2 Sheets--Sheet 1.

R. HAWKES & H. J. PAINE.

Improvement in Spark Arresters.

No. 124,738. Patented March 19, 1872.

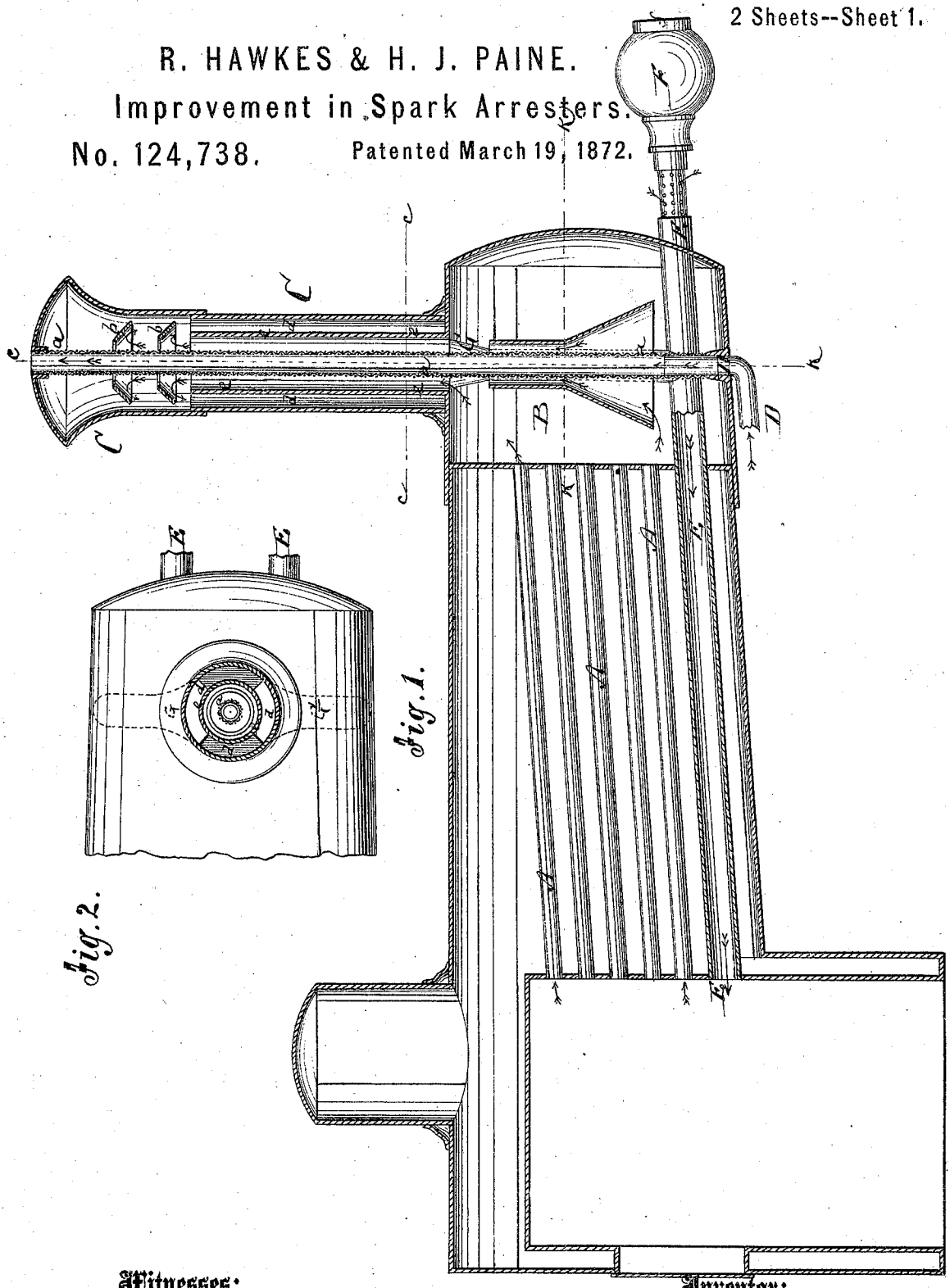

Fig. 1.

Fig. 2.

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R. HAWKES & H. J. PAINE. 2 Sheets--Sheet 2.

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Fig. 3.

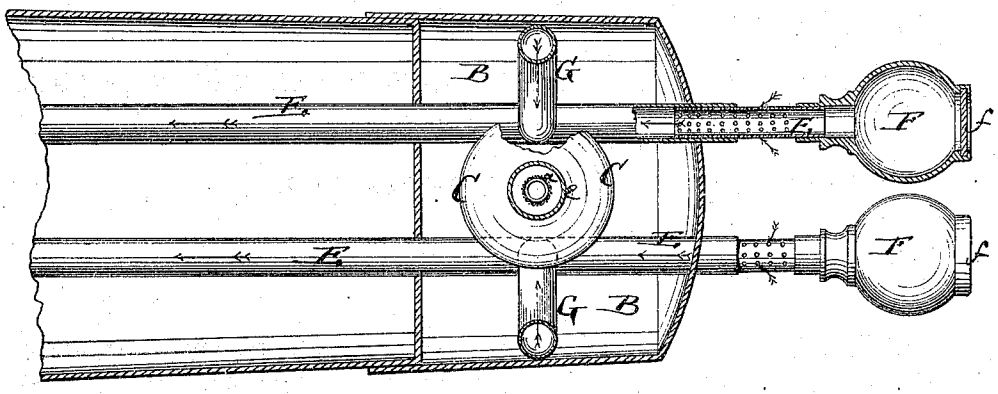
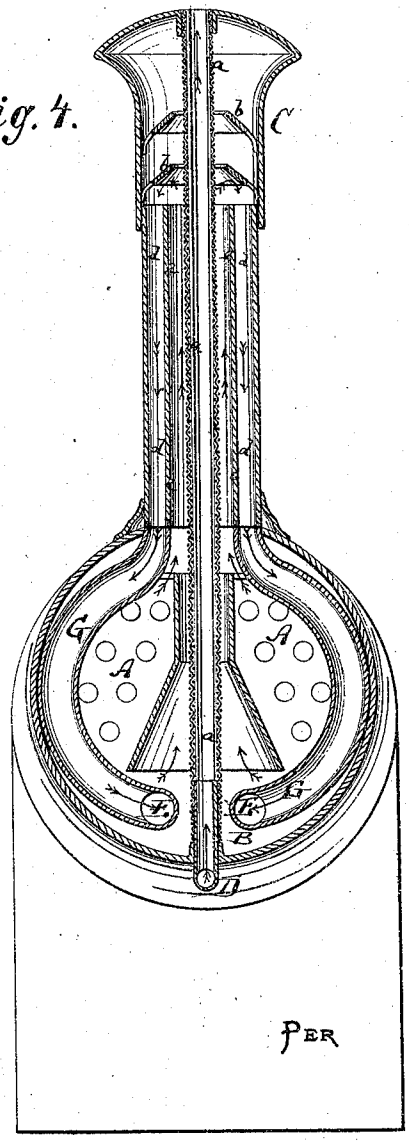


Fig. 4.



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Reissued Sept. 17th 1872.

124,738

UNITED STATES PATENT OFFICE.

RUSSELL HAWKES AND HENRY J. PAINE, OF PROVIDENCE, RHODE ISLAND, ASSIGNORS TO THEMSELVES AND JOSEPH KELLEY, OF SAME PLACE.

IMPROVEMENT IN SPARK-ARRESTERS.

Specification forming part of Letters Patent No. 124,738, dated March 19, 1872.

Specification describing a new and Improved Spark-Arrester for Locomotive-Engines, invented by RUSSELL HAWKES and HENRY J. PAINE, of Providence, in the county of Providence and State of Rhode Island.

Figure 1 represents a longitudinal vertica-section of our invention. Fig. 2 is a horizon tal section on the line *c c*, Fig. 1. Fig. 3 is a horizontal section on the line *k k*, Fig. 1; and Fig. 4, a vertical transverse section on the line *c k*, Fig. 1.

Similar letters of reference indicate corresponding parts.

The invention will first be fully described, and then clearly pointed out in the claims.

A A in the drawing are the smoke-flues of the locomotive-boiler conveying the products of combustion from the fire-place to the smoke-chamber B, whence the same escapes through the smoke-stack C. The upper end of the stack is closed, except in the middle, from which a pipe, *a*, of wire-gauze or perforated sheet metal, projects downward and connects at the lower end with the steam-exhaust pipe D. All smoke that reaches the chamber B is by the force of the exhaust, as well as by the ordinary draught and by its own impetus, caused to enter the perforated pipe *a*, and ascend in the same to escape. Sparks and cinders, however, of larger size than the apertures of the pipe *a*, cannot escape into the same, but are, by the same stated forces, carried up around the pipe *a* into the upper, outer, and closed part of the smoke-stack. In this upper outer part are some inclined rings *b b*, which deflect the ascending sparks or cinders, and cause them to enter an annular space, *d*, which is, by an upright tube, *e*, formed in the smoke-stack, as shown. The lower end of the space *d* is closed, except where it communicates with two, more or less, pipes, G G, which communicate with as many horizontal or inclined tubes E E that lead back to the fire-place. Thus all the sparks, cinders, &c., that are carried to the chamber B are conducted back to the fire-place for complete consumption.

It may be necessary to create a draught in the pipes E E in order to force the sparks and cinders backward therein. For this purpose these pipes are carried through the front end of the engine, and open or perforated in front, so the air entering them during the forward motion of the locomotive may carry the cinders into the furnace, besides furnishing oxygen for a more complete combustion of the gases.

Since the pipes E E are thus open at both ends, we have thought well to utilize the light of the fire that shines through them by attaching to their front ends spherical reflectors F F with glass faces *f f*. The same will constitute signals that can be used for suitable purposes, and will be displayed without the use of lamps or extra lights.

Having thus described our invention, we claim as new and desire to secure by Letters Patent—

1. The pipe *e* and annular chamber *d* formed in a smoke-stack, together with the perforated pipe *a*, as specified.

2. The combination of the pipes E E and G G with the annular space *d* and perforated pipe *a*, as specified.

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Witnesses:
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