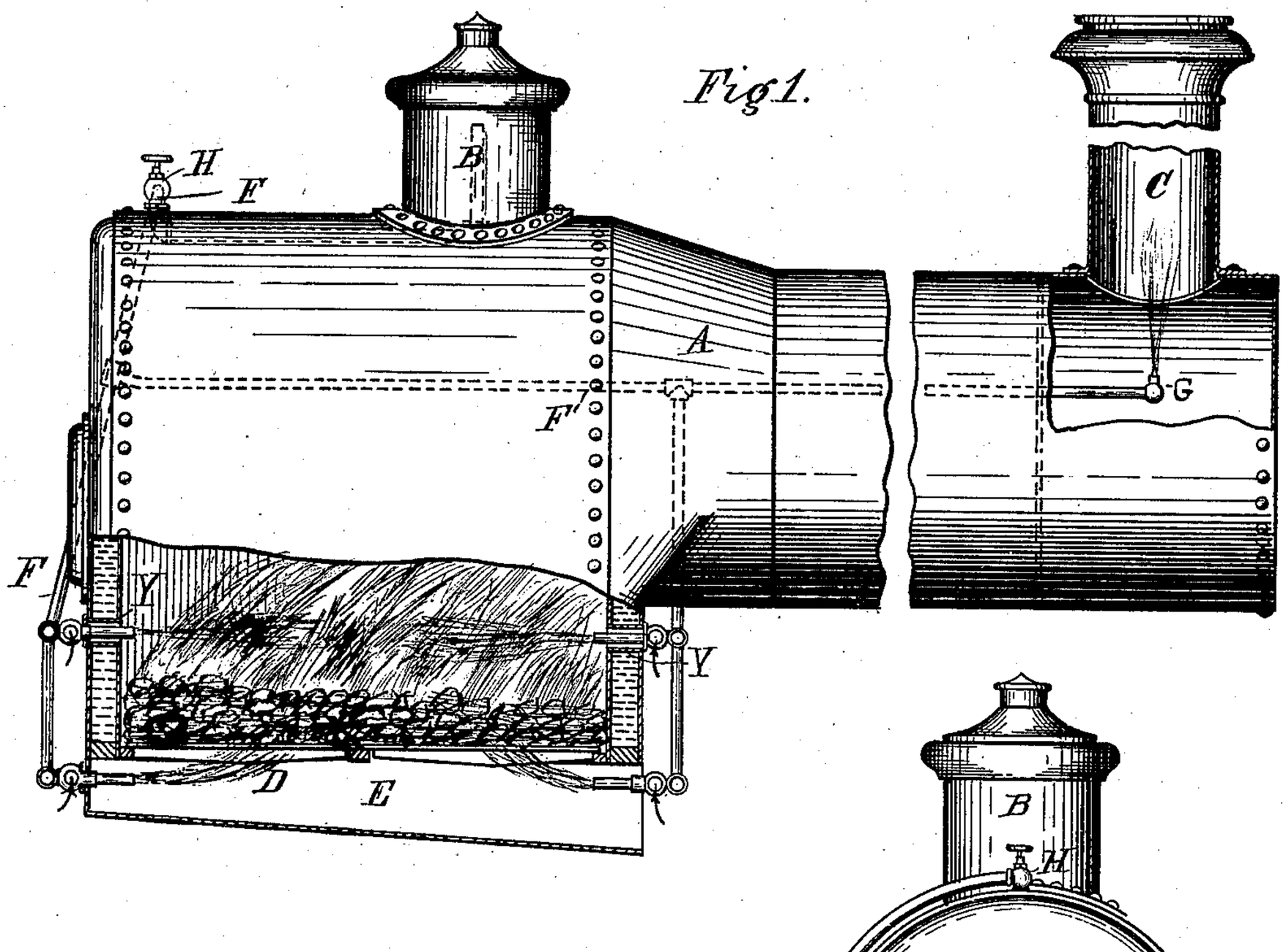
(No Model.)

W. S. HUTCHINSON.

AIR INJECTOR FOR FURNACES.

No. 373,139. Patented Nov. 15, 1887.

Fig 1.



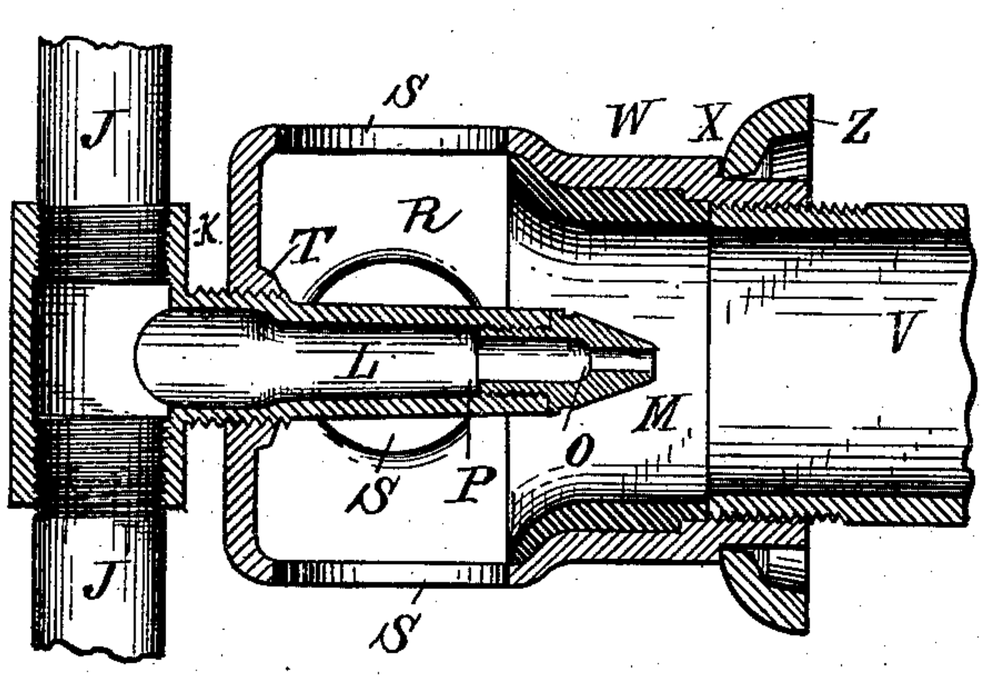


Fig. 3.

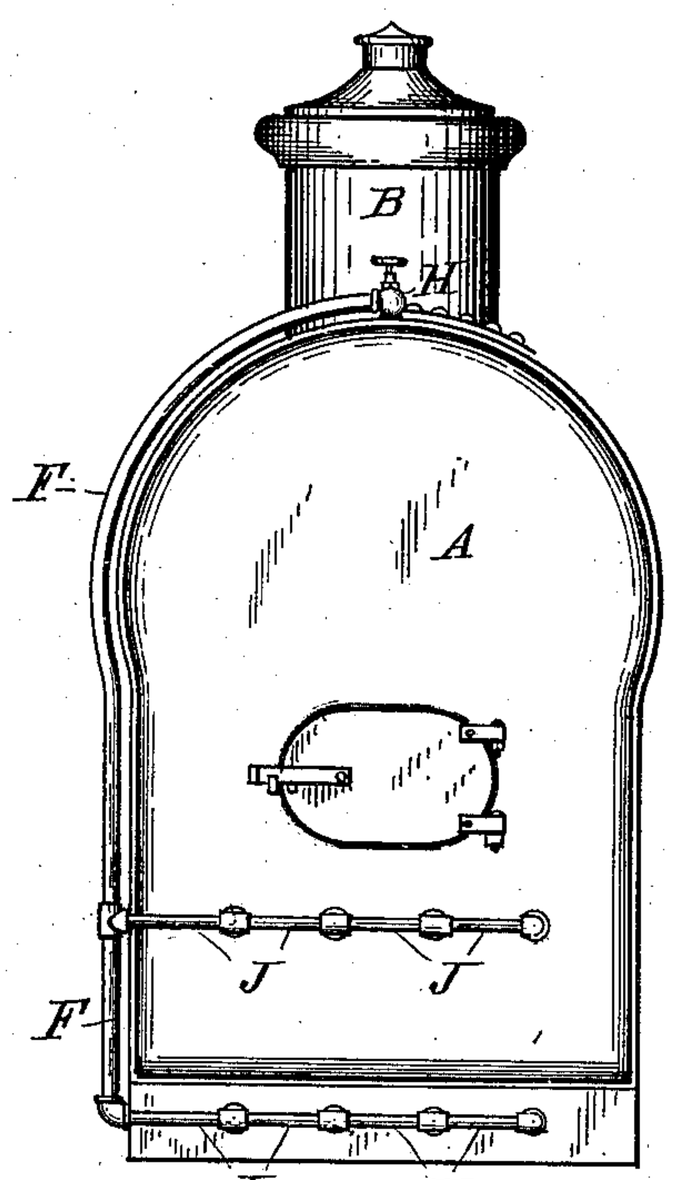


Fig. 2.

Witnesses:
Saml. B. Dover.
G. G. Jackson

Inventor.
William S. Hutchinson
By Bruce & W. Parker,
Atty.

UNITED STATES PATENT OFFICE.

WILLIAM S. HUTCHINSON, OF CHICAGO, ILLINOIS.

AIR-INJECTOR FOR FURNACES.

SPECIFICATION forming part of Letters Patent No. 373,139, dated November 15, 1887.

Application filed November 20, 1886. Serial No. 219,514. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM S. HUTCHINSON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Air-Injectors for Furnaces, which are fully set forth in the following specification.

My invention relates to devices for increasing the draft of furnaces, supplying them with air, and aiding the combustion or decomposition of the gas or smoke which arises from them.

The objects of my invention are to decrease the noise caused by the air and steam, and to provide a combined T and steam-supply nozzle. I accomplish these objects by the means illustrated in the accompanying drawings, wherein—

Figure 1 is a side view of a locomotive-boiler with my invention attached and parts broken away. Fig. 2 is an end view of same. Fig. 3 is a sectional view of a steam-nozzle, air-globe, and connecting parts.

Like parts are indicated by the same letter throughout the drawings.

A is a boiler; B, the steam-dome; C, the smoke-stack; D, the furnace; E, an ash-pan; F, a steam-pipe leading from the steam-dome along the head of the boiler, thence forwardly along the boiler, and terminating in a steam-nozzle which discharges into the base of the smoke-stack. H is a valve which controls this pipe.

J J are transverse pipes along the front and rear of the furnace, formed by short sections and the T's, K, from which project the steam-nozzles L.

M is a jet-tip, of non-corrosive metal, screw-threaded into or otherwise attached to the nozzle L. O is a shoulder on the inside of the tip, and P shoulders on the interior of the nozzle, whereby the passage-way of the nozzle and tip gradually increases from the T to the discharge end, as shown in Fig. 3, where it will be seen that, by reason of these shoulders or offsets of the interior of the jet, the same is successively diminished in size from left to right.

R is an air-globe having the apertures S about its side and being screw-threaded on the nozzle at T by a right-hand thread, and screw-threaded on the nipple V by a left-hand screw-thread, U.

W is a cushion about the mouth of the air-pipe X, which leads from the globe R. This cushion is composed of any kind of sound-deadening or non-conducting substance, as lead. The nipple V passes through the flue Y and opens into the furnace. The flue Y is protected from cold-air drafts by the collar Z, which covers its ends. The flue, being thus protected from sudden and excessive changes of temperature, is comparatively free from the danger of being loosened.

My invention operates after the manner of an air-injector. The area of the discharge-nozzle is about one-tenth of an inch, and the area of the air-pipe about the discharge-tip is about one and one-fourth of an inch, and by this arrangement I discharge into the furnace, through each air-globe and air-pipe, about two hundred times as much air as the steam discharged through the steam-nozzle and tip.

The use and operation of my invention are as follows:

I have shown my invention as applied to a locomotive furnace and boiler, though it may be applied to various uses. The steam-pipe leads from the steam-dome down along the head of the boiler. At a proper point it sends off a branch pipe to supply the upper row of rear air-injectors, and this pipe also proceeds down to supply the air-injectors which open into the ash-pan. The steam-pipe then proceeds forward until it sends off another branch pipe to supply the front air-injectors. The steam-pipe continues its course until it reaches the interior of the smoke-stack, where it terminates in a jet which assists the draft.

The air-injectors are arranged in rows along the sides of the furnace, and each is constructed as shown. The steam passing out through the steam-jet tip, having the interior structure as shown, has the greatest possible power of supplying air. The air is drawn in through the apertures in the side of the air-globe, and the sound usually made by it is greatly decreased or nearly deadened by the cushion in the interior of the globe. About the mouth of the air-pipe, which leads from the air-globe and into which the steam-nozzle discharges, is placed this cushion or non-conductor of sound. Many different substances could be used. I have found lead to work very well. This cushion

receives the current of air and deadens the sound which it makes when passing over the unprotected surface of the air-pipe. The shape of this cushion also facilitates the supplying of the air. When the supply of steam is cut off, a certain quantity of steam, water, or moisture is left in the steam-tip, and corrosion would follow were it not for the non-corrosive material used. The threads on the ends of the air-globes are the one right and the other left, so that one globe can be inserted or removed without disturbing the remainder. The T's are cast with the nozzles projecting or formed continuous therewith. The steam discharged through the various tips operates, in the manner of an injector, to inject a large quantity of air into the furnace through the globe and the pipe into which the tip projects. This latter pipe in the illustration passes through a flue, which in turn passes through the water-space about the furnace, and the globe and T extend outwardly from the end thereof. The collar about the globe covers up the connection between the globe and the flue, thus excluding air from the flue. Any quantity of steam can be discharged through these nozzles, and the discharge thereof draws large quantities of air into the furnace to assist the draft, consume the smoke, and increase the heat. The area of the steam-discharge aperture is one-tenth of an inch, and of the air-pipe about the same is one and one-fourth of an inch. The steam-jet in the smoke-stack keeps up a draft, so as to keep the fire or heat from puffing out behind, which it sometimes does when the draft is clogged and the air-injectors are at work.

The discharge-tip is made of what is known as "steam metal" and "alloy" or "compound," and which is manufactured and sold in Chicago and elsewhere.

I claim—

1. A steam-nozzle for an air-injector, provided with a tip having an interior shoulder, in combination with a T continuous therewith.

2. An air-globe for an air-injector, provided with a sound-deadening cushion about the mouth of the air-supply pipe.

3. An air-globe provided with an air-pipe and a sound-deadening cushion about the mouth thereof, in combination with a steam-nozzle which discharges through the air-pipe.

4. An air-globe having side apertures, an air-pipe, and a sound-deadening cushion about the mouth of the latter, in combination with a nozzle which is screw-threaded into one end of such globe and passes through the same and discharges into the air-pipe.

5. The combination, with a steam boiler and furnace, of a steam-pipe leading from the steam dome, a series of air-injectors at the front and rear of the furnace, discharging above and below the grate-bars, and a steam-jet toward the forward part of the boiler and immediately below the smoke-stack, all of the said air and steam injectors being supplied with a constant current of steam from the said steam-pipe for the purpose of supplying the air to the fire, causing the hot gases to be burned before they leave the furnace, and preserving a constant draft through the smoke-stack.

In testimony whereof I have hereunto set my hand, in the presence of two witnesses, at Chicago, Illinois, this 10th day of November, A. D. 1886.

WILLIAM S. HUTCHINSON.

Witnesses:
FRANCIS W. PARKER,
G. G. JACKSON.