

No. 753,357.

PATENTED MAR. 1, 1904.

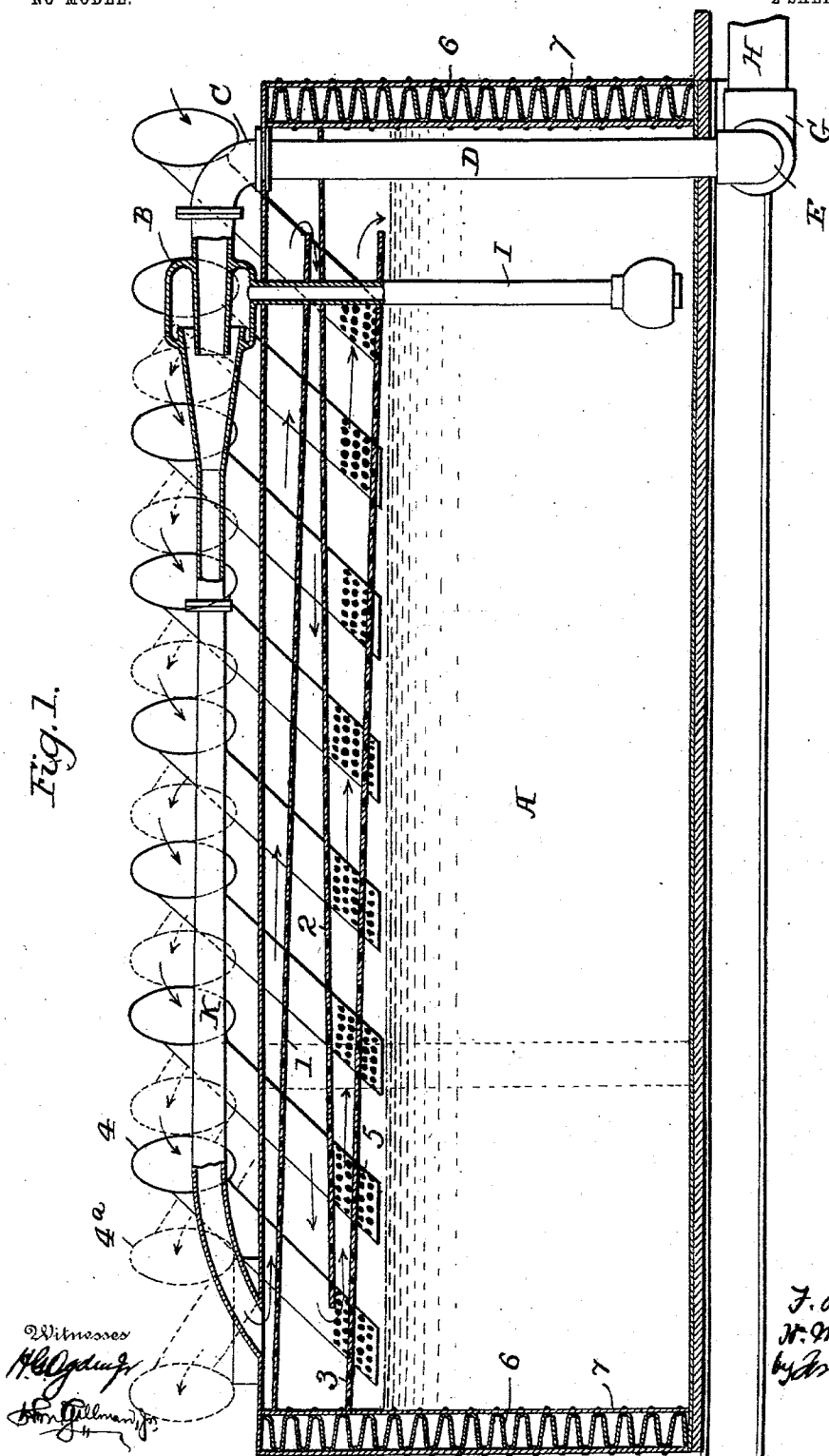
F. BURGER & H. M. WILLIAMS.  
LOCOMOTIVE TANK CONDENSER.

APPLICATION FILED APR. 23, 1901.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 1.



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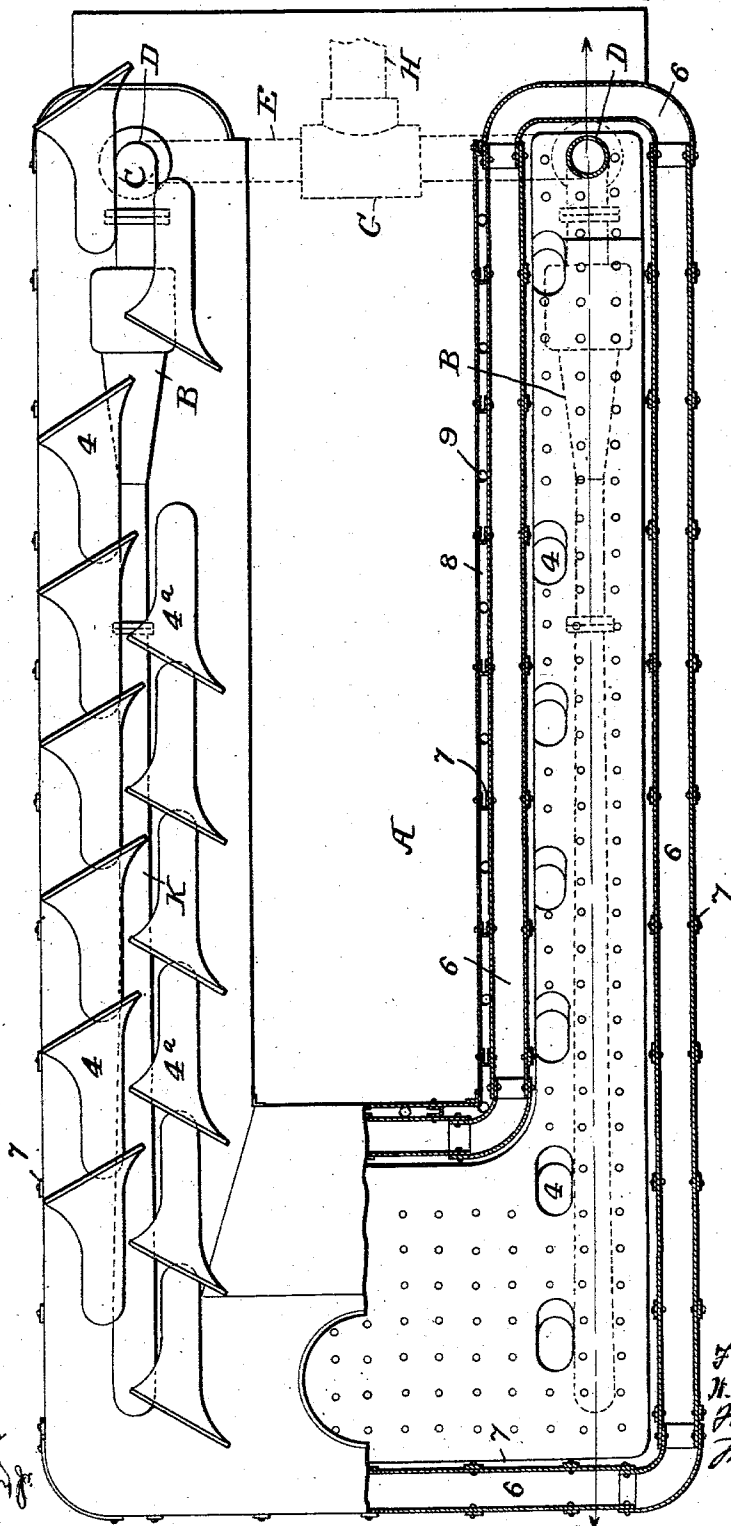
APPLICATION FILED APR. 23, 1901.

NO MODEL.

2 SHEETS—SHEET 2.

Fig. 2.

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# UNITED STATES PATENT OFFICE.

FRANZ BURGER AND HENRY M. WILLIAMS, OF FORT WAYNE, INDIANA; SAID  
BURGER ASSIGNOR OF ONE-HALF OF HIS RIGHT TO SAID WILLIAMS.

## LOCOMOTIVE-TANK CONDENSER.

SPECIFICATION forming part of Letters Patent No. 753,357, dated March 1, 1904.

Application filed April 23, 1901. Serial No. 57,120. (No model.)

*To all whom it may concern:*

Be it known that we, FRANZ BURGER and HENRY M. WILLIAMS, citizens of the United States, residing at Fort Wayne, in the county of Allen and State of Indiana, have invented certain new and useful Improvements in Locomotive-Tank Condensers, of which the following is a specification.

Our invention has for its object to condense the steam from an engine and to utilize the condensed steam in the form of water; and our invention consists in the various features of construction and arrangement of parts having the general mode of operation substantially as hereinafter more particularly set forth.

Referring to the accompanying drawings, wherein is illustrated an embodiment of our invention, Figure 1 is a longitudinal vertical section of a locomotive-tank embodying our improvements, and Fig. 2 is a part plan and part horizontal sectional view.

In carrying out our invention we combine with the tank of a locomotive-tender an ejector or similar means for bringing together the exhaust-steam from the locomotive and a stream of water from the tender, and we employ suitable means for condensing the steam and for cooling the steam and water; and our invention may be said in a general way to relate to the subject-matter of our application, Serial No. 12,861, filed April 14, 1900, being an improvement and extension of some of the features thereof.

In carrying out our invention as illustrated in the drawings we utilize a tank A—such, for instance, as is used in a locomotive-tender—and we arrange in connection therewith, preferably, two ejectors B B, one on each side of the water-legs of the tank. These ejectors are connected to receive the exhaust-steam from the locomotive or engine, and in the present instance we have shown a pipe H, adapted to be connected to the engine, which pipe enters a T G in a horizontal pipe E and which has vertical branches D and curved connections C, leading to the compression-nozzles of the ejectors B. Communicating with these ejectors are the pipes I, extending into the water-legs of the tender and adapted to per-

mit the flow of fluid from the tender into the ejectors, where it commingles with the steam, tending to condense the same, and the combined water and steam is forced by the ejectors through a pipe K toward the rear end of the tender.

Arranged in the upper portion of the water-space of the tender, as in the water-legs, is a series of inclined perforated plates, three being shown in the present instance, and these are arranged with their alternate ends secured to the walls of the tender and their other ends free, and in the present instance the upper plate 1 is fastened to the back end of the tank and is inclined toward the front end, while the plate 2 is fastened to the front end of the tank and inclines toward the back, and the plate 3 is, like plate 1, secured to the rear end of the tank and inclines forward. All these plates are provided with perforations, as indicated in the drawings, to permit air to pass and circulate between and through the plates.

In order to furnish a supply of air, we provide a series of air-funnels, shown as arranged on the upper portion of the tender and part of them as opening toward the forward end of the tank and part toward the rear end. In the present instance the funnels 4 are shown with their open ends extending forward, and the tubular portions extend through the plates 1 2 3 and terminate above the water in the tank, while the lower portions of the funnels are perforated, as at 5, so that air may pass through the perforations into the spaces between the plates or may be brought into the space below the bottom plate and between the plates 2 and 3. The other series of funnels 4<sup>a</sup> have their open ends extending toward the rear of the tender, and preferably their tubular portions extend through only the upper casing of the water-legs above the upper perforated plate 1.

In order to further aid in keeping the water cool and condensing the exhaust-steam, we construct the vertical walls of the tank so that they have a greater surface exposed to the atmosphere as well as to the contained water, and in order to do this the walls are in the present instance shown in the form of

corrugated plates 6, so arranged that the water extends into the corrugations on one side of the plates and the air has free access to the corrugations on the outside of the plates. In order to make these sufficiently rigid, some suitable means must be provided—as, for instance, the vertical stay-rods 7—which give the proper rigidity to the sides and still permit the free flow of fluid and air over the corrugated surfaces.

The tender is provided with room for the fuel between the two water-legs, as shown; but to prevent the fuel from coming in contact with the corrugated walls of the tank we have placed a partition-wall 8, which may be of sheet metal, near the corrugations, leaving an air-space between them, and to further aid in the circulation of the air around the inner portions of the legs perforations 9 in the floor of the tender are provided, the object being to so construct and arrange the walls of the tank that the greatest amount of air can have free access thereto, which will tend to cool the water and aid in the condensation of the exhaust-steam.

The operation of the device is readily understood, and the exhaust-steam entering through the pipe H passes by the connecting-pipes to the ejectors B, where it draws the water from the tank through the pipes I and commingling with the water passes through the pipe K, where it enters the tank near the rear thereof and flows down over the inclined perforated plate 1 onto the plate 2 and back onto the plate 3 into the reservoir. The plates being perforated, more or less of the water will trickle through the perforations, and the air rushing in through the funnels 4, especially when the tender is moving rapidly, will furnish a sufficient supply of air, which impinging upon the water passing through the perforations between the plates will commingle therewith and tend to further condense the steam and cool the water, and thence the air passes outward through the funnels 4<sup>a</sup>. At the same time the air circulating around and through the corrugations in the tank still further aids in maintaining the water cool and effecting the condensation of the exhaust-steam.

What we claim is—

1. A condensing-tank provided with a series of inclined perforated plates arranged one above the other, and alternately connected to the opposite walls of the tank combined with means for discharging steam onto the upper plate, substantially as described.

2. A condensing-tank provided with a series of perforated plates, arranged one above the

other, and a series of funnels extending through the plates, combined with means for discharging exhaust-steam onto the upper plate, substantially as described.

3. A condensing-tank provided with a series of perforated plates, arranged one above the other and a series of funnels extending through the plates, said funnels having perforations to permit the discharge of air between the plates, combined with means for discharging exhaust-steam onto the upper plate, substantially as described.

4. The combination with a condensing-tank, of two series of funnels having their outer ends extending in opposite directions and their inner ends extending into the tank, combined with a series of perforated plates arranged one above the other within the tank, and means for discharging exhaust-steam onto the upper plate, substantially as described.

5. The combination with a condensing-tank, of a series of plates arranged one above the other within the tank, and two series of funnels, one having their inner ends extending through the plates and the other having their inner ends arranged above the plates, combined with means for discharging exhaust-steam onto the upper plate, substantially as described.

6. In a condensing-tank, the combination with a series of inclined perforated plates arranged one above the other and alternately mounted on the opposite ends of the tank, of two series of funnels having their open ends extending in opposite directions, one series being provided with tubular portions extending through the plates, whereby the air on entering one series of funnels passes through the plates and out through the other series of funnels, and means for discharging exhaust-steam onto the upper plate, substantially as described.

7. The combination with a condensing-tank, of ejectors connected to receive the exhaust-steam from the engine, pipes leading from the tank to the ejectors, a pipe leading from the ejectors to the rear end of the tank and delivering thereto, a series of inclined perforated plates, and a series of air-funnels extending through the plates and delivering air into the tank, substantially as described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

FRANZ BURGER.

HENRY M. WILLIAMS.

Witnesses:

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