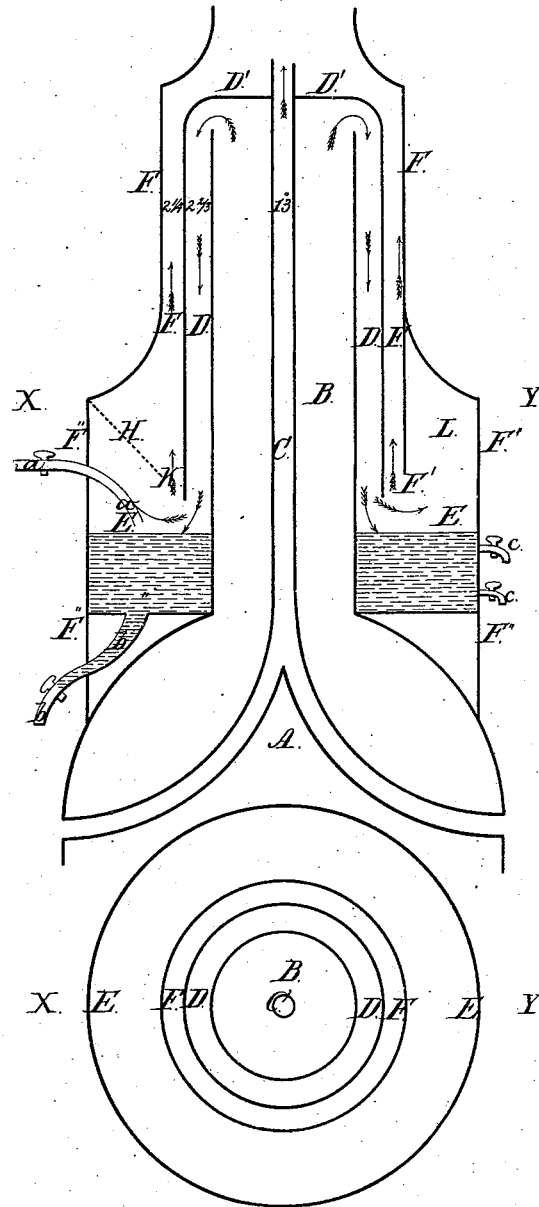


Sheet 1-2 Sheets.

J. A. Roebling,
Spark Arrestor,
No 2,958, *Patented Feb. 16, 1843.*

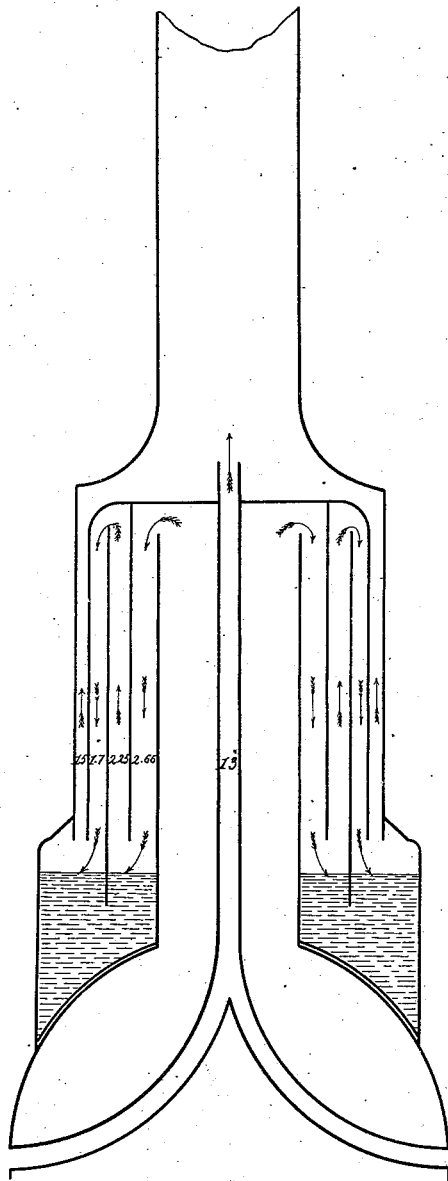


Sheet 2 - 2 Sheets,
J. A. Roebling,

Spark Arrester,

No. 2,958,

Patented Feb. 16, 1843.



UNITED STATES PATENT OFFICE.

JNO. A. ROEBLING, OF SAXONBURG, PENNSYLVANIA.

SPARK-ARRESTER.

Specification of Letters Patent No. 2,958, dated February 16, 1843.

To all whom it may concern:

Be it known that I, JOHN AUGUSTUS ROEBLING, civil engineer, of Saxonburg, Butler county, State of Pennsylvania, have
5 invented a new Draft-Improving Spark-Extinguisher for the Use of Locomotives; and I do hereby declare that the following is a full and exact description.

The nature of my improvement consists in
10 the arrangement of two or more concentric flues, which may be cylindrical and in a vertical position or nearly so, to be placed around the lower part of the chimney, and connected with each other so, that those ad-
15 joining will communicate either at the top or bottom, and cause the smoke to ascend and descend alternately before escaping into the chimney—in connection with a cistern or reservoir of water, immediately below
20 those flues, so as to communicate with them and be common to all—for the purpose of directing the sparks, while passing down the descending flues, forcibly and if required, repeatedly, into the water, and thus ex-
25 tinguishing them, at the same time improving the draft by extending the travel of the smoke.

In order to convey a more clear idea of my improvement, I refer to the accompanying
30 drawings Nos. 1 and 2 which represent vertical and horizontal sections of the apparatus.

The drawing No. 1 exhibits the arrester with but one downward flue.

35 A shows part of a section of the smoke compartment of a locomotive with the two branches of the exhaust pipe.

B is a common chimney pipe, 13 inches in diameter, cut off at a height of from 3 to 4
40 feet.

C is the exhaust pipe which passes through the top of D D the next surrounding case, which has an inclosed top at D', D', and which forms a descending flue, concentric
45 to B, so as to leave a clear space of 2½ inches all around the latter. The direction of the draft in the different flues is indicated by little arrows.

E E is the water cistern or reservoir with
50 about 6 inches depth of water so as to leave a space of 3 inches below the lower edge of the flue D D. This cistern should be as wide and large as possible, so as to create a considerable volume of space above the water
55 for the purpose of reducing the velocity of

the draft above the surface and producing a calm region.

F F is the next ascending flue and of the same areal square section as the others. Its base is enlarged so as to serve as a top to the
60 reservoir, it terminates in G a common chimney pipe surmounting the whole and which may be furnished with hitches so as to be easily lowered when passing viaducts. The exhaust steam discharges into this pipe,
65 through the pipe C.

H is a perforated sheet or wire gauze in the shape of an inverted truncated cone, so fixed, that an open space of 2 inches is left
70 between its lower edge at K, and the descending flue D. This open space is marked K. The perforated sheet is only represented on one side of the drawing, on the other side it is omitted, and instead of it the outer case F is extended farther down, as seen at
75 F' so as to form a separate space L, into which those sparks will fly off, which do not strike the water after the descent. The outer case F, F, is widened out at its lower end, F'', F'', to give room for the water
80 cistern E, E, and for the perforated cone H, when that is used, or for the space L, when the perforated cone is omitted, and the partition F', is employed.

The action and the use of the apparatus
85 will now be readily understood. The smoke and sparks will first ascend the pipe B, then descend the next surrounding flue D D down to the cistern, where the sparks will strike the surface of water with considerable force.
90 The greater part of smoke and gases will thence pass through the opening K into the flue F F and escape into the chimney G. The perforated sheet or wire gauze serves to arrest those few light and straggling
95 sparks, which may not immediately strike the water. These will naturally fly off into the space of the reservoir, formed by the enlargement at F'', where they will either be checked by the cone or settle down of them-
100 selves, when out of the reach of the draft. This space should therefore be as large as possible. If the holes in the perforated sheet are wide enough, then the space K may be closed. The sheet H, instead of being
105 conical may be in a horizontal position. The draft will, however, be more or less impaired in that case and I prefer the arrangement as exhibited in the drawing and which has been tested by experiments. If the perforated
110

sheet is omitted altogether, then those sparks which do not strike the water immediately, will fly off into the space L and then drop. The perforated sheet is not at all essential; 5 the downward draft, as my experiments have proved, is so forcible that not a single spark will escape submersion, and no particle of a spark is seen to escape at the top of the chimney even in the darkest night. 10 The improvement of the draft can be best observed in firing up the engine. The force of the draft when running depends however in a great measure upon the power of the exhaust steam and the extent of chimney 15 above the orifice of the exhaust pipe.

The merit of the above apparatus and its novelty consists entirely in the arrangement of the downward flues and draft, combined with the water cistern, whereby the sparks 20 are at once hurried into the water without checking them by wire gauze or impeding the draft in any way.

The number of concentric flues may be doubled as is exhibited in the drawing No. 2. 25 In this instance it is required, that the case of the first ascending flue should be extended down, into the water. These repeated ascents and descents will insure the effectual immersion of all the sparks. This however 30 is well enough effected by the single downward flue. The additional advantage is a more uniform and steady draft. With reference to draft the above arrangements will be found in strict accordance with the pneu- 35 matic laws. In fact the practice followed in the construction of the Russian stoves and other flue furnaces has long since sanctioned the principle here applied.

The cistern may be supplied with water 40 by the force pump of the engine through a small feed pipe as shown at *a, a*, or by the spout at the water stations. Another pipe *b, b*, passing from the bottom of the cistern in front of the boiler through the frame 45 below, and furnished with a cock, will serve to discharge the water and accumulated

sparks. One or two little gage cocks, *c, c*, attached to the cistern will serve to indicate the level inside.

The objection* of top heaviness made 50 against most arresters, is entirely removed by the above plan. The top of the chimney terminates in a simple pipe; indeed the construction of the whole admits of such a model as to effect a decided improvement in 55 the appearance of the engine.

What I claim as new and as my original invention and wish to secure by Letters Patent, is—

The arrangement of two or more concentric flues, which may be cylindrical and in a vertical position or nearly so, to be placed around the lower part of the chimney, and connected with each other so, that those adjoining, will communicate either at the top 65 or bottom, and cause the draft to ascend and descend alternately, before escaping into the upper part of the chimney, in connection with a cistern or reservoir of water, immediately below those flues, so as to communicate with them and be common to all, 70 for the purpose of directing the sparks while passing down the descending flues, forcibly, and if required repeatedly, into the water, and thus extinguishing them, at the same 75 time improving the draft by extending the travel of the smoke, the above apparatus to be used either in connection or without a wire gauze or perforated sheet, the whole to be constructed and to work substantially in the 80 manner as set forth above. I do not claim the application of a cistern of water separately, but I claim its combination with concentric and vertical flues, as above specified, so as to cause the sparks to strike the water 85 in a vertical direction or nearly so, and repeatedly if required, and thus extinguishing them in the most effective manner.

JOHN A. ROEBLING.

Witnesses:

E. GULBRATH,
HADEN SMITH.