

No. 795,367.

PATENTED JULY 25, 1905.

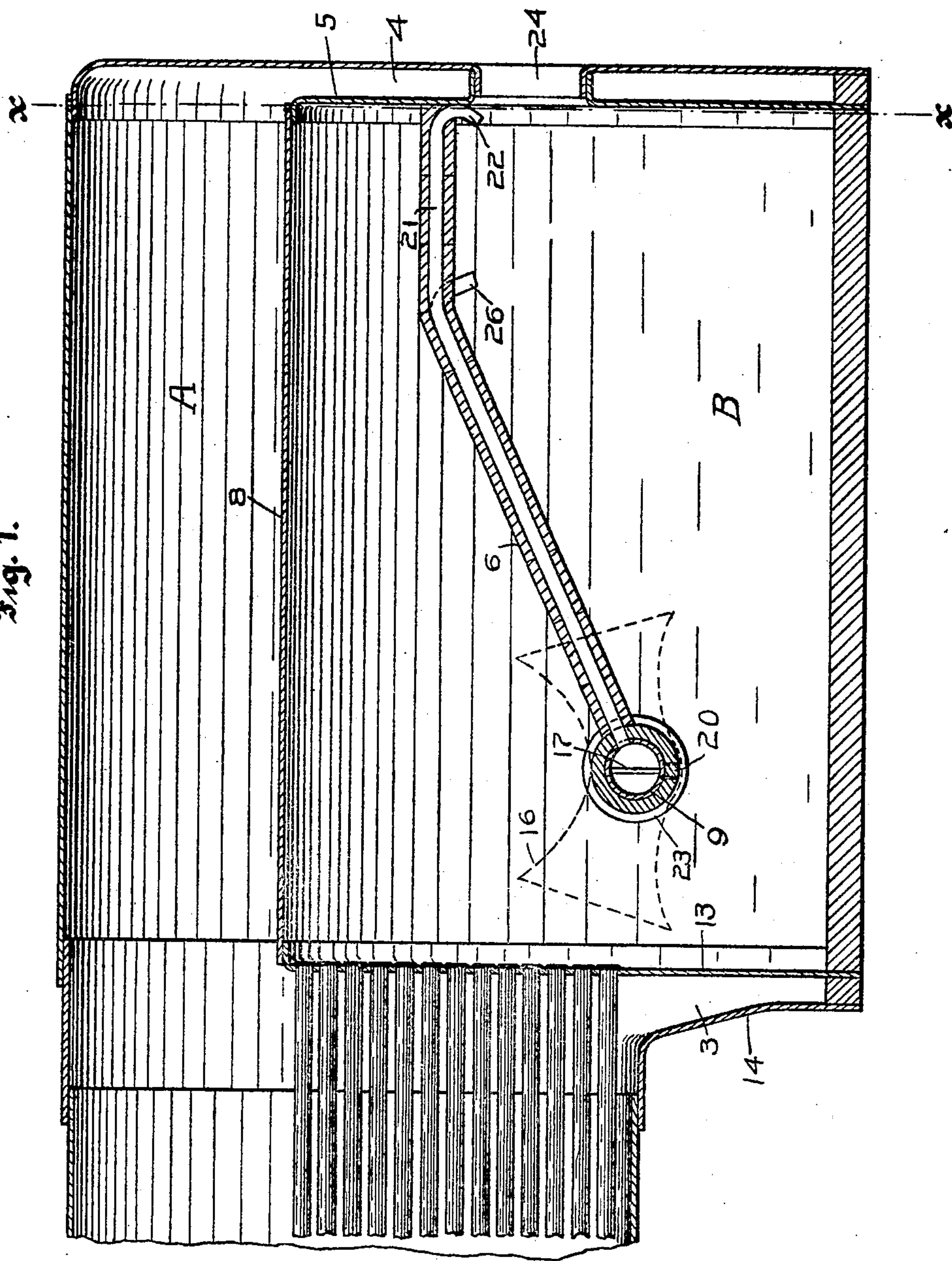
S. F. PIERCE.

AUTOMATIC BLOWING APPARATUS FOR LOCOMOTIVES.

APPLICATION FILED APR. 6, 1905.

3 SHEETS—SHEET 1.

Fig. 1.



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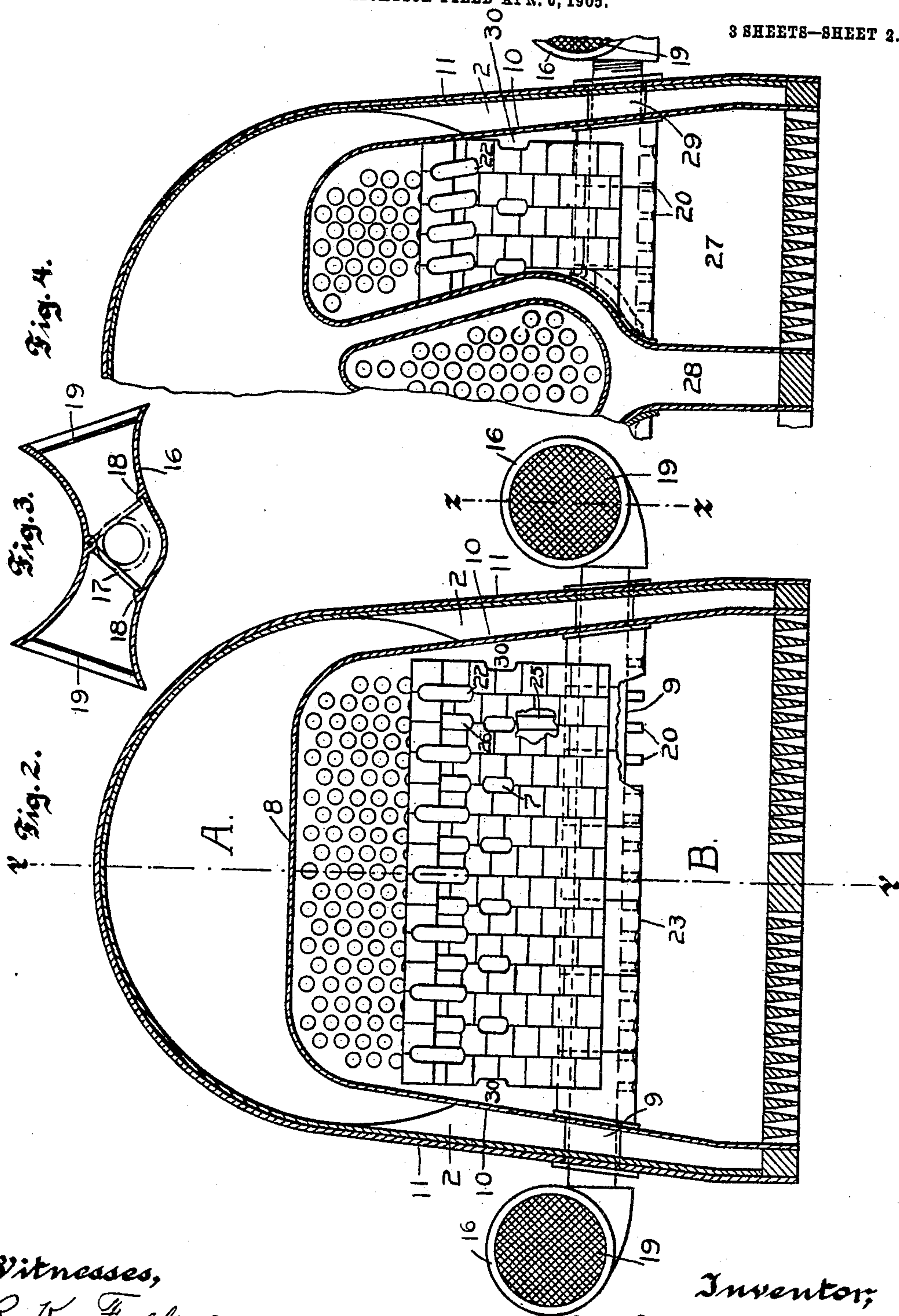
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3 SHEETS—SHEET 2.



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3 SHEETS—SHEET 3.

Fig. 6.

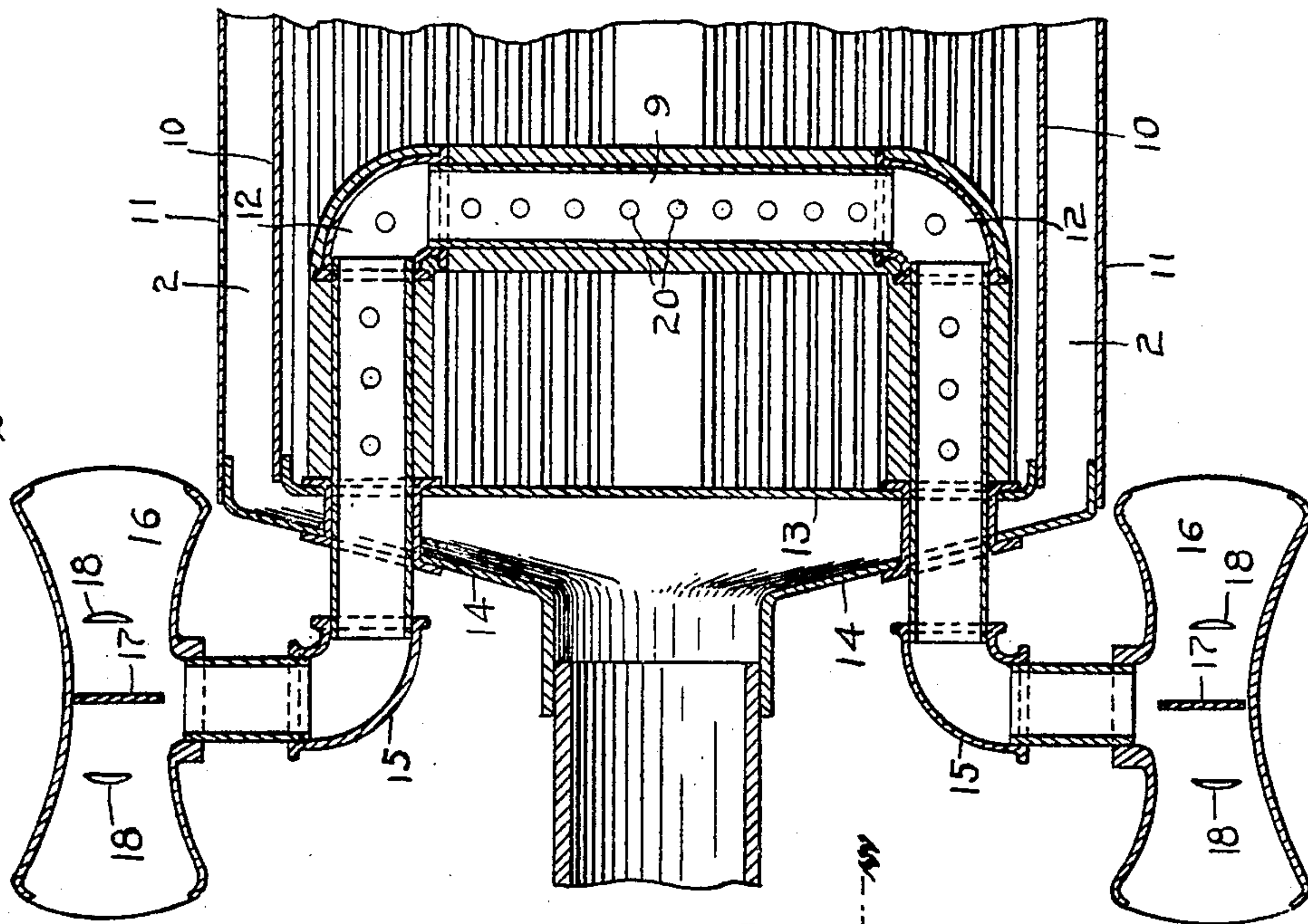
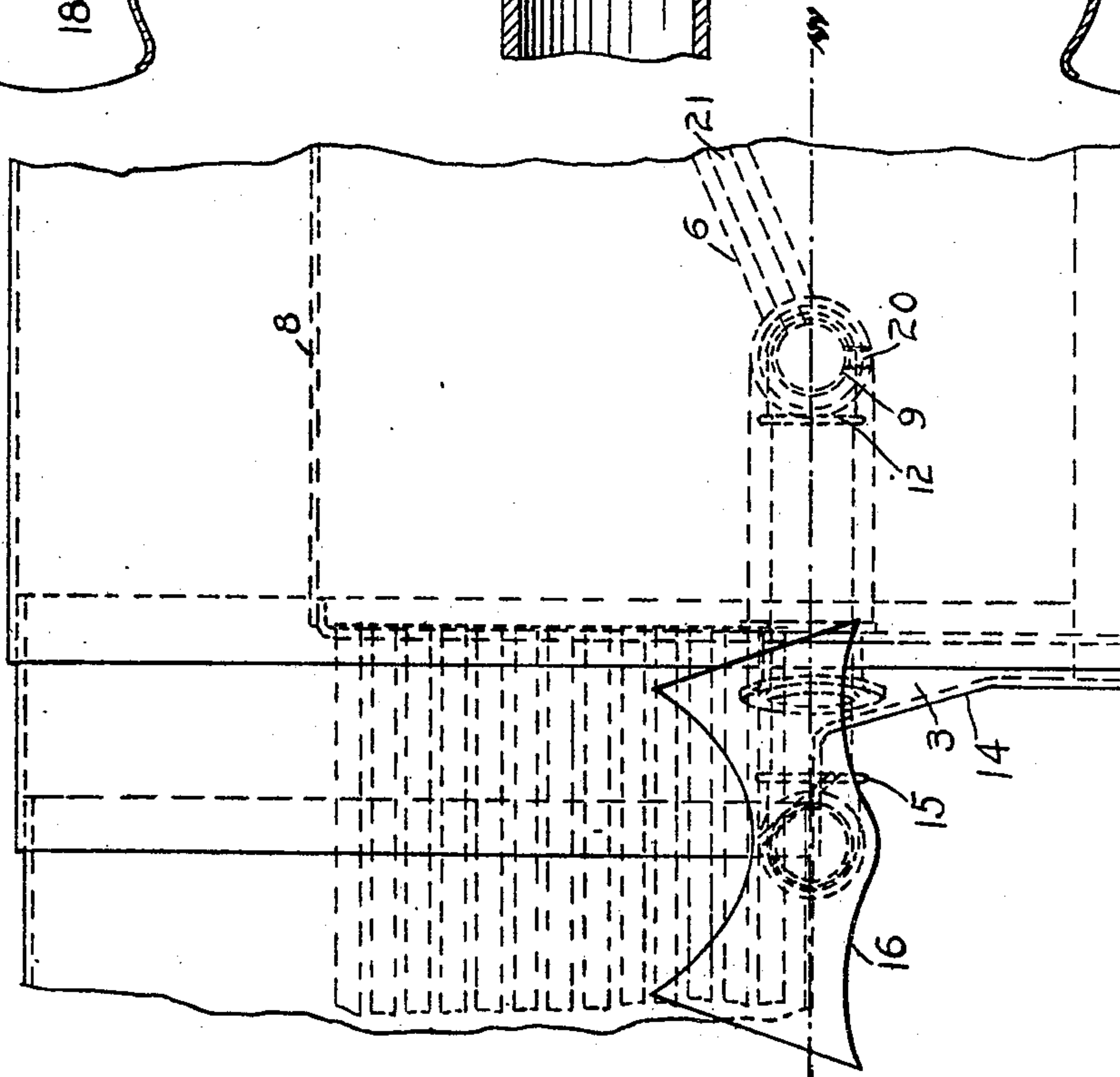


Fig. 5.



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UNITED STATES PATENT OFFICE.

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AUTOMATIC BLOWING APPARATUS FOR LOCOMOTIVES.

No. 795,367.

Specification of Letters Patent.

Patented July 25, 1905.

Application filed April 6, 1905. Serial No. 254,119.

To all whom it may concern:

Be it known that I, SIMEON F. PIERCE, a citizen of the United States, residing at St. Paul, in the county of Ramsey and State of Minnesota, have invented certain new and useful Improvements in Automatic Blowing Apparatus for Locomotives, of which the following is a specification.

My invention relates to improvements in automatic blowing apparatus for locomotives, and has for its objects to provide improved means for automatically introducing and forcing air into the fire-box at selected points, for supporting and protecting the fire-arch, and for directing and deflecting the air-drafts down upon the fire.

To this end my invention consists in the construction, combination, and arrangement of parts hereinafter described and claimed.

In the accompanying drawings, forming part of this specification, Figure 1 is a longitudinal section through the middle of a locomotive fire-box provided with my blowing apparatus, taken on line *y y* of Fig. 2 and showing the main air-pipe extended through the side water-legs. Fig. 2 is a vertical cross-section taken on line *x x* of Fig. 1 just inside of the rear end of the fire-box. Fig. 3 is a vertical section taken on line *z z* of Fig. 2 through the middle of the inlet-funnel at one end of the blower-pipe. Fig. 4 is a vertical cross-section, partly broken away, showing my blowing apparatus applied to one of the twin fire-boxes of a locomotive having a longitudinal dividing-wall such as that covered by Letters Patent of the United States No. 784,881, issued to me on March 14, 1905. Fig. 5 is a side view, partly broken away, of a locomotive-boiler, showing the main pipe extended through the forward water-leg; and Fig. 6 is a horizontal section taken on line *w w* of Fig. 5.

As shown in the drawings, A represents the boiler, and B the fire-box, of a locomotive, the fire-box being protected by the usual water-legs 2 at the sides and 3 and 4 at front and rear, respectively. Extending forwardly and downwardly from the rear wall 5 of the fire-box to the forward part of the fire-box is a fire-arch 6, having at intervals openings 7 to permit the products of combustion to pass up through the fire-arch to the upper portion of the fire-box, so as to heat the crown-sheet 8 of the boiler. Arranged at the forward end of the fire-arch and forming a support for the same is a main air-pipe 9, running

transversely through the fire-box and extending through the walls of the fire-box and boiler to the outside air. It is immaterial, so far as the present invention is concerned, through which of the walls the pipe passes, the selection being governed in each case by considerations of convenience and efficiency. In Figs. 2 and 3 the pipe is shown extended through the side walls 10 and 11, respectively, of fire-box and boiler, while in Figs. 5 and 6 it is shown formed with elbows 12 and extended through the forward walls 13 and 14 of fire-box and boiler. In this case it is provided with an elbow 15 outside the boiler and extended to or beyond the sides of the boiler, so that the funnels hereinafter mentioned may extend beyond the sides of the boiler for the intake of air whether the locomotive is traveling forward or backward.

Screwed or otherwise suitably secured upon each end of the pipe 9 outside the lines of the side walls of the boiler is a double-headed funnel 16, one of the funnel ends being directed toward the forward end of the locomotive and the other toward the rear end, so that the funnel shall always be in position for the intake of air whether the locomotive is moving ahead or backward. Within the funnel and pivoted to the middle of the top wall thereof is a cut-off valve or damper 17 common to both of the funnel ends and cutting off communication between them. The valve is shown as swinging in a vertical plane, and its travel in either direction is limited by the lugs or seats 18 on either side of the middle of the funnel. When the locomotive is at rest, the valve will hang vertically under gravity, with its edge across the bore of the pipe 9, so that the pipe is open to communication with both of the funnel ends. When the locomotive is in motion, however, the pressure of the air in the funnel end facing the direction of travel will throw the valve back against the farther lug, opening the entire bore of the pipe to communication with that funnel end and shutting it off from the other funnel end. It is important that the air should at all times have free passage through the pipe 9 and all communicating pipes within the fire-box in order to keep them cool and preserve them from the destructive heat of the fire. In order to force the air into the fire-box under great pressure, and thereby create a great draft, the funnel ends are widely belled out, as shown in Fig. 3. The mouths of the funnel may be provided with screens

19 to prevent the entry of stones and large gravel. Within the fire-box the pipe may be incased in masonry or tiling 23, and along its under side it is formed with any desired number of outlet-ports 20, through which the air is discharged upon the fire.

Extending upwardly and rearwardly from the pipe 9 through the interior of the fire-arch 6 are a number of communicating branch pipes 21, having discharge-nozzles 22, projecting down through the arch and directed toward the forward part of the fire-box. I prefer to carry these pipes back to the rear of the fire-box, so that their discharge ends shall rest against and be supported by the rear wall 5 of the fire-box above the level of the feed-opening 24. If desired, other branch pipes 25 may be extended part way back toward the rear wall, so that their nozzles 26 will project down from the arch at intermediate points along its length, and it will be found desirable to have these nozzles directed rearwardly toward the back corners of the fire-box, which are not reached by the usual drafts.

The air which is forced into the pipe 9 is partly discharged upon the top of the fire through the outlet-ports 20 and partly carried back through the branch pipes toward the rear of the fire-box, whence it is discharged downwardly and forwardly toward the forward end of the fire-box through the nozzles 22 and downwardly and rearwardly through the nozzles 26. It will be observed that the air-blast through the nozzles 22 along the rear wall will deflect the air entering through the feed-door down upon the fire more quickly and nearer its point of entry than the fire-arch can, and, indeed, the use of these branch pipes makes a fire-arch unnecessary, although it is a convenient means of protecting the pipes from the heat. By having nozzles pointing in different directions the air will be distributed more evenly over the fire.

In Fig. 4 I have shown a locomotive-boiler wherein there are twin fire-boxes 27 separated by a longitudinal water-wall 28, such as is shown in my Letters Patent No. 784,881, dated March 14, 1905. In this construction there may, if desired, be a separate pipe 29 on each side of the dividing water-wall, as shown in Fig. 4, the inner end of each pipe being supported in any suitable way in the adjacent side of the water-wall and the outer end passing through the outer walls of fire-box and boiler in the manner described.

It will be observed that the fire-arch is supported firmly by the cross-pipe 9 at its free end and by the branch pipes 21, resting against the rear wall of the fire-box. This makes it possible to leave a space 30 between each side of the fire-arch and the adjacent side wall of the fire-box, so that flames may pass up next to the water-legs at the sides and heat the contained water. It will also

be observed that the colder air passing through the pipes 9, 21, and 25 will protect the pipes and the fire-arch from the destructive heat of the fire and that the air in passing through the pipes will itself become heated before it is discharged upon the fire. The area of the mouths of the funnel is so much greater than the sectional area of the pipes that when the locomotive is in motion the pressure upon this large area will cause the air to be discharged through the pipes with great force and velocity. The force and velocity of the discharge is also increased by reason of the expansion of the air in the pipes as they become heated, the pipes being of smaller sectional area than the funnel.

It will be evident that various modifications may be made in the details of the device and the arrangement and positioning of the parts without departing from the principle of the invention, the scope of which is defined in the claims.

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

1. The combination, with a locomotive and its fire-box, of a main air-pipe transversely arranged in the forward part of the fire-box, and provided with outlet-ports, said pipe extending through one of the walls of the fire-box to the outside air, and branch pipes leading upwardly and rearwardly from the main pipe to the rear of the fire-box, the ends of the pipes being supported upon the rear wall and having downwardly-directed discharge-nozzles.

2. The combination, with a locomotive and its fire-box, of a main air-pipe arranged in the fire-box and extending through one of the walls thereof to the outside air, said pipe having discharge-ports within the fire-box, a funnel upon the outer end of the pipe, and branch pipes leading rearwardly from the main pipe and having downwardly-directed nozzles.

3. The combination, with a locomotive and its fire-box, of a main air-pipe transversely arranged in the forward part of the fire-box and provided with outlet-ports, said pipe extending through one of the walls of the fire-box to the outside air, and branch communicating pipes leading from the main pipe to the rear of the fire-box and having nozzles directed downwardly and forwardly toward the forward part of the fire-box.

4. The combination, with a locomotive and its fire-box, of a fire-arch extending forwardly and downwardly to the forward part of the fire-box, a main air-pipe extending transversely across the fire-box at the forward end of the fire-arch and passing through the walls of the fire-box to the outside air, and branch communicating pipes leading from the main pipe through the interior of the fire-arch to the rear of the fire-box and

supported upon the rear wall thereof, said pipes having nozzles projecting downwardly through the arch and directed toward the forward part of the fire-box.

5. The combination, with a locomotive and its fire-box, of a main air-pipe arranged in the forward part of the fire-box and extending on either side through the walls thereof to the outside air, branch communicating pipes extending upwardly and rearwardly from the main pipe toward the rear of the fire-box and having downwardly-projecting discharge-nozzles, and a funnel upon each of the outer ends of the main air-pipe arranged substantially in line with the direction of travel of the locomotive.

6. The combination, with a locomotive and its fire-box, of a main air-pipe transversely arranged in the forward part of the fire-box and provided along its under side with discharge-ports, said pipe extending through one of the walls of the fire-box to the outside air, a funnel upon the end of the pipe, and branch pipes leading upwardly and rearwardly from the main pipe, some of the branch pipes extending back to the rear of the fire-box and having downwardly and forwardly directed nozzles, and other branch

pipes extending a less distance toward the rear of the fire-box and having downwardly and rearwardly directed nozzles.

7. The combination, with a locomotive and its fire-box, of an air-pipe leading from the outside air and discharging into the fire-box, a double-headed funnel upon the outer end of the pipe, the funnel ends being oppositely disposed, and directed one toward the forward end of the locomotive and the other toward the rear end of the locomotive, and an intermediate valve arranged between the funnel ends and shutting them off from communication with each other, said valve standing normally in position to allow communication between the pipe and both of the funnel ends when the locomotive is at rest, but being movable by the pressure of the air in one of the funnel ends when the locomotive is in motion into position to cut off communication between the pipe and the other funnel end.

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

SIMEON F. PIERCE.

Witnesses:

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EMILY F. OTIS.