R. Hale,

Exhaust Mechanism for Locomotives.

No. 25,407. Patented Sep. 13, 1859.

Fig. 1.

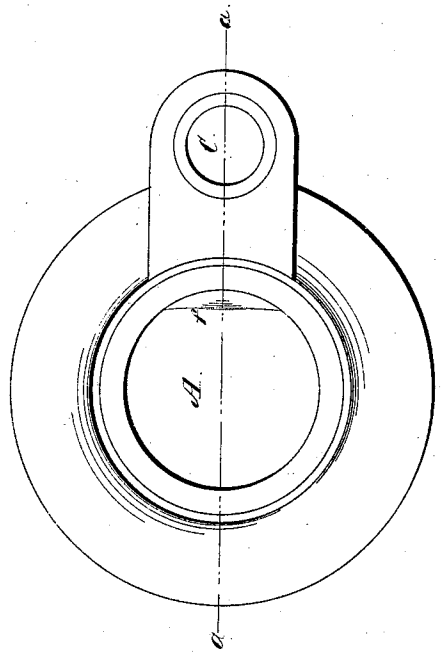
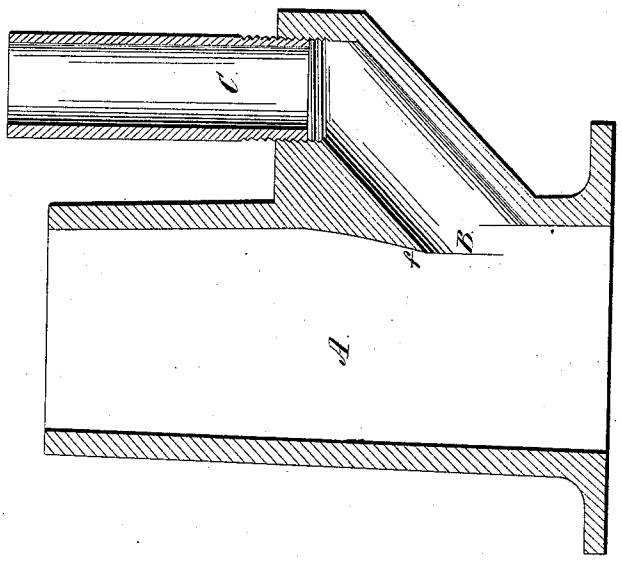


Fig. 2.



Witnesses:
Robt W Hale
P. C. Tschumacher.

Inventor:
Robt Hale.

N. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ROBERT HALE, OF ROXBURY, MASSACHUSETTS.

EXHAUST-PIPE FOR STEAM-ENGINES.

Specification of Letters Patent No. 25,407, dated September 13, 1859.

To all whom it may concern:

Be it known that I, ROBT. HALE, of Roxbury, in the county of Norfolk and State of Massachusetts, have invented a new and improved method of leading off a portion of the exhaust-steam of locomotives for the purpose of heating the feed-water in the tanks, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a plan; Fig. 2 a vertical section upon the line A, A, of Fig. 1.

My invention has for its object to lead off a portion of the exhaust steam of locomotives for the purpose of heating the water within the tank.

It is known that a small portion of the exhaust steam of locomotives if passed through the water in the tank is sufficient to raise the feed water to the boiling point, by which great economy of fuel results and all danger of bursting of water pipes by freezing is avoided. An obvious method of effecting this end would be to lead off a portion of the exhaust steam and inject it into the tank or tender. A difficulty has however been experienced in the attempts heretofore made to divert a portion of the steam from its direct course through the exhaust nozzle.

If the exhaust steam be all thrown into a box or chamber from which a portion is allowed to pass by one pipe to the tank while the balance is devoted to the production of draft, it is found that the momentum which the steam acquires in its passage from the cylinders is destroyed and that the elastic force with which it expands from the box is not sufficient to create the necessary draft. On the other hand if the pipe for the conduit of the steam to the tank enter directly into the side of the exhaust nozzle or the pipe from the cylinders thereto, the momentum of the steam in the exhaust pipe is sufficient to carry it past the opening into the branch pipe and to prevent it from entering in sufficient quantity to effect the desired end. To remedy this difficulty I interrupt the course of a portion of the steam through the exhaust nozzle by a sharp projection or lip which is made to project into it directly over the entrance into the branch pipe, by which a portion of the steam is deflected and caused to enter this pipe without interrupting the course or diminishing the momentum of the main body of the steam.

On the fifth day of May 1837 Letters Patent of the United States were granted to me for a method of leading off a variable portion of the exhaust steam, at the option and according to the judgment of the engineer. By my present invention I am enabled to lead off a uniform specified portion of the exhaust steam for the purpose of heating the feed water, without requiring to call the attention of the engineer thereto.

To enable others skilled in the art to understand my invention I will proceed to describe the manner in which I have carried it out.

In the accompanying drawing A, is the exhaust pipe in one side of which is made an opening B, to which is adapted a pipe or conduit C, that leads to the feed water in the tank.

Immediately over the opening a sharp projection or lip *f*, is cast upon the interior surface of the pipe to cut the steam as it passes and to assist in deflecting it into the conduit C.

Some method of forcing the steam to enter the branch pipe is rendered the more necessary by the resistance which the water in the tank offers to the entry of the steam the pressure to be overcome being proportionate to the depth of the water in the tender. The lip above described most effectually accomplishes this purpose while that portion of the steam which passes through the main exhaust pipe acts with undiminished power to produce draft. Furthermore it is found that 1/6 of the exhaust steam of a locomotive is sufficient to bring its feed water to a temperature of 212° Fahrenheit, but the feed water being hot less fire is required to generate steam, consequently less draft is necessary to urge the fire and the remaining 5/6 is sufficient to answer the purpose. It is manifest that where a portion of the exhaust steam is led off to the tank as above described, the area of the exhaust nozzle should be proportionately diminished that the steam may be discharged therefrom with the requisite force to insure the draft.

What I claim as my invention and desire to secure by Letters Patent is—

An exhaust pipe constructed as described, and having an opening B, and a steam pipe C, in combination with a lip *f* operating in the manner set forth for the purpose specified.

ROBT. HALE.

Witnesses:

SAM. COOPER,

T. E. TESCHEMACHER.