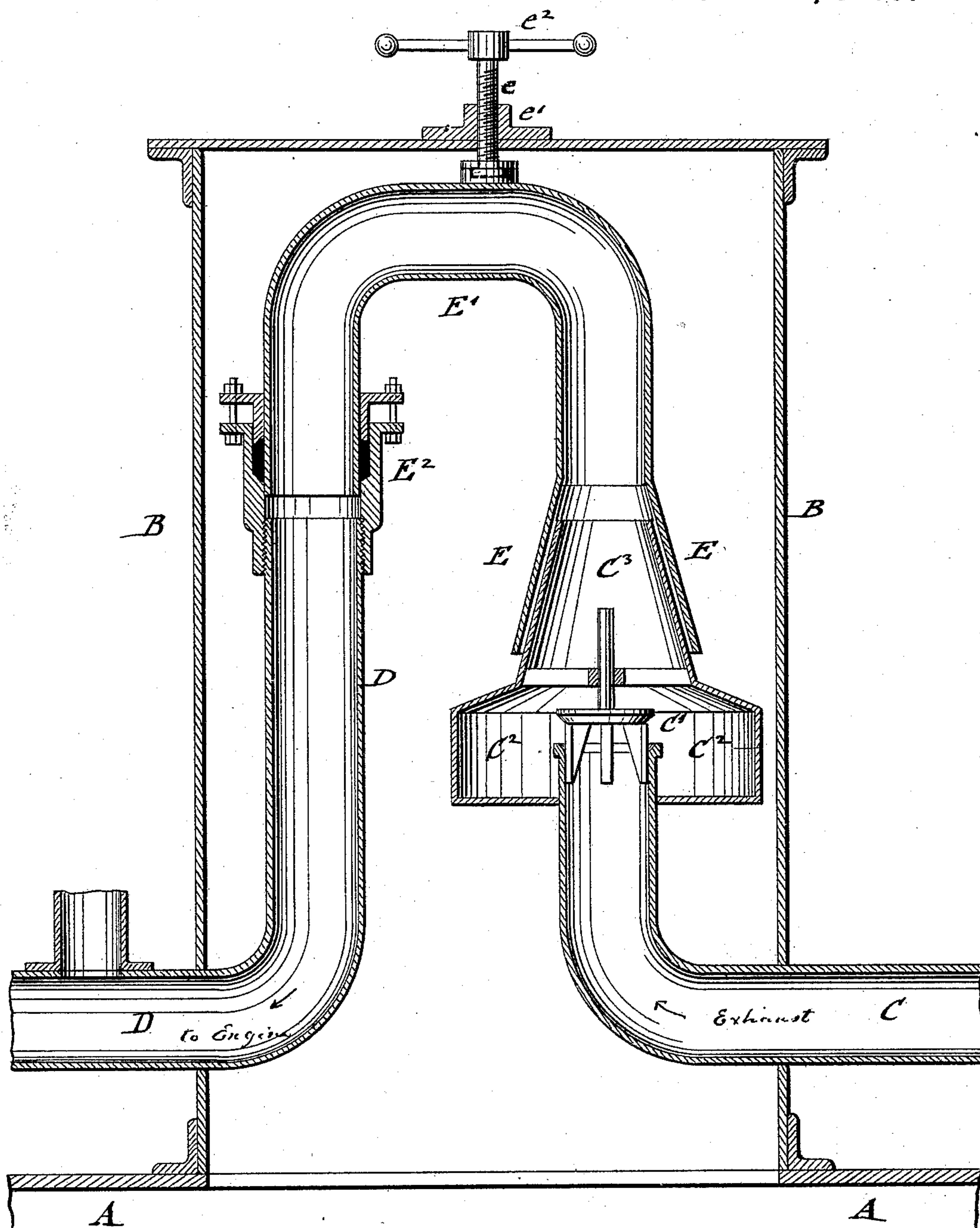


(No Model.)

A. SAUER.  
REGENERATING EXHAUST.

No. 396,713.

Patented Jan. 22, 1889.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

ALBERT SAUER, OF PITTSBURG, PENNSYLVANIA.

## REGENERATING-EXHAUST.

SPECIFICATION forming part of Letters Patent No. 396,713, dated January 22, 1889.

Application filed March 19, 1888. Renewed December 20, 1888. Serial No. 294,246. (No model.)

*To all whom it may concern:*

Be it known that I, ALBERT SAUER, of Pittsburg, in the county of Allegheny, State of Pennsylvania, have invented certain new and useful Improvements in Regenerating-Exhausts, of which the following is a specification.

This invention relates to an improved attachment for steam-generators by which the exhaust-steam is sucked off from the exhaust side of the piston of the motor-engine, reheated, mixed with live steam of high pressure, and resupplied to the motor-engine; and the invention consists of an attachment to steam-generators which is located in the steam-dome of the generator and connected by a live-steam pipe with the supply-pipe and by a second pipe with the exhaust-pipe of the motor-engine. The inner end of the exhaust-steam pipe is provided with a check-valve and inclosed by a casing having a nozzle that is surrounded by a second concentric nozzle which receives live steam and serves to suck in the exhaust-steam and mix it with the live steam. The exterior nozzle is connected by a bent pipe and stuffing-box with the live-steam pipe, the bent pipe being provided with means for adjusting the exterior nozzle toward the nozzle of the exhaust-pipe, so as to regulate the supply of live steam according to the speed of the engine.

The accompanying drawing represents a vertical section of my improved attachment to steam-boilers.

A represents a steam-boiler of any approved construction, and B the steam-dome of the same, in which dry steam of the required high pressure is collected. A pipe, C, is connected with the exhaust-pipe and a live-steam pipe, D, with the supply-pipe of a steam-engine. The exhaust-pipe C terminates at the inside of the dome A, and is provided with a check-valve, C', which is guided in a suitable manner at the interior of a casing, C<sup>2</sup>, that incloses the end of the exhaust-pipe and its check-valve. The casing C<sup>2</sup> is provided with a conical nozzle, C<sup>3</sup>, which is surrounded by an exterior concentric nozzle, E, which latter is connected by a bent pipe, E', with the live-steam pipe D. A stuffing-box, E<sup>2</sup>, forms the connection of the bent pipe E' with the live-

steam pipe D and permits the adjustment of the former toward the live-steam pipe D. To the bent pipe E' is swiveled a screw-post, e, which passes through a screw-nut, e', at the top of the steam-dome, and is provided with an upright adjusting-lever or hand-wheel, e<sup>2</sup>, at the outer end, so that the nozzle E can be adjusted nearer to or away from the nozzle C<sup>3</sup> for starting and stopping the engine and for regulating the quantity of live steam that passes from the dome to the engine.

When the engine is stopped, the pressure of the steam in the dome B closes the check-valve C' of the exhaust-pipe C and interrupts the action of the injector, which is formed by the nozzles C<sup>3</sup> and E. When the engine is started, the steam passes through the space between the nozzles C<sup>3</sup> and E, creates a vacuum in the interior nozzle, opens the check-valve, and exerts a continuous suction on the exhaust side of the piston, so as to draw the exhaust-steam into the nozzle C<sup>2</sup>, and thence, by the injector action of the nozzle E, into the bent pipe E', where it is mixed with live steam of high pressure, reheated in its passage through the bent pipe E', and resupplied with the live steam to the engine. In this manner the exhaust side of the piston is relieved of any back-pressure, and thereby a more effective working of the steam-engine and a considerable saving in the use of steam obtained.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination, with the dome of a steam-generator, of an injector located in said dome, a live-steam pipe connecting the discharge end of the injector with the motor-engine, and an exhaust-pipe connected to the suction end of the injector and provided with a check-valve, substantially as set forth.

2. The combination, with the dome of a steam-generator, of an exhaust-pipe terminating at the outside of said dome, a check-valve at the end of the exhaust-pipe, a casing surrounding the valved end of the exhaust-pipe, the casing being provided with a conical exhaust-nozzle, a second nozzle surrounding the exhaust-nozzle, and a live-steam pipe connecting the exterior nozzle with the motor-engine, substantially as set forth.

3. The combination, with the dome of a

steam-generator, of an exhaust-pipe terminat-  
ing inside of said dome, a check-valve at the  
end of said exhaust-pipe, a casing surround-  
ing the valved end of the exhaust-pipe, said  
5 casing being provided with a conical exhaust-  
nozzle, a second nozzle surrounding the ex-  
haust-nozzle, a bent pipe applied to the noz-  
zle, a live-steam pipe having a stuffing-box  
for the end of the bent pipe, and means for  
10 adjusting the bent pipe and exterior nozzle,

so as to increase or decrease the supply of  
live steam to the same, substantially as set  
forth.

In testimony that I claim the foregoing as  
my invention I have signed my name in pres- 15  
ence of two subscribing witnesses.

ALBERT SAUER.

Witnesses:

PAUL GOEPEL,  
JOHN A. STRALEY.