

No. 631,273.

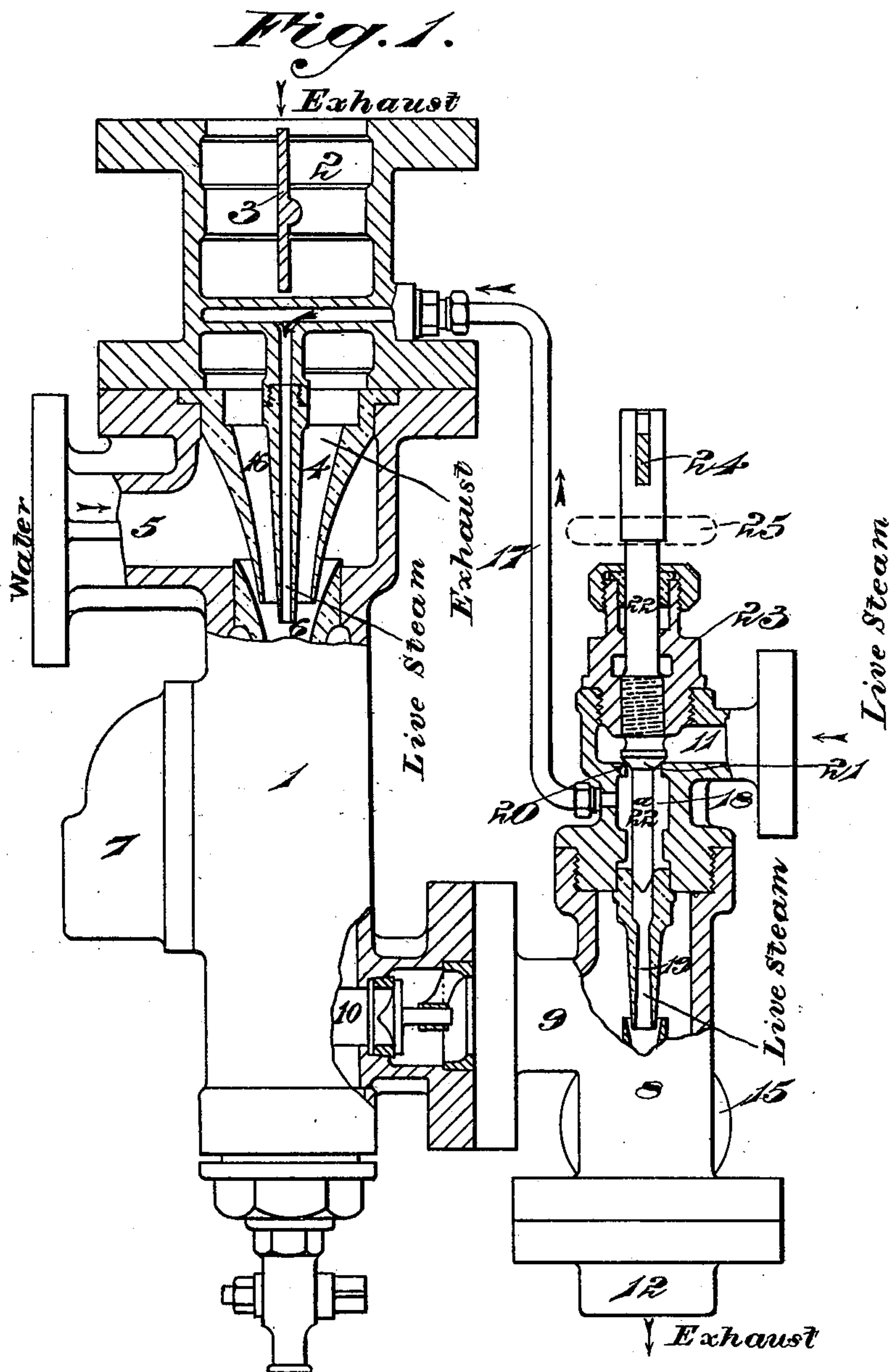
Patented Aug. 22, 1899.

R. G. BROOKE.
INJECTOR.

(Application filed May 7, 1898.)

(Model.)

2 Sheets—Sheet 1.



Witnesses:

C. C. Duff
M. H. Haskell

Inventor

Robert G. Brooke

per *C. C. Duff*
Attorney

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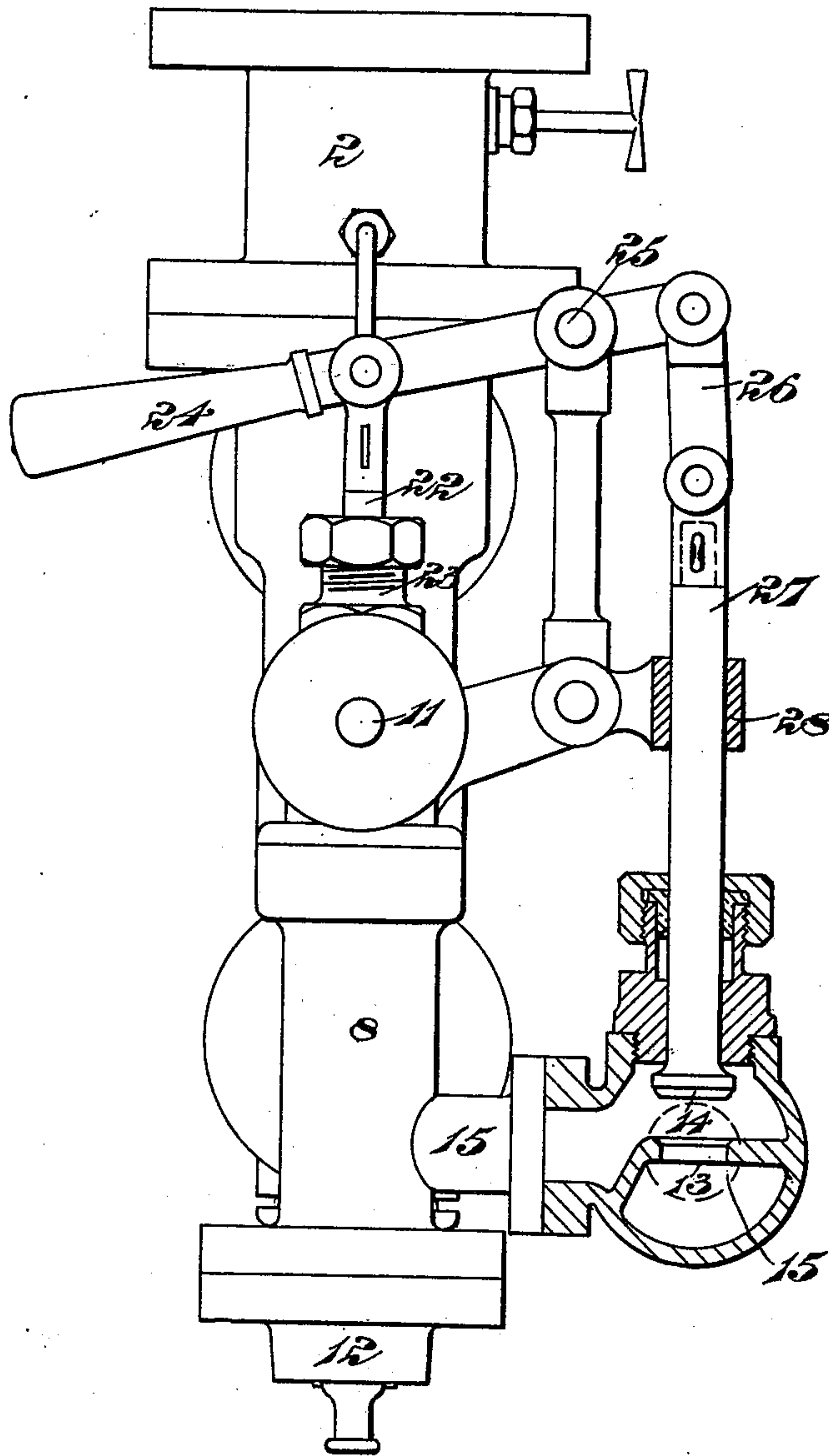
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(Model.)

2 Sheets—Sheet 2.

Fig. 2.



Witnesses:

E. C. Duff
M. H. Haskell

Inventor

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per *E. C. Duff*
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UNITED STATES PATENT OFFICE.

ROBERT GRUNDY BROOKE, OF MACCLESFIELD, ENGLAND.

INJECTOR.

SPECIFICATION forming part of Letters Patent No. 631,273, dated August 22, 1899.

Application filed May 7, 1898. Serial No. 680,038. (Model.)

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 Macclesfield, in the county of Chester, England, have invented Improvements in Injectors, of which the following is a specification.

In combined exhaust and supplementary injectors in which the supplementary injector receives its water from the exhaust-injector and forces it by means of live steam against a higher pressure than the exhaust-injector could force it alone it is sometimes necessary to provide the exhaust-steam nozzle with a central live-steam spindle from which a jet of live steam is caused to issue in order to cause the exhaust-injector to start in a quick and reliable manner.

Now according to this invention live steam is admitted to the live-steam spindle of the exhaust-injector by movement of the same operating part that serves to admit live steam to the supplementary injector, but in such a way that it enters the said steam-spindle before it enters the steam-nozzle of the supplementary injector, whereby the combined injectors are caused to start and work in a better manner than usual.

Figures 1 and 2 of the accompanying illustrative drawings are views taken at right angles to each other and each showing, partly in side elevation and partly in vertical section, combined exhaust and supplementary injectors with one arrangement of live-steam-controlling means according to this invention.

1 is the exhaust-steam injector, having an exhaust-steam inlet 2 with controlling-valve 3, an exhaust-steam nozzle 4, water-inlet 5, combining-nozzle 6, and overflow 7.

8 is the supplementary injector, having an inlet 9 in communication with the delivery 10 of the exhaust-injector, a live-steam inlet 11, a delivery-outlet 12, a relief-opening 13, controlled by a valve 14, and a relief or overflow branch 15. 10^a is a back-pressure valve between the two injectors. 16 is the live-steam spindle of the exhaust-injector, arranged centrally within the exhaust-steam nozzle 4. It is in communication with one end of a steam-supply pipe 17, the other end of which is in communication with a live-steam chamber 18,

formed in the supplementary injector 8, between the steam-nozzle 19 thereof and the seat 20 of the valve 21, that controls the supply of live steam from the inlet 11 to such nozzle. This valve 21 is fast on a stem or spindle 22, the inner end 22^a of which extends some distance into the nozzle 19, which it fits, so that on partly opening the valve live steam will pass to the supply-pipe 17 of the live-steam spindle 16 of the exhaust-injector before the inner end 22^a of the valve-spindle leaves the steam-nozzle 19 of the supplementary injector and permits live steam to pass thereto. The valve-spindle 22 extends through a stuffing-box 23 and may be moved endwise by a hand-lever 24, or it may be screw-threaded, as indicated in dotted lines at 22^b, and be turned by a hand-wheel 25 (also indicated in dotted lines) or equivalent.

As will be seen, with the arrangement described by slightly raising the spindle 22 and valve 21 live steam can be permitted to enter the pipe 17 and pass to the live-steam spindle 16 of the exhaust-injector 1 before it is admitted to the steam-nozzle 19 of the supplementary injector, to which it can be admitted by raising the spindle sufficiently to withdraw its lower end 22^a from the steam-nozzle 19. The movement of the valve-spindle 22 may be utilized to simultaneously operate the starting-valve on the overflow of the supplementary injector 8. In the arrangement shown for this purpose in the drawings the hand-lever 24, pivoted at 25, is connected at its other end by a link 26 to the upper end of a rod 27, that is arranged to slide vertically in a guide 28, parallel to the valve-spindle 22, and carries at its lower end the starting or relief valve 14, controlling the overflow or relief opening 13.

As will be seen, the arrangement is such that the hand-lever 24 can be moved in the direction of the arrow *a* sufficiently to open the valve 21 and admit live steam to the steam-spindle 16 without admitting it to the steam-nozzle 19 and without closing the starting or relief 14, so as to permit the exhaust-injector to start, and upon moving the hand-lever to a further extent in the same direction after a jet has been established through the combined injectors the starting or relief valve 14 can be closed and live steam simultaneously

admitted to the steam-nozzle 19 of the supplementary injector, so as to bring this injector into action.

What I claim is—

5 1. In combined exhaust and supplementary injectors, the combination with a live-steam spindle in the exhaust-injector and a live-steam nozzle in the supplementary injector, of valve mechanism for controlling the supply of live steam to each of these parts, said
10 valve mechanism acting when operated to admit live steam to said steam-spindle before it admits it to said steam-nozzle.

2. In combined exhaust and supplementary
15 injectors, a live-steam spindle in the exhaust-injector, a live-steam-supply pipe or passage in communication at one end with said spindle and at the other end with a chamber to which live steam is admitted, and a steam-
20 controlling device adapted when operated to admit live steam to said pipe before it admits it to the steam-nozzle of the supplementary injector.

3. In combined exhaust and supplementary
25 injectors, a live-steam spindle in the exhaust-injector, a live-steam-supply pipe or passage in communication at one end with said spindle and at the other end with a live-steam chamber in the supplementary injector, and
30 a live-steam-controlling device comprising two connected parts one of which is adapted to control the supply of live steam to the said steam-chamber and the other to control the supply of live steam to the live-steam nozzle
35 of the supplementary injector, said device acting when operated in one direction to admit steam to the said pipe or passage before it admits steam to the nozzle of the supplementary injector, substantially as described.

40 4. In combined exhaust and supplementary injectors, a live-steam spindle in the exhaust-injector, a live-steam-supply pipe or passage in communication at one end with said spindle and at the other end with a live-steam
45 chamber in the supplementary injector, and a live-steam-controlling device comprising a spindle that is provided with a valve adapted to control the passage of live steam to said chamber and has its inner end arranged to
50 extend into the steam-nozzle of the supple-

mentary injector, said valve and inner end of said spindle being so arranged that the valve can be opened before the end of the spindle will leave said steam-nozzle, substantially as described.

55 5. In combined exhaust and supplementary injectors, the combination with a live-steam spindle in the exhaust-injector, a live-steam nozzle in the supplementary injector, and a
60 starting or relief valve on the overflow of the supplementary injector, of valve mechanism adapted to control the supply of live steam to said live-steam spindle and steam-nozzle and connected to said starting or relief valve, said mechanism being capable when moved
65 of admitting live steam to said steam-spindle before admitting live steam to said nozzle and without closing the starting or relief valve, and of being moved to admit live steam to said steam-nozzle and to simultaneously close
70 the starting or relief valve, substantially as described.

6. In combined exhaust and supplementary injectors, a live-steam spindle in the exhaust-
75 injector, a live-steam-supply pipe or passage in communication at one end with said spindle and at the other end with a chamber to which live steam is admitted, a starting-valve on the overflow of the supplementary injector, a spindle carrying said starting-valve, a
80 live-steam-controlling device comprising a spindle that is provided with a valve adapted to control the passage of live steam to said chamber and has its inner end arranged to extend into the steam-nozzle of the supplementary injector, said valve and inner end
85 of said spindle being so arranged that the valve can be opened before the end of the spindle will leave said steam-nozzle, and a lever connected to the outer ends of the two
90 valve-spindles, substantially as described for the purposes specified.

Signed at Manchester, in the county of Lancaster, England, this 21st day of April, 1898.

ROBERT GRUNDY BROOKE.

Witnesses:

W. WARDLE,
E. JONES.