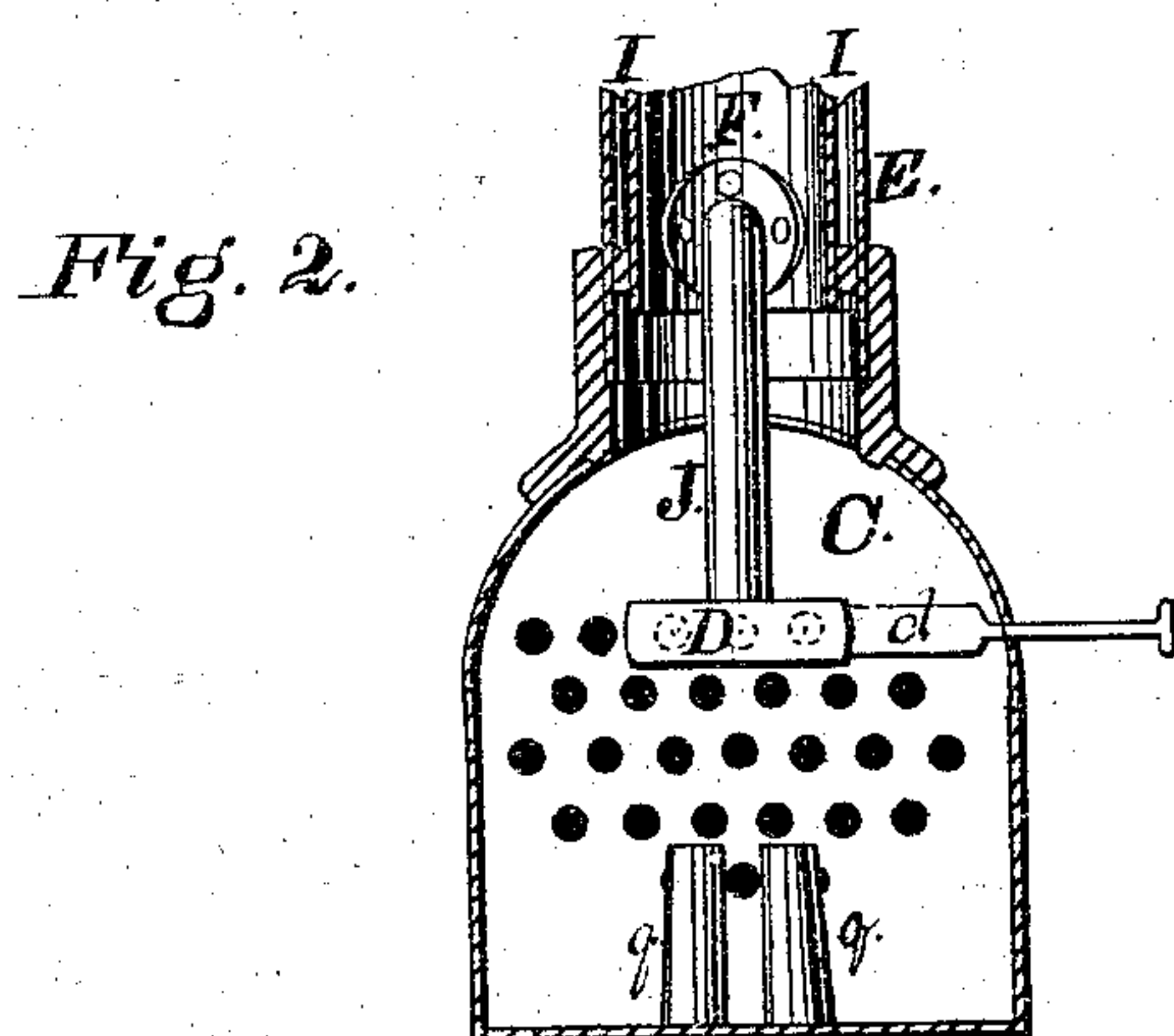
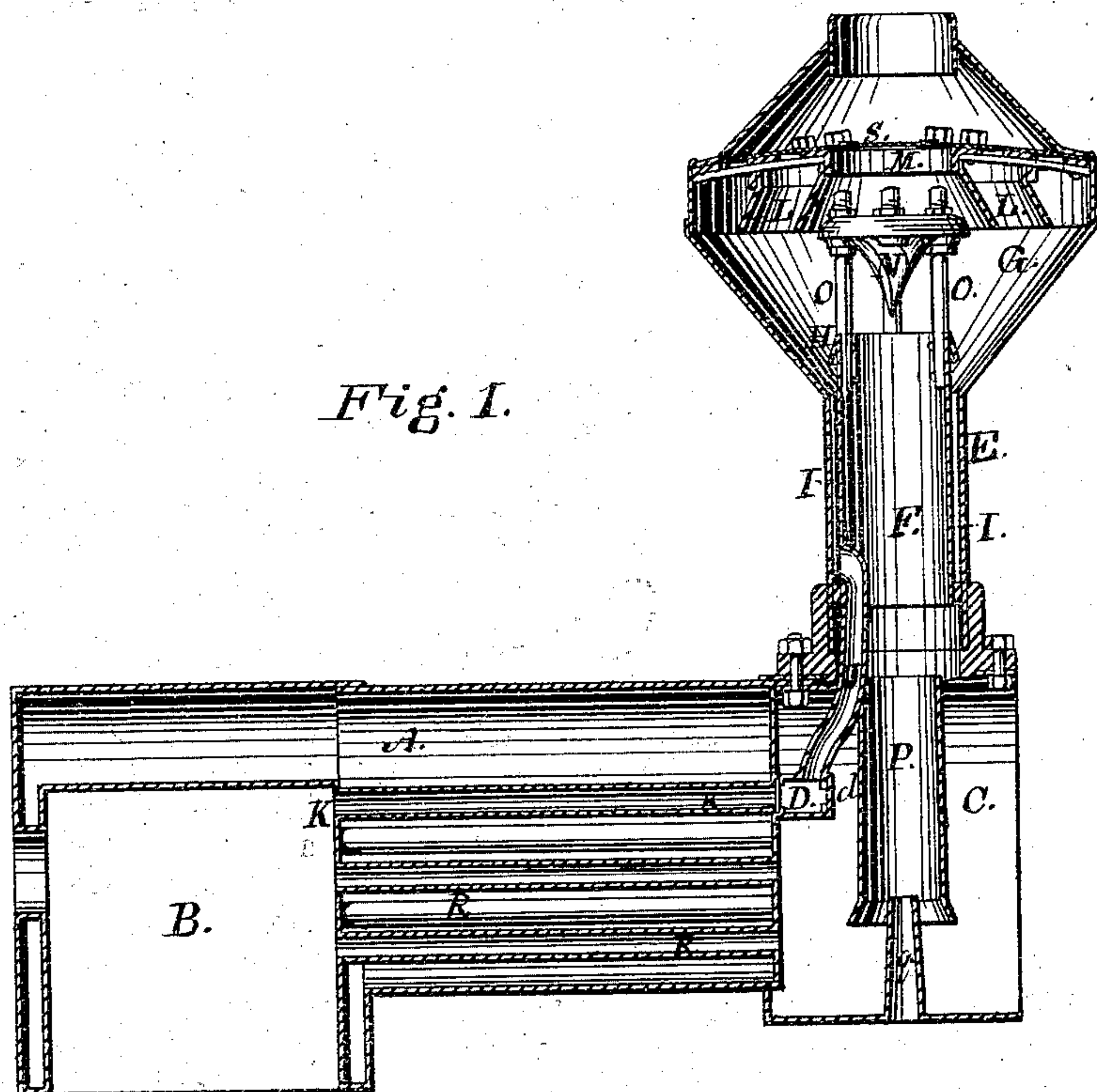


F. A. PERRY.
Spark Arresters.

No. 153,907.

Patented Aug. 11, 1874.



WITNESSES
C. Clarence Poole,
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By

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UNITED STATES PATENT OFFICE.

REISSUED

FRANCIS A. PERRY, OF KEENE, NEW HAMPSHIRE.

IMPROVEMENT IN SPARK-ARRESTERS.

Specification forming part of Letters Patent No. **153,907**, dated August 11, 1874; application filed July 9, 1874.

To all whom it may concern:

Be it known that I, FRANCIS A. PERRY, of Keene, in the county of Cheshire and State of New Hampshire, have invented certain new and useful Improvements in Spark-Arresters; and the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings making a part of this specification, in which—

Figure 1 represents a sectional side view of a locomotive steam-boiler and smoke-stack, showing my improvements as they are constructed and attached to the same to operate. Fig. 2 represents a sectional view of the front end of a boiler (open end) on a line with the tube-plate, with smoke-stack broken off, showing the pipe connecting therewith to a series of the upper tier of the tubes, for returning the cinders and sparks to the fire-box or furnace.

My invention consists in placing within the smoke arch and stack of portable and locomotive engines the following combined devices for gathering and returning the sparks and unconsumed combustible matter through one or more of the boiler-tubes to the fire-box, to be consumed, namely: A box secured to the upper portion of the tube-plate, provided with a sliding shutter to cut off the outward draft of one or more of the top tier of the fire-flues from the smoke-arch; also, the pipe connecting the said box and flues with the cylindrical space between the inner and outer cylinders, forming the body of the smoke-stack, to receive the cinders and sparks.

A more general and detailed description of my improvements will now be given, referring to the drawings and to the letters marked thereon.

Without making any change or alteration in the boiler A, as they are ordinarily constructed for portable or locomotive steam-engines, I fit an oblong box, D, so as to cover the ends or take in two or more of the top tier of the boiler-tubes or fire-flues K K, the box being entirely within the smoke-arch C, and is held in its place by sockets secured to it and driven into the ends of the tubes K K; or it may be secured to the tube-sheet by screw-bolts. The box D is made open in front, and is provided with a sliding lid, *d*, to close it up

and cut off all the draft through the tubes K K in the forward direction. When the slide is drawn the heat and flame will be in the same direction as the other flues R R. Into the top of the box D is fitted a vertical curved pipe, J, which extends up inside the inner cylinder F, and connects with the cylindrical chamber I, between the inner and outer cylinder E, forming the upright body of the smoke-stack, to which the cinders and sparks are drawn, they being deflected by the conical plates L L, which are secured to the netting-frame M above; and the adjustable spirally-fluted cone N, supported on vertical pillars *o o*, so as to be centrally above the exhaust steam, (near the top of the smoke-stack,) which impinges against the spirally-fluted cone, and gives a rapid whirling motion to the sparks and cinders within the enlarged conical portion of the stack G, and directs the current of them downward toward the deflecting-ring H, into the cylindrical chamber I, where they are conveyed through the pipe J and boiler-tubes K K into the fire-box B. The force of the exhaust steam up through the inner cylinder F, coming in contact with the cinders and sparks, dashing them against the cone N, deflectors L L, the angle-irons, netting, and other obstructions at the top, breaks and reduces them fine, and renders them suitable to be drawn down through the pipe J and tubes K K, discharging them into the furnace B hot, mixing with the gases, and assisting materially in the combustion of the other fuel contained therein. Successive exhaust against the deflecting devices above described causes a downward pressure and current at the upper portion of the stack under the netting S, and serves to force the unconsumed products of combustion into the cylindrical chamber I, which has no outlet at the bottom, except through the pipe J and flues K K, so that the smoke and sparks are returned to the furnace B, retaining the greater portion of the heat taken up in their ignition, and increased by the exhaust steam passing twice through the flues of the boiler A. The sliding shutter *d* on the front of the box D in the smoke-arch C may be occasionally opened when the engine is working, which will effectually clean out any deposit of sand or cinders that may have lodged therein.

P is the ordinary petticoat-pipe used in the smoke-arch of locomotive-engines, into which the exhaust-pipes *q q* enter, to create a draft through the tubes or fire-flues R R, and the force of the exhaust steam above the petticoat-pipe P, as it enters the lower end of stack F, produces an immense suction and force to carry all of the unconsumed matter to the deflecting devices above, and return them, through the chamber I, pipe J, and flues K K, to the fire-box B, the result of which is a great saving of fuel, consuming the larger portion of the gas and smoke, lessening the danger of sparks setting fire to and destroying property along the line of railroads, and relieving the traveling public from the great annoyance of smoke, sparks, and cinders coming into the cars while they are in motion, converting wasted products into a useful purpose, all of which is accomplished by putting into any locomotive the devices as above described.

I do not claim a double-cylinder smoke-stack, or a space between to return the sparks

and cinders to the smoke-arch, nor a box in the bottom of the arch to connect with the lower tubes of the boiler; neither do I claim a pipe or pipes externally or internally connected to the hood or upper portion of the smoke-stack, and terminating in the ash-pit or furnace of a steam-boiler, as they are all old and well-known devices; but

What I do claim as my invention, and desire to secure by Letters Patent, is—

The arrangement and combination of a box, D, with its sliding shutter *d*, the pipe J connecting the cylindrical chamber I with one or more of the upper tier of the boiler-tubes K K, for returning the cinders, sparks, and smoke to the furnace B, substantially as and for the purposes herein shown and described.

In testimony whereof I hereunto subscribe my name.

FRANCIS A. PERRY.

Witnesses:

F. A. FAULKNER,
D. C. HOWARD.

1250
words.