

.(No Model.)

2 Sheets—Sheet 1.

G. C. FINK.

Combined Heater and Muffler.

No. 238,773.

Patented March 15, 1881.

FIG. I.

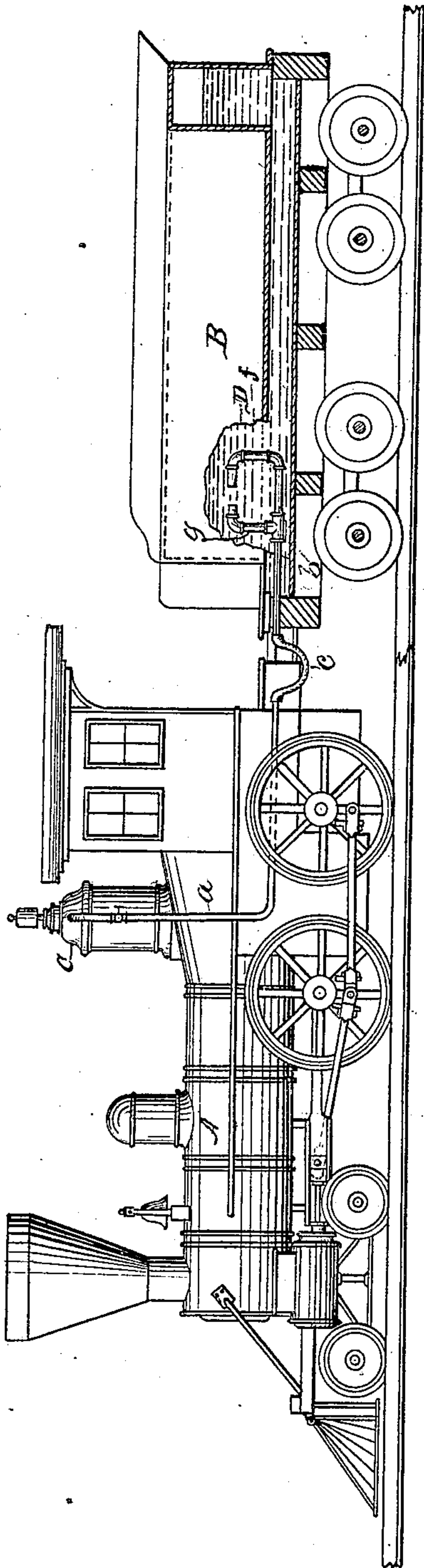
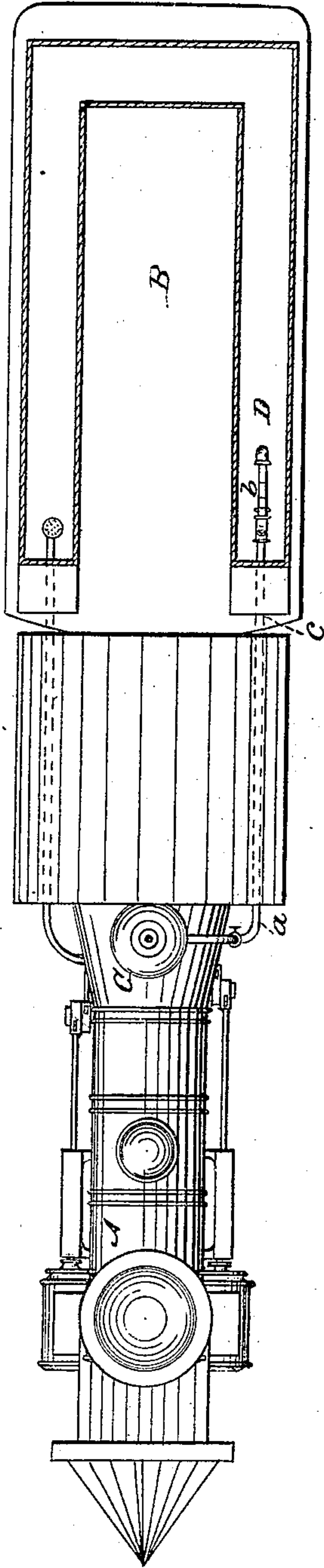


FIG. II.



WITNESSES:

*Gordie C. Fink*  
*James Mich. Loran*

INVENTOR:

*Samuel C. Fink*

(No Model.)

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FIG. III.

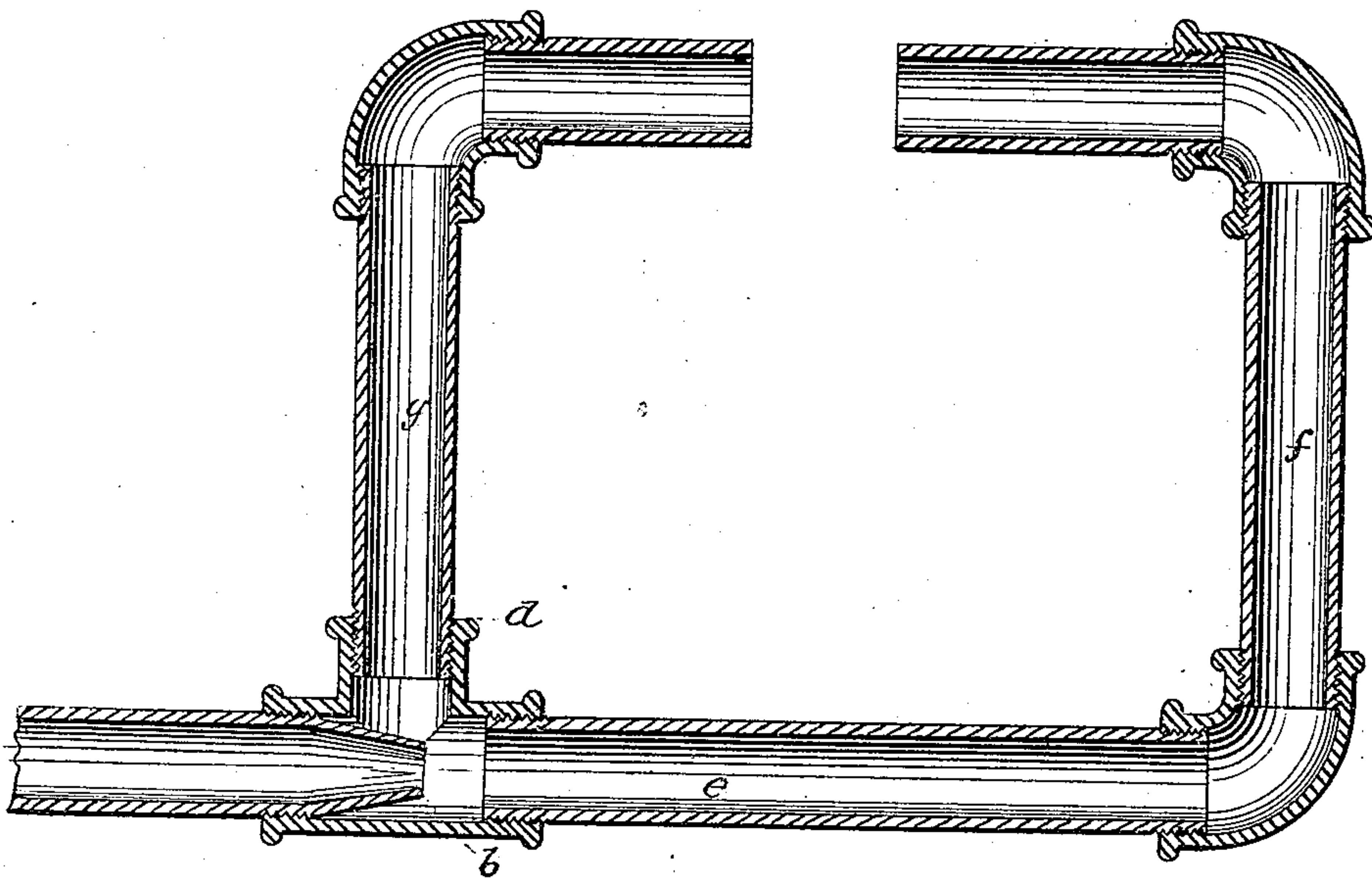
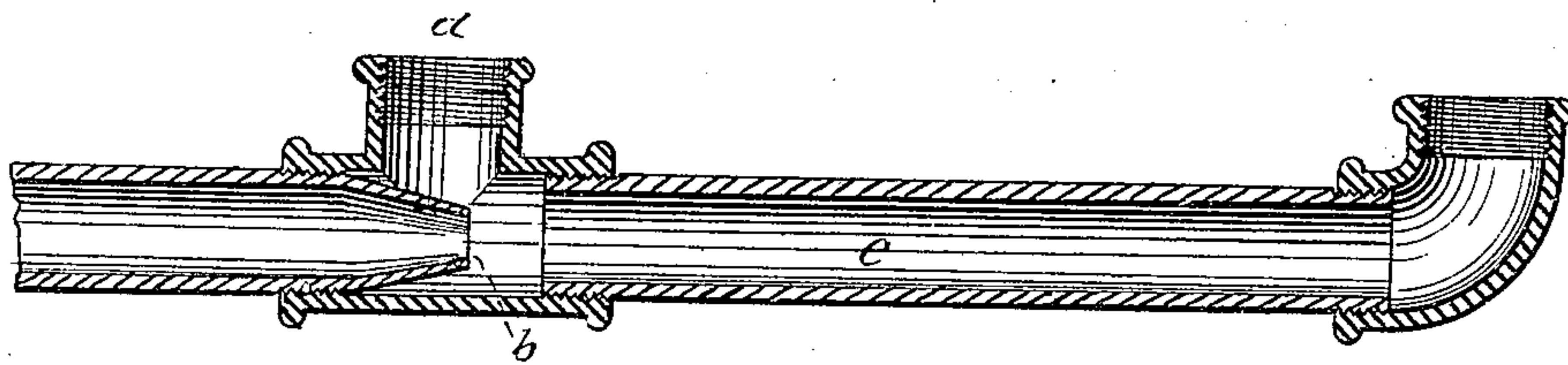


FIG. IV.



WITNESSES:

*Burdie E. Fink*  
*James Nichol*

INVENTOR:

*Gilmore C. Fink*



# UNITED STATES PATENT OFFICE.

GILMORE C. FINK, OF ST. PETERSBURG, PENNSYLVANIA.

## COMBINED HEATER AND MUFFLER.

SPECIFICATION forming part of Letters Patent No. 238,773, dated March 15, 1881.

Application filed November 12, 1880. (No model.)

*To all whom it may concern:*

Be it known that I, GILMORE C. FINK, a citizen of the United States, residing at St. Petersburg, in the county of Clarion and State of Pennsylvania, have invented certain new and useful Improvements in Combined Heater and Muffler; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

My invention relates to the utilization of the blow-off steam from the safety-valves of steam-boilers, but applies more particularly to locomotives, and to the lessening and deadening of the noise created by said blowing off.

It is well known that the sudden absence or displacement of a certain volume of air causes a vacuum and a recoil of the atmosphere, and that the vacancy is suddenly filled with what surrounds it. This sudden displacement and recoil of the atmosphere is, as is well known, the cause of the sound or noise of boilers blowing off steam, and which, when the engines are at depots and other places of rest, is so great as to be absolutely deafening. The great number of travelers, besides the large quantity of freight shipped from one point to another, demands a great number of locomotives constantly at one place. The combined noise of these locomotives creates such a terrible noise and nuisance as to make hearing in close proximity to the depot impossible, besides the hurtful and impairing effect it has on the hearing. This annoyance has become so great as to demand, in some places, legislative enactments for its suppression.

Therefore to destroy and to completely and entirely overcome this noise and annoyance is the object of my invention; and it consists in locating in the tender of a locomotive an injection-nozzle to be connected to a pipe leading from the safety-valve chamber, or from the point on the boiler from which the steam is blowing off; secondly, in attaching to the discharge end of the injector a curved pipe turning backward toward the injector, and still another pipe connected to the water-inflow of the injector and turning to or facing

the pipe just described, both being parallel to the injector, the ends of the said pipes being sufficiently separated as to permit water to be drawn into the inflow end of the injector, the operation of which will be more fully hereinafter explained.

It is evident that where a vacuum is caused mechanically the surrounding vapor or water must fill its place, if permitted to do so, with an attendant force equal to the power required for the exhaustion. This is the principle I propose to utilize in carrying out my invention.

Referring to the accompanying drawings, Figure I represents a locomotive and tender, part of the latter being broken away to more clearly illustrate my invention. Fig. II shows a plan view of the same, showing the injector in position in the tender. Fig. III shows the injector and the circulating device attached. Fig. IV shows the injector and a form of circulating device. Any form of the well-known injectors will answer the purpose.

The same letters will serve to indicate like parts in all the figures.

A is the locomotive; B, the tender; C, the safety-valve chamber, and D the water-space in the tender. *a* is a pipe leading from and conveying the blow-off steam to the injector *b*, a portion of said pipe being flexible, as shown at *c*. This injector is provided with the usual water-inflow nozzle *d* and condensing-pipe *e*. (Shown more clearly in Figs. III and IV, Sheet 2.) The blow-off steam from the boiler is conducted through pipe *a c* to the injector located in the tender, and in the usual manner is condensed by the water drawn in through the water-inflow nozzle *d*. The steam in this way is prevented from coming in contact with the air, and instead is conveyed into the tender, where it is condensed, and thus the usual noise is overcome and the heat in the steam is utilized in heating the feed-water.

Now, it may sometimes happen that the waste steam makes the water in the tender too hot to be successfully pumped into the boiler. In this case I attach a curved pipe, *f*, to the end of the discharge-nozzle, and another pipe, *g*, to the inflow-nozzle. These pipes are arranged to face each other, but some distance apart, as may be seen at Figs. I and III, the operation of which is as follows: The injection-



pipe surrounds the steam-pipe, so that the injection water will partially condense the steam in that pipe before it reaches the end of the injector or condensing pipe. This condensing-  
 5 pipe extends beyond the cross-branches. The vacuum formed by the condensation of steam draws in the water with more or less velocity, and forces it round through the curved pipe *f* and out of the end of said pipe with more or less  
 10 force. The mouth of pipe *g* being immediately in front of the end of pipe *f*, receives the water escaping from *f*, and is again drawn round by the vacuum caused by the condensed steam, and in this way a constant circulation of the  
 15 water is kept up in the tender. Thus the hot water is kept in this particular locality until the engine stops blowing off, when it is eventually drawn round to the pump side of the tender. By this time the heat is neutralized  
 20 by the mixing of the hot and cold water, when it is in good condition to be fed to the boiler.

I prefer to locate the injector in the opposite side of the tender from the pump side, so that the water has a longer distance to travel, and  
 25 in this way becomes thoroughly mixed with the cold water before it reaches the pump.

Thus it will be seen that I entirely destroy the noise of the blow-off steam by condensing it by a very efficient and simple means.

30 It will be observed that my invention can be applied to locomotives now in use with but very little expenditure of time or money.

It will also be observed that it can be applied to all kinds of boilers with good results  
 35 by simply immersing the injector in water and connecting the blow-off steam thereto.

I am aware that it is not new to conduct the waste blow-off steam to the tenders of locomotives; but I am not aware that it has ever been done through and by the means of an injector. I do not, therefore, desire to confine  
 40 myself to the exact arrangement, nor to the location of the device in the tender.

Having now fully described my invention, its mode of construction and operation, what  
 45 I claim as new, and desire to secure by Letters Patent, is—

1. The combination of an injector located within the tender, and a blow-off chamber, with the safety-valve, said chamber and injector being  
 50 connected by a suitable pipe, whereby the blow-off steam is condensed, and the noise usually occasioned thereby is avoided, in the manner described.

2. The combination, with an injector located  
 55 within the tender, of the water-circulating device, operated by blow-off steam from the boiler, by which the water passing through said injector, or a portion thereof, is made to circulate and again pass through the injector, in the  
 60 manner and for the purpose herein set forth.

3. The method herein described of retaining the hot water in one portion of the tender by means of a steam-injector and a circulating  
 65 device, all arranged and operating together, for the purpose set forth.

In testimony whereof I affix my signature in presence of two witnesses.

GILMORE C. FINK.

Witnesses:

JAMES NICHES. CALLAN,  
 BIRDIE E. FINK.