G. H. GRIGGS.

Spark-Arresters and Consumers.

No. 156,460. Patented Nov. 3, 1874.

Fig. 1.

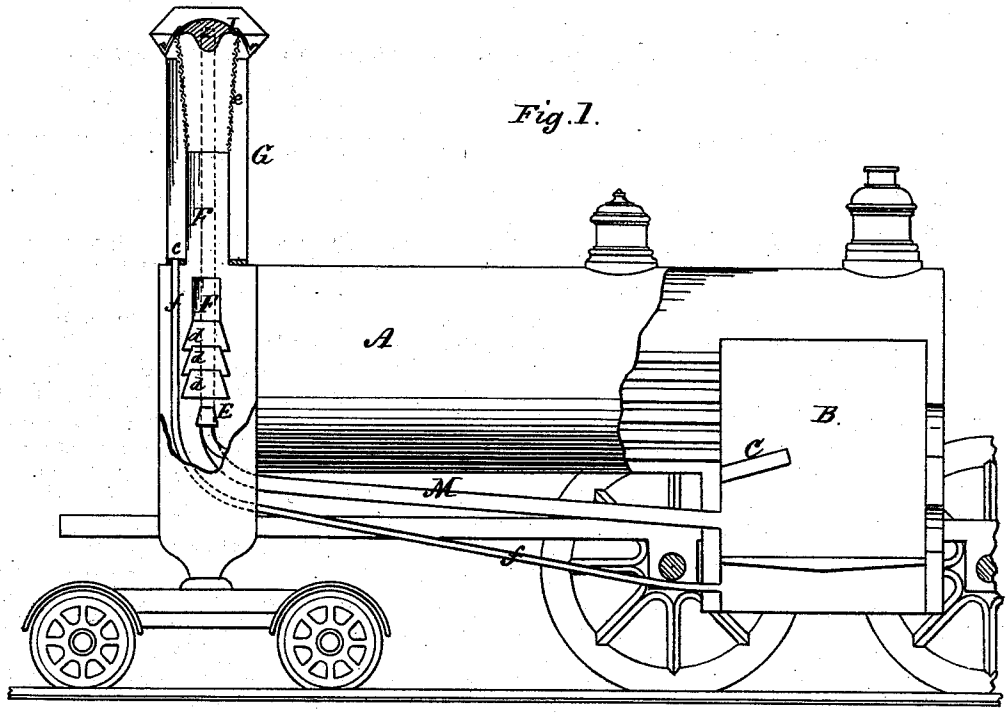
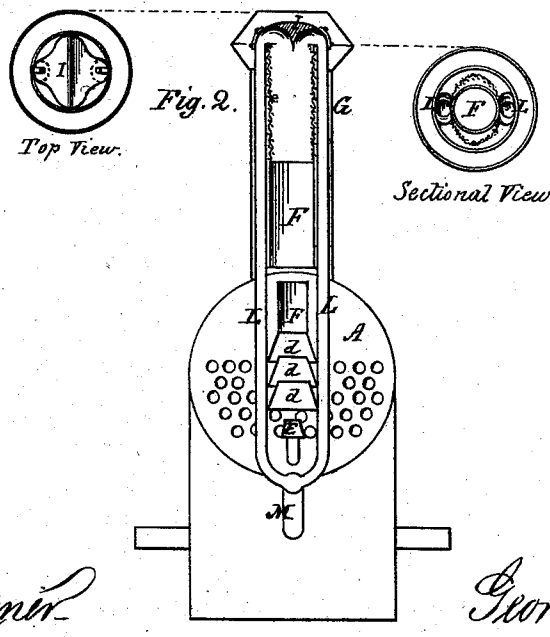


Fig. 2.



Top View.

Sectional View.

Witnesses.
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UNITED STATES PATENT OFFICE.

GEORGE H. GRIGGS, OF WHITESTONE, NEW YORK, ASSIGNOR TO CHARLES F. PIKE, OF PROVIDENCE, RHODE ISLAND.

IMPROVEMENT IN SPARK ARRESTERS AND CONSUMERS.

Specification forming part of Letters Patent No. **156,460**, dated November 3, 1874; application filed October 25, 1872.

To all whom it may concern:

Be it known that I, GEORGE H. GRIGGS, of Whitestone, in the county of Queens and State of New York, formerly of the city and county of Worcester, in the State of Massachusetts, have invented a certain new and useful Improvement in Spark Arresters and Consumers.

The improvement herein described relates to the invention patented by me November 7, 1871, reissued in two divisions September 10, 1872, Nos. 5,050 and 5,051; and consists in a special arrangement of the return spark-flues, whereby the unconsumed products of combustion are forced and driven by the exhaust steam from the top of the smoke-stack downward and to the rear, below and outside of the boiler, into the fire-box beneath the "arch" or "reverberator;" and I do hereby declare that the following specification, taken in connection with the drawings furnished and forming a part of the same, is a clear and true description of a locomotive-engine embodying my improvement.

Referring to the drawing, Figure 1 represents a locomotive-engine, partially in side elevation and partially in longitudinal vertical section. Fig. 2 represents the same in transverse section, on a line with the center of the smoke-stack; also top and section views adjacent to the mouth-piece of the return-flues.

A denotes the boiler; B, denotes the fire-box, and C the arch or reverberator. E denotes the exhaust-pipe, which projects upward through the floor of the smoke-arch, as usual. F denotes a compound blast-pipe, possessing no novel features, which is provided with several petticoat-pipes, *d*. G denotes an exterior smoke-stack, of the usual form. Between the pipes F and G is an annular space, which extends from the saddle-plate over the smoke-arch to the top of the smoke-stack. I denotes the mouth-piece of the return spark-flues. L, in each instance, denotes one of two return spark-flues, which connect with the mouth-piece I near the top of the stack, and extend downward through the smoke-arch, curve to the rear, and connect with a nearly horizontal flue, M, which extends to and through the front wall of the fire-box, below the arch or reverberator. The barrel-netting *e*, which connects the blast-pipe F with the mouth-piece I of the return-flues, is substantially the same as that shown in my original patent referred to. The return-flues L may be placed wholly within or outside of the smoke-stack, as may be desired. If the returned blast be entered into the fire-box above the arch, its value will be materially lessened, for its combustion will not be so complete, owing to the liability of its escape direct into the boiler-tubes. The form of the mouth-piece I can be varied, but it should be so formed and set that it will direct the blast into the flues L. As shown and described in my former Letters Patent referred to, the return-flue is connected with the mouth-piece I, and extends downward on a slight incline over the boiler to a point near the front of the cab, and thence branches downward and enters the fire-box on each side. In this instance the branching of the return-flue is simply reversed, and, instead of commencing in a single flue and branching into two, as before, it commences in two flues and unites in one, and enters the fire-box through its forward wall, beneath the arch or reverberator. It is, of course, non-essential that the flue be branched, for each of the vertical flues may be connected direct with the fire-box below the arch, and approximate results will accrue. It is, however, preferable that a single flue be employed beneath the boiler, as herein shown, on account of the lessened cost and the convenient space afforded therefor beneath the center of the locomotive. From the space *c* at the base of the exterior stack a conducting pipe or flue, *f*, is attached, which extends downward through the smoke-arch, curves to the rear and inclines downward, extends to the rear, and unites with the ash-pan, through which the fine dust and sparks which fall into said space *c* are conducted to the ash-pan. To secure a free passage therefrom, a jet of steam may be employed therein, adjacent to the ash-pan, near the mouth of the flue, in a manner well known.

It has been proposed by others, since my original invention, to drive by my method the returned blast through one or more combined return-flues and boiler-tubes, in order that the heat may contribute in its transit to the gen-

eration of steam within the boiler. I therefore desire it to be distinctly understood that I herein disclaim such special arrangement of combined boiler-tubes and return-flues. Experience has demonstrated to me that the return-flues must be occasionally renewed, owing to the unavoidable wear of their interior surfaces, resulting from the force of the blast, the attrition of the sparks, and the action of the gases and decomposed steam on the metal. So long as these return-flues are outside of the boiler, they can be continued in use with economic and desirable results, even after they have actually become perforated in several places. On the other hand, if the flues be arranged as boiler-tubes, they are subjected to the same destructive forces, but cannot be continued in use with safety beyond that point at which they might fail to withstand the pressure within the boiler. Should such flues or tubes be at all defective in their structure, so as to render them leaky, the locomotive would be rendered wholly worthless until the injury had been properly repaired. It is for this reason that I declare my preference for the "exterior return-flue," constructed so as to be wholly outside of the boiler. At the point where it enters the fire-box it may, as shown, be arranged to pass through the "water-jacket" surrounding the fire-box; and although said jacket communicates with, and is in fact a part of, the boiler, yet it will not be open to the objections above named, as for that short distance the pipe may be specially protected either by an encircling copper ring, a fire-clay lining, or by any other well-known means suited thereto.

I am also aware that by the employment of blowers, fans, and similar mechanical devices, unconsumed products of combustion have been driven from the smoke-stack and smoke-arch to the fire-box, below the arch or reverberator, through flues located outside of and below the boiler.

I am not aware, however, that prior to my invention there existed any apparatus in which there was the arrangement of return-flues as herein shown, in which the sparks and other unconsumed products of combustion could be driven from the smoke-stack by the force of the exhaust steam, through flues parallel with the stack, outside of and below the boiler, into the fire-box beneath the reverberator; and

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

The arrangement with relation to each other, substantially as described, of the smoke-stack, the return spark-flues, the mouth-piece I, the fire-box, and arch or reverberator, whereby the unconsumed products of combustion are driven by the force of the exhaust steam through the vertical flues within or adjacent to the smoke-stack, a horizontal or inclined flue below and outside of the boiler, into the fire-box beneath the reverberator, as specified.

GEORGE HENRY GRIGGS.

Witnesses:

HARRY HILL,

ANDW. W. SMITH.