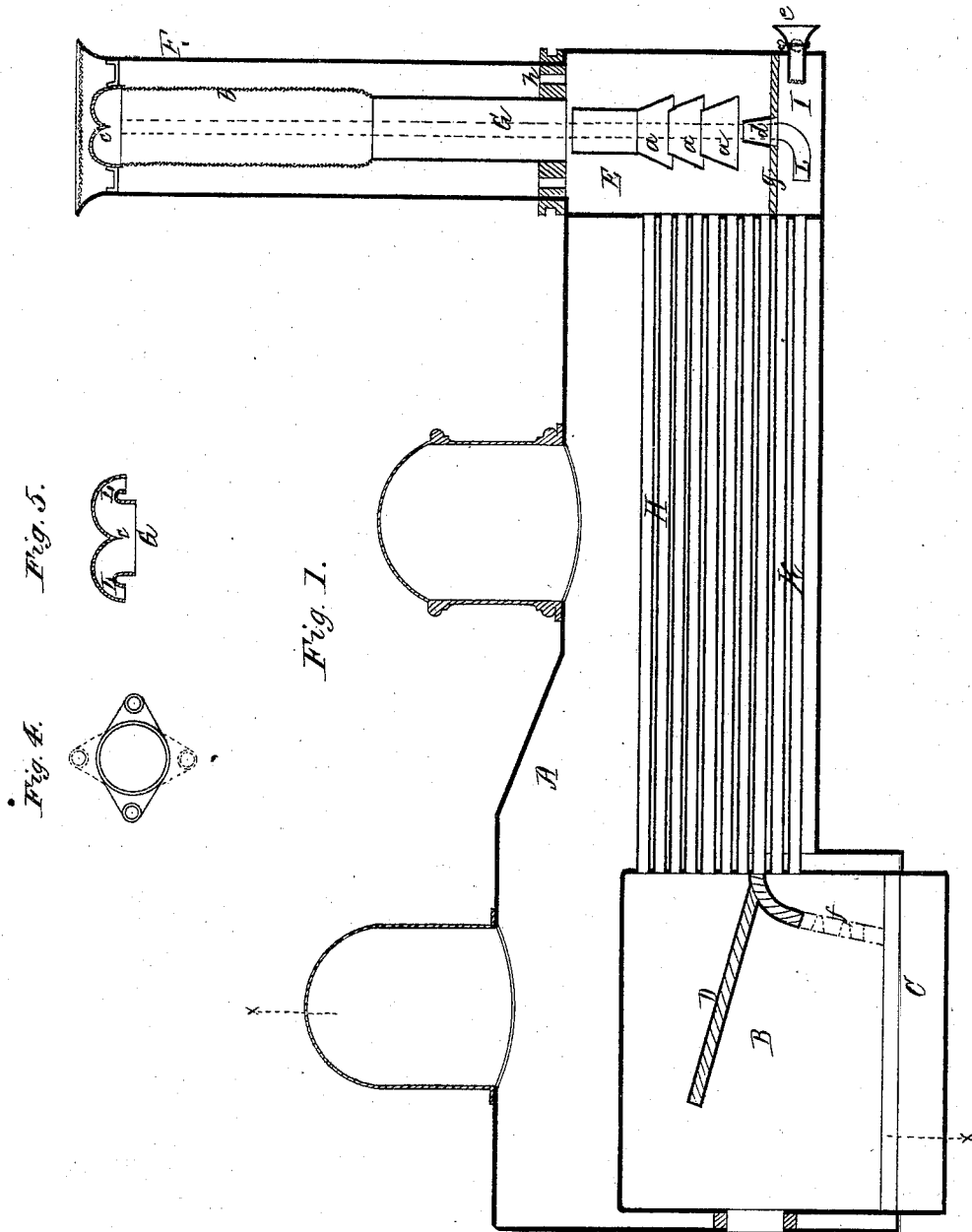


C. F. PIKE.

Improvement in Spark-Arresters and Consumers for Locomotives, &c.

No. 130,820.

Patented Aug. 27, 1872.



Witnesses:

Witnesses:
Phil. F. Larnier
Geo. F. Frenz,

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Charles F. Pike-
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Fig. 2.

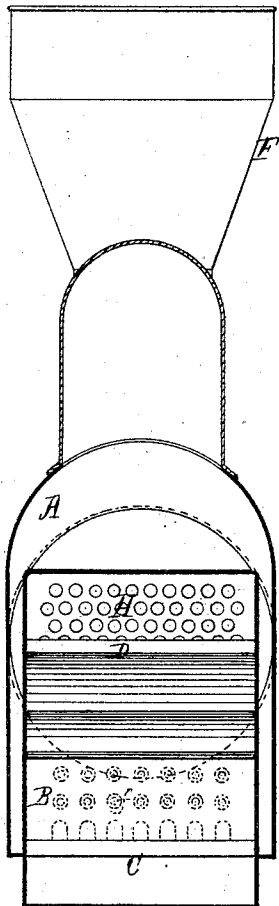


Fig. 3.

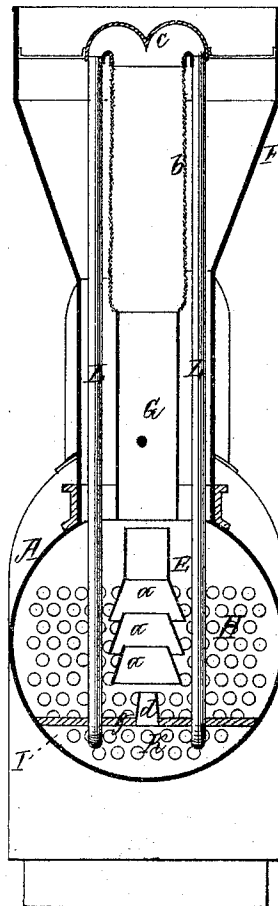
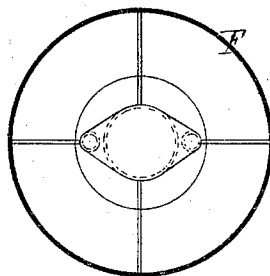


Fig. 6.



Witnesses:

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UNITED STATES PATENT OFFICE.

CHARLES F. PIKE, OF PROVIDENCE, RHODE ISLAND.

IMPROVEMENT IN SPARK ARRESTERS AND CONSUMERS FOR LOCOMOTIVES, &c.

Specification forming part of Letters Patent No. 130,820, dated August 27, 1872.

To all whom it may concern:

Be it known that I, CHARLES F. PIKE, of the city and county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Spark Arresters and Consumers, which are applicable to locomotive and other steam boilers.

My invention consists in a certain novel combination and arrangement of the fire-box or furnace, direct tubes, return flues, smoke-stack, and steam-exhaust pipe, by means of which all the sparks and more or less of the gases, smoke, and other unconsumed products of combustion are returned from the smoke-stack to the fire-box and practically utilized as fuel; and I do hereby declare that the following specification, taken in connection with the drawing furnished and forming a part of the same, is a clear, true, and exact description of a locomotive-boiler embodying my invention.

Referring to the two sheets of drawing herewith, Figure 1 is a longitudinal vertical section with a straight smoke-stack of a locomotive-boiler, in which my improvements are exhibited. Fig. 2 represents a vertical cross-section on lines X X. Fig. 3 is a vertical cross-section through the front end of the boiler and smoke-stack. Figs. 4 and 5 are detail views of the inverted cone-shaped deflecting-plate. Fig. 6 is a top view of the stack, showing the manner of bracing and attaching the deflecting-plate.

The boiler A, fire-box or furnace B, ash-pan C, fire-brick arch D, smoke-arch E, and smoke-stack F do not materially differ from others well known. The exhaust-pipe *d*, petticoat-pipes *a*, and interior smoke-pipe, which constitute the compound interior blast-pipe G, with its barrel-netting *b* and deflecting-plate *e*, are all substantially like those described and shown in the patent granted to George H. Griggs, dated November 7, 1871, No. 120,638, and require no extended description herein. H denotes the direct flues, which connect the furnace and smoke-arch E. I denotes a return-chamber, through which the unconsumed products of combustion pass on their way from the smoke-stack to the furnace, and within which said products are mixed with air to render them more thoroughly combustible. This chamber is located immediately below the smoke-arch E, and is separated therefrom

by a horizontal partition, *g*, covered with fire-clay. It communicates with the open air by means of open bell-mouthed pipes *e*, provided with an interior netting and a damper. K denotes in each instance one of several return boiler-tubes which connect the furnace with the return-chamber I. Within the furnace extending from the fire-arch, and wholly in front of the induction-apertures of these return boiler-flues downward to the grate, is a perforated fire-brick partition, *f*, for properly distributing the return-blast and preventing it from forcing flames, &c., through the furnace-door when opened. These perforations may also be applied to a greater or lesser extent to the fire or smoke-arch D. L denotes the return stack-flues. They are vertical, and set within the exterior stack and outside of the interior compound blast-pipe. At their upper ends they connect with the bell-mouthed cone-plate *c*. These return stack-flues extend from the top of the compound blast-pipe downward through the smoke-arch E and partition *g* into the return-chamber I, in which the ends are curved to the rear in the direction of the mouths of the boiler return-tubes. Two or more additional return stack-flues may be employed. It will only be necessary to form the deflecting-plate to suit the several flues, as is suggested in Fig. 4. The return stack-flues, instead of terminating in the return-chamber, may be made to pass directly to and connect directly with the return-flues K.

Having thus described the several portions of my apparatus, I will now describe their operation. On starting a fire the smoke passes from the furnace, through the direct tubes H, into the smoke-arch, upward through the smoke-pipe G, out of the top of the stack. For facilitating the passage of smoke from the smoke-arch openings *h* are provided outside of the compound blast-pipe, as shown in Fig. 1. When the old-style stack is employed, as shown in Fig. 3, an annular opening is provided, surrounding the interior pipe at the junction with the top of the smoke-arch. As soon as the engine can be started the exhaust steam, passing from the pipe *d* upward through the petticoat-pipes, creates or induces a powerful draft, which draws into and carries upward within the compound blast-pipe G the smoke, gases, cinders, and other unconsumed products of

combustion. None of the larger sparks and cinders escape through the barrel-netting *b*, although more or less of the smoke and gases will readily find egress. A crown netting, as usual, at top of the stack, will prevent the exit of such smaller sparks as may, perchance, escape through the interior netting *b*. A large portion of the uprising blast will be directed to the right and left into the mouths of the several return stack-flues *L*, and are guided by the inverted bell-mouthed plate *c* downward. By the continuous force of the blast such sparks, cinders, gases, &c., as may be entered within the mouths of the return-flues *L* will be driven and forced downward into the return-chamber, and thence through the return boiler-tubes *K* to the furnace. By arranging and constructing the flues as herein described the heat of the returning blast, which is very great, is utilized within the boiler for generating steam, and at the same time the external appearance of the locomotive-engine is unchanged.

I am aware that it is not new to return the

unconsumed products of combustion through return boiler-flues; I am not aware, however, that before my invention such unconsumed products of combustion were ever driven through the boiler-tubes by the force of the exhaust steam; and

I therefore claim as new and desire to secure by Letters Patent—

The combination of the furnace, the compound blast-pipe *G*, the return stack-flues *L*, and return boiler-tubes *K*, all connected and arranged substantially as described, for the purpose of driving, by the force of the exhaust steam, the compound hot blast, composed of steam, all of the solid and a portion of the gaseous unconsumed products of combustion, from the smoke-arch to the furnace, through the return boiler-tubes, and enabling it to contribute in its transit to the generation of steam, as set forth.

CHARLES F. PIKE.

Witnesses:

JOHN B. KILTON,
E. W. SALISBURY.