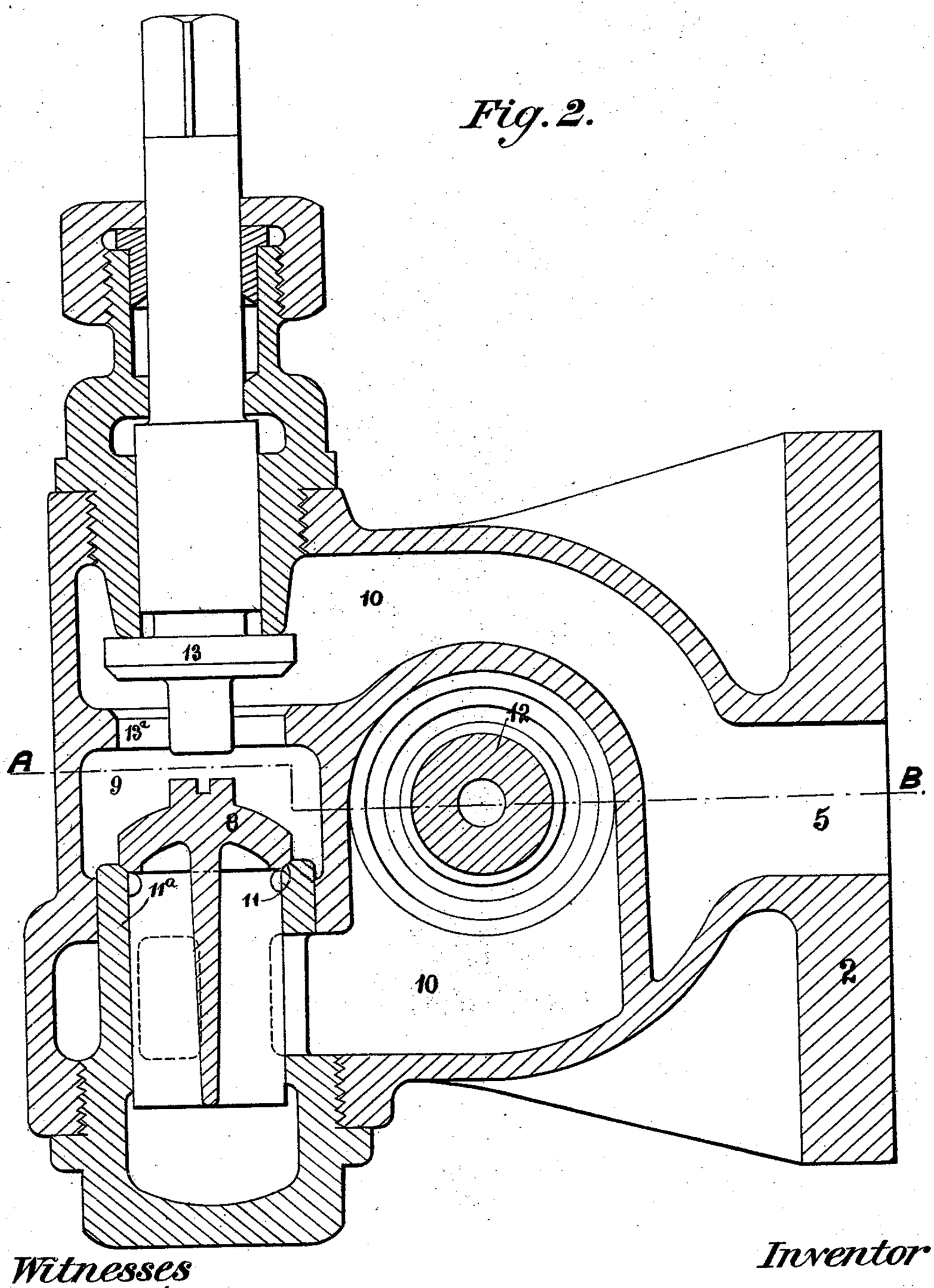
Fig. 2.



Witnesses

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UNITED STATES PATENT OFFICE.

ROBERT GRUNDY BROOKE, OF BLACKPOOL, ENGLAND.

INJECTOR.

SPECIFICATION forming part of Letters Patent No. 534,194, dated February 12, 1895.

Application filed October 15, 1892. Serial No. 448,966. (Model.) Patented in England April 12, 1892, No. 7,039, and in Canada May 15, 1893, No. 42,909.

To all whom it may concern:

Be it known that I, ROBERT GRUNDY BROOKE, a subject of the Queen of Great Britain and Ireland, residing at Blackpool, in the county of Lancaster, England, have invented Improvements in Injectors, (for which Letters Patent have been obtained in Great Britain, No. 7,039, dated April 12, 1892, and in Canada, No. 42,909, dated May 15, 1893,) of which the following is a specification.

This invention has reference to injectors of the type known as combination injectors, in which several boiler fittings usually separate and distinct from the injector, are combined in the one apparatus.

Injectors of this class have usually been fixed on the back plate of locomotive fire boxes, but it is found that it is not always practicable or convenient to fix injectors on this part of the boiler. An object of my present invention is to construct an injector of the type referred to in such a manner that it can be conveniently fixed to any part of the boiler, and so that its various parts can be more conveniently taken apart than has hitherto been usual. For this purpose I construct an injector of the kind referred to with a self-contained non-return or check valve having its case so formed and arranged in relation to a specially formed delivery passage that the seat of the said valve, as well as the valve itself, can be made removable without breaking any of the injector joints or connections; that the injector can be fixed with its body near to the boiler shell; and that the combining and delivery nozzles can if desired be readily withdrawn from the delivery end of the injector casing in a manner well understood.

In the accompanying drawings, Figure 1 is a horizontal section on the line A B Fig. 2; and Fig. 2 is a vertical cross section to a large scale on the line C D Fig. 1, of an injector of the type referred to, constructed according to this invention.

1 is the injector casing formed with a flange 2 by means of which it can be fixed to a boiler shell 3 with its steam inlet 4 and delivery outlet 5 directly opposite steam and delivery pipes 6 and 7 respectively arranged within the boiler and so that the body of the injector can be close up to the boiler.

8 is the self-contained non-return or check valve arranged within a case 9 and serving to check the return flow of water through the specially constructed delivery passage 10.

11 is the valve seat.

The valve case is arranged at the side of the injector casing away from the flange 2, and the delivery passage 10 is arranged transversely to the delivery nozzle 12 so that the water from the delivery nozzle will first pass outwardly and away from the final delivery outlet 5 until it passes through the valve case 9, whence it will pass back in a direction toward the final delivery outlet and thence into the boiler. By this construction it will be seen that the valve seat 11 for the non-return valve 8 can be formed on a tubular part 11^a adapted to be screwed into the bottom of the valve case so that the valve seat and the non-return valve can be readily removed for refacing or other purpose and then be replaced, without breaking any of the injector joints or connections.

The injector may as shown be provided with a stop valve 13 adapted when moved onto its seat 13^a to close the delivery passage 10 at a point between the non-return valve 8 and the boiler so that the said non-return valve together with its seat, can then be removed while the boiler is under steam.

The valve case 9 containing the non-return valve 10, and it may be also the stop valve, instead of being made in one with the main body of the injector casing as shown, may be made separate therefrom and be secured thereto by any convenient means; also the valve seat for the non-return valve may be cast in one with the wall of the chamber and the valve be introduced from the top through an opening normally closed by a plug.

The delivery nozzle 12 together with the part 12* of the combining nozzle, is screwed into the injector casing at 1^a which is formed at the adjacent end with an opening normally closed by a screw cover 14 by removing which the delivery and combining nozzles can after shutting off the supply of steam to the steam nozzle 15 be readily withdrawn from the in-

jector casing without disturbing any other portions of the injector.

The injector casing instead of being constructed with a single flange 2 formed with steam inlet and delivery openings 4 and 5 arranged near together as shown, can be constructed with separate steam and delivery flanges as indicated by dotted lines so arranged that each of them can be fastened direct to the boiler as well understood.

The injector described may be provided as shown, with a steam valve 16, having its axis arranged co-axially with that of the injector. This valve is formed in one with or carried by the regulating spindle 17 which carries the screw 17^a for regulating the position of the steam nozzle 15 and the adjacent end of which nozzle is formed with a seat at 15^a for the steam valve as well understood.

What I claim is—

1. In an injector of the type herein referred to a non-return valve arranged to control the flow of water through the delivery passage, and having a seat capable of being removed without breaking any of the injector joints or connections substantially as herein described for the purpose specified.

2. An injector of the type herein referred to constructed with a check valve arranged to control the flow of water through the delivery passage, a removable seat therefor, and a stop valve arranged to close the delivery passage at a point between the said check valve and the delivery outlet substantially as herein described.

3. An injector of the type herein referred to having a delivery passage extending transversely around the delivery nozzle so that water issuing from said nozzle will first take a direction away from the final delivery outlet and afterward a direction toward such outlet, a valve chamber formed in a part of such passage, and a check valve located in said chamber, substantially as herein described for the purpose specified.

4. An injector of the type herein referred to having a flange 2 with steam inlet and delivery outlet, a delivery passage extending from and transversely around the delivery nozzle, a valve chamber formed in said passage at a point of the injector casing opposite to said flange, a check valve located in said valve chamber and a removable tubular support formed with a valve seat and screwed through the delivery passage and injector casing substantially as herein described for the purpose specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ROBERT GRUNDY BROOKE.

Witnesses:

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