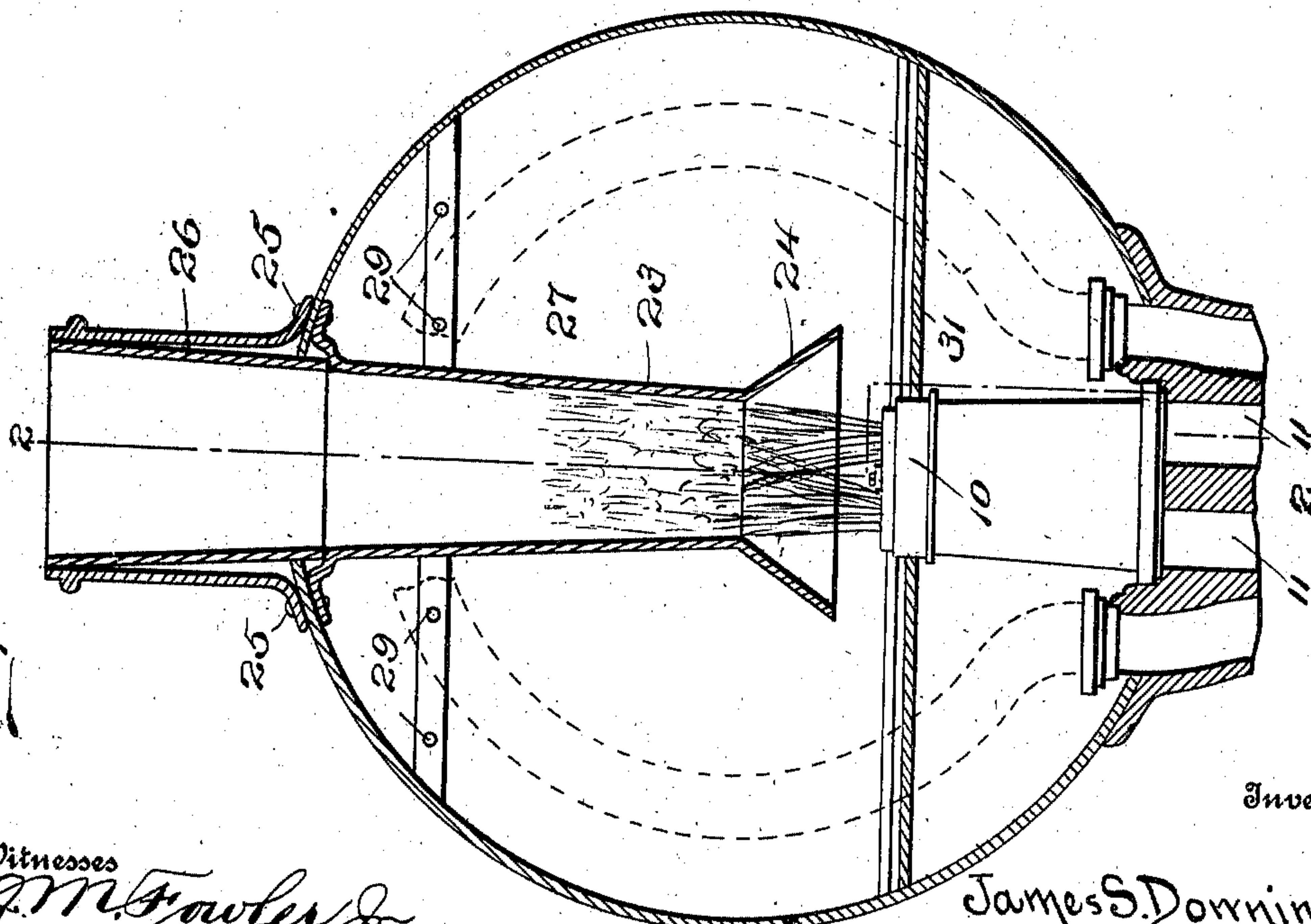


947,660.

~~2 SHEETS—SHEET 1.~~



James S. Downing,

Witnesses

J. M. Fowler Jr.

L. L. Merrill

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Mason F. L. Lawrence

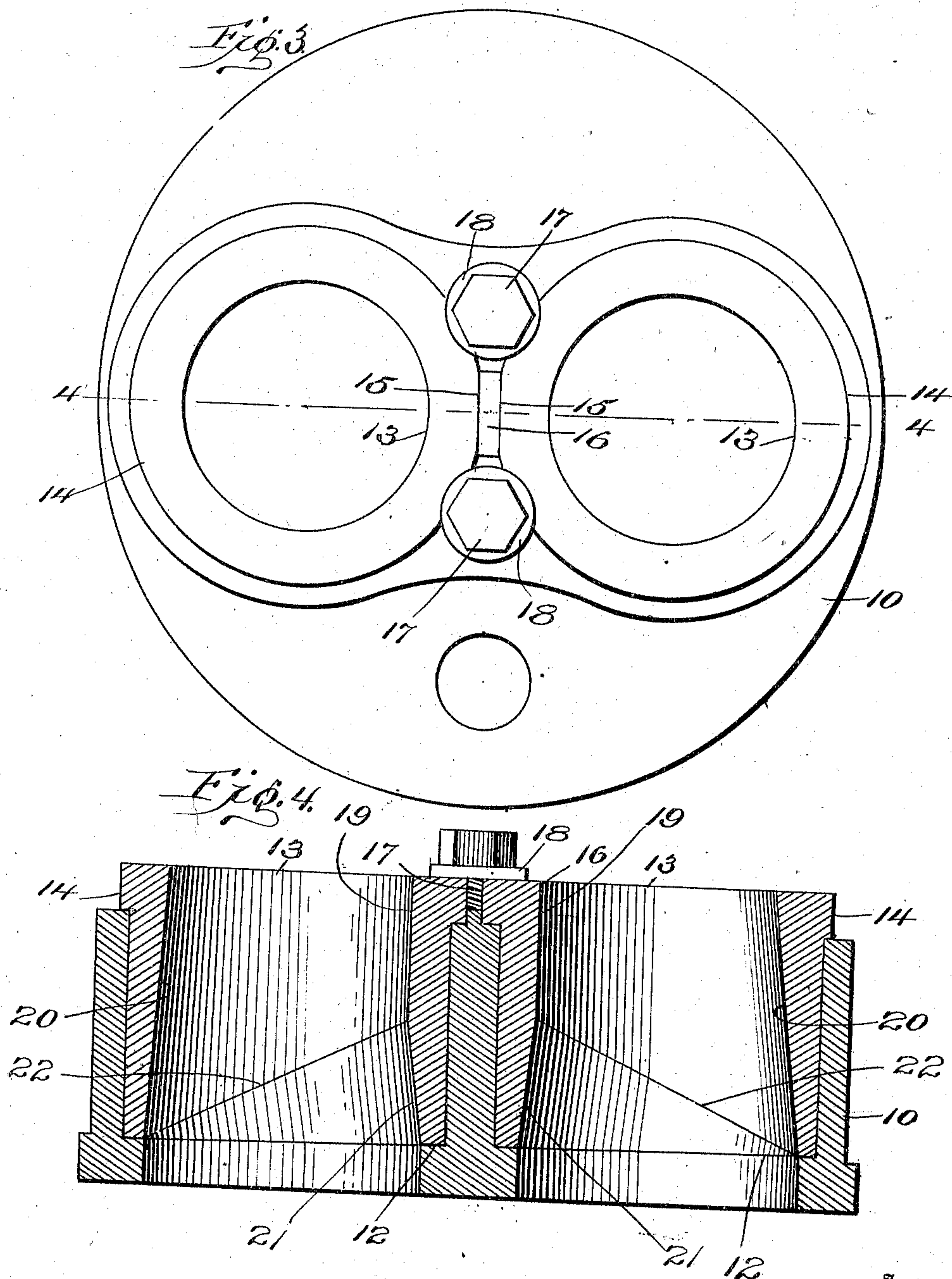
Attorneys

J. S. DOWNING.
DRAFT APPLIANCE FOR STEAM ENGINE BOILERS.
APPLICATION FILED AUG. 13, 1908.

947,660.

Patented Jan. 25, 1910.

2 SHEETS—SHEET 2.



Inventor,

Witnesses

*J. M. Fowler &
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James S. Downing,

By *Mason F. Lawrence,*
his Attorney.

UNITED STATES PATENT OFFICE.

JAMES S. DOWNING, OF ATLANTA, GEORGIA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO DOWNING LOCOMOTIVE DRAFT APPLIANCE COMPANY, OF ATLANTA, GEORGIA, A CORPORATION OF GEORGIA.

DRAFT APPLIANCE FOR STEAM-ENGINE BOILERS

947,660.

Specification of Letters Patent. Patented Jan. 25, 1910.

Application filed August 13, 1908. Serial No. 448,373.

To all whom it may concern:

Be it known that I, JAMES S. DOWNING, a citizen of the United States, residing at Atlanta, in the county of Fulton and State of Georgia, have invented certain new and useful Improvements in Draft Appliances for Steam-Engine Boilers; 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.

This invention relates to a draft appliance for steam engine boilers, and has for an object to provide a device employing the exhaust to produce the maximum efficiency of draft within the stack.

A further object of the invention is to provide nozzles for the exhaust ports properly proportioned and directed to exhaust the steam within the stack with the minimum friction and maximum vacuum efficiency.

A further object of the invention is to provide an exhaust stand with nozzles removably secured within the stand.

A further object of the invention is to provide in a draft appliance an exhaust stand with exhaust nozzles removably seated within the stand and with improved means for positioning and maintaining the nozzles in position.

With these and other objects in view, the invention comprises certain novel constructions, combinations and arrangements of parts, as will be hereinafter fully described and claimed.

In the drawings:—Figure 1 is a vertical, transverse sectional view of a conventional locomotive front end showing the draft appliance in elevation and taken on line 1—1 of Fig. 2. Fig. 2 is a vertical, longitudinal section of a conventional locomotive front end showing the draft appliance in edge elevation and taken on line 2—2 of Fig. 1. Fig. 3 is a top plan view of the exhaust stand and exhaust nozzles carried thereby. Fig. 4 is a vertical, sectional view of the exhaust stand and nozzles taken on line 4—4 of Fig. 3.

Like characters of reference designate corresponding parts throughout the several views.

The exhaust stand 10, which forms a part of the present invention, is adapted to be secured to the upper end of the exhaust pipes

11 shown in the conventional front end of Figs. 1 and 2.

The draft stand is provided with sockets having flanges 12 at the bottom within which sockets the draft nozzles 13 are seated preferably provided at their upper ends with annular shoulders 14 which are flattened as at 15 to properly position the nozzles relative to a lug 16 rigid or integral with the exhaust stand. The draft nozzles are freely removable from the stand and are maintained in position by bolts 17 having collars or washers 18 engaging upon the upper surfaces of the shoulders 14. The nozzles 13 are bored internally upon a taper so that the adjacent sides of the nozzles as at 19 are parallel for substantially half the distance at the upper end while the sides of the bore opposite, as at 20, are inclined toward each other at the upper ends. At their lower ends another bore is provided upon a different inclination cutting only the adjacent sides as 21 and forming with the main bore a crest 22 entirely about the bore but at the opposite edges coinciding substantially with the lower edges of the taper 20. The peculiar formation internally of the nozzles is a very important element of the present invention. In Fig. 1 dotted lines are employed to show the discharge of steam from the upper ends of the exhaust nozzles and the relative expansion of such steam. The expansion of steam per inch of rise can be definitely figured out and above the nozzles a lift pipe 23 of the petticoat pattern is employed having a bell 24 at its lower extremity disposed exactly above the exhaust stand and the lower end of the lift pipe at its juncture with the bell is accurately positioned relative to the nozzles so that the steam exhausted from the nozzles expands in its rise to the lower end of the lift pipe exactly enough to fill the lower end of such pipe. The lift or petticoat 23 is connected with the shell in any approved manner as by the rivets 25 and in communication with the stack in any approved manner, the connection depending entirely upon the type of stack employed and the connection here shown is also a conventional showing and any other means of connecting such petticoat pipe and stack will be fully as applicable to the present invention.

To the rear of the lift pipe 23 a baffle

plate 27 is secured to the boiler head above the ends of the flues shown diagrammatically at 28 and in any approved manner as by the rivet 29. The baffle plate 27 is bent as at 30 to form a substantially horizontal portion 31 engaging the exhaust stand 10 and in front of the exhaust stand and baffle plate a screen 32 is employed through which the smoke from the flues 28 passes about the lift pipe first and then by reason of the exhaust passing upwardly from the exhaust nozzle within the lift pipe is carried under the edge of the bell 24 and upwardly within the pipe.

Particular stress is laid upon the peculiar and novel internal formation of the nozzles 13 with the angles and relative inclinations of the bores and the position of such nozzles relative to the lift pipe and the proportions of such nozzles and pipe so that the exhaust steam discharged from such nozzle is discharged as indicated in Fig. 1 with the expansion also as indicated whereby the lower end of the lift pipe is accurately filled with exhaust steam to serve as a fluid piston in exhausting the front end to draw the smoke, sparks, etc. through the flues 28 and screen 32 within the chamber above the screen and baffle plate and finally up the lift pipe.

The present invention is not intended by any means as a spark arrester, but notwithstanding that fact the employment of the screen 32 discharging as it does the smoke and sparks above the lower end of the lift pipe serves to drop the sparks, if any such arrive at such chamber, below the lower end of the lift pipe where they can do no damage. The essence of the present invention is the formation of the discharge nozzles and the relation of such discharge nozzles both as to position and size to the lift pipe.

What I claim is:—

1. The combination with a stack, of a tapered lift pipe disposed as a continuation thereof and formed with a petticoat at its lower end, and a plurality of exhaust nozzles side by side and so formed that their axes converge upwardly and discharge into and substantially fill the lower end of the lift pipe.

2. The combination with a stack, of a ta-

pered lift pipe disposed as a continuation thereof and formed with a reversely tapered petticoat at its lower end, and a plurality of tapered exhaust nozzles side by side so formed that their axes converge upwardly and discharge into and fill the lower end of the lift pipe.

3. The combination with a stack, of a tapered lift pipe disposed as a continuation thereof and formed with a petticoat at its lower end, and a plurality of exhaust nozzles so positioned side by side that their axes converge upwardly and discharging into the lift pipe and so proportioned and positioned that the expansion of the exhaust fills the lower end of such lift pipe.

4. The combination with a stack, of a lift pipe disposed as a continuation thereof, and smaller at the bottom, a petticoat formed about the bottom of the lift pipe and forming a bell, a plurality of internally tapered exhaust nozzles disposed below the petticoat and so positioned that their axes converge upwardly and the exhaust discharged from the said nozzles expands to correspond in area to the area of the lower end of the lift pipe.

5. The combination with a front end having flues communicating therewith, of a baffle plate disposed at an inclination within the front end, and covering the forward end of the flues, an exhaust stand erected in the front end and extending upwardly through the baffle plate, a lift pipe formed as a stack continuation and extending downwardly within the front end and terminating above the exhaust stand, a petticoat formed about the lower end of the lift pipe, exhaust nozzles removably secured to the top of the exhaust stand, and so positioned that their axes converge upwardly and so proportioned that the exhaust discharged from the said nozzles expands to correspond in area to and to fill the lower end of the lift pipe.

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

JAMES S. DOWNING.

Witnesses:

A. T. CURRY,
JOHN E. COOPER.